MEDIC TRAINING

CURRICULUM
VOLUME 2

EHSSG

EHSSG.ORG

ABBREVIATIONS USED

mg	Milligram
g	Gram
kg	Kilogram
cc	Cubic centimeter
ml	milliliter
d	Day
mn	Minutes
x	Times
/	Per
Tab	Tablet

PO	Per os (oral)
IM	Intramuscular
IV	Intravenous
PR	Per rectum
PV	Per vagina
SC	Subcutaneous
STAT	Single dose
OD	One time a day
BID	2 times a day/ 12 hourly
TID	3 times a day/ 8 hourly
QID	4 times a day/ 6 hourly

AFB	Acid Fast Bacilli
AIDS	Acquired Immune Deficiency Syndrome
ANC	Ante Natal Care
ARI	Acute Respiratory Infection
BP	Blood Pressure
CRP	C-Reactive Protein
D5W	Dextrose 5% and Saline/Water
ESR	Erythrocyte Sedimentation Rate
Hb	Haemoglobin
Hct	Haematocrit
HIV	Human Immuno-deficiency Virus
OPD	Out-Patient Department
LRTI	Lower Respiratory Tract Infection
PFT	Plasmodium Falciparum Trophozoites
PFG	Plasmodium Falciparum Gametocytes

ORS	Oral Rehydration Salts
PR	Pulse Rate
PVG	Plasmodium Vivax Gametocytes
PVT	Plasmodium Vivax Trophozoites
R/L	Ringers Lactate
RR	Respiratory Rate
SFP	Supplementary Feeding Program
TB	Tuberculosis
TFP	Therapeutic Feeding Program
URTI	Upper Respiratory Tract Infection
UTI	Urinary Tract Infection
IPD	In-Patient Department
MS	Malaria Smear
NSS	Normal Saline Solution

EAR DISEASES

OTITIS

DEFINITION

Otitis is an infection of the ear. There are two areas of the ear that can be affected:

1. Otitis Externa (outer ear).
2. Otitis Media (middle ear).
3. Labyrinthitis (inner ear) – usually viral and causes vertigo.

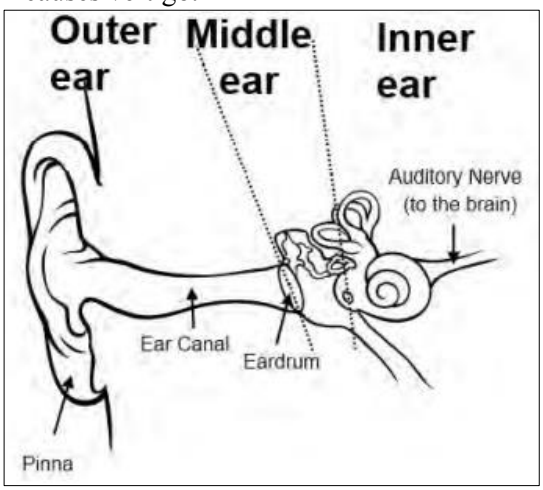


Figure - Ear anatomy

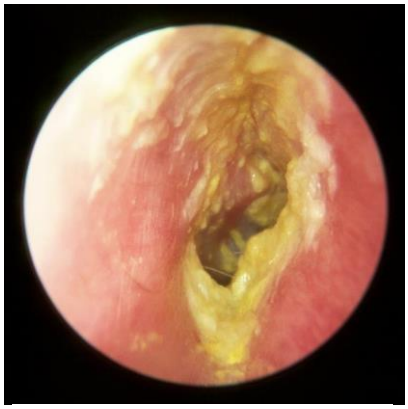


Figure - Otitis Externa

OTITIS EXTERNA

DEFINITION

Skin infection of the ear canal (the outer ear).

CAUSES

- Often no cause
- Trauma to ear canal
- Foreign body
- Skin disease e.g., eczema

SYMPTOMS

- Pain or itching of ear.
- Ear feels full.
- May have discharge that is clear or pus.

SIGNS

- Ear canal is red, swollen.
- Ear drum: looks normal.
- Sometimes fungus in the external ear canal.
- Look for foreign body.

Babies and small children cannot explain that they have ear pain. Check the ears each time they have fever, vomiting, crying, agitation, or diarrhoea.

TREATMENT

1. **If can see the ear drum well and there is no perforation**: clean the ears with **sterile water** or **NSS,** especially when there is pus or fluid.
2. **If cannot see the ear drum well: Dry mop the ear.**
   a. Educate the mother that is important to dry the ear.
   b. Use a clean, absorbing cotton cloth or soft strong tissue paper for making a wick. Do **NOT** use a cotton-tipped applicator, a stick or paper because little pieces can fall in the ear and make the infection worse.
   c. Place the wick in the child's ear until the wick is wet.
   d. Replace the wet wick with a clean dry one.
   e. Repeat these steps until the wick stays dry. Then the ear is dry.
   f. Repeat this process 3 times per day; continue until the ear is dry.

Figure - How to make wick for drying ears

3. Explain need to avoid getting the ear wet e.g., no swimming, be careful when washing.
4. If a foreign body is present, do not push it with cotton, but clean gently with oil until it comes out (sometimes this will need to be repeated for 2-3 days).
5. Apply cadexin or other topical antibiotic drop with a cotton bud. Some ear drops, like **cadexin,** have steroids to decrease swelling. If not available, you can use **prednisolone** 20mg PO stat dose to decrease severe swelling.
6. Repeat this local treatment every day until cured (usually 3 to 5 days).
7. Treat the fever and the pain with **paracetamol**.
8. If no improvement after 5 days, give PO **cloxacillin**.
9. If it is difficult to clean the ear (especially with severe fungal infection) consider referral to an ENT specialist.

LOCALISED OTITIS EXTERNA

DEFINITION

A boil, furuncle, or abscess at the entrance of the ear canal.

CAUSES

Infection of a hair follicle, gland, or sebaceous cyst, most often from Staphylococcus aureus.

SIGNS AND SYMPTOMS

- Pain
- Localized swelling or abscess
- Redness
- Pus from a perforated tympanic membrane can cause otitis externa.

TREATMENT

- Apply antiseptic ointment daily (gentian violet or povidone)
- Incision and drainage of abscess.
- If the infection is severe, give cloxacillin PO or IV depending on the severity of infection.
- Use paracetamol or ibuprofen for pain control.
- Counsel the patient not to pick the ears with pins, toothpicks, or fingernails. Avoid getting water into the ear.

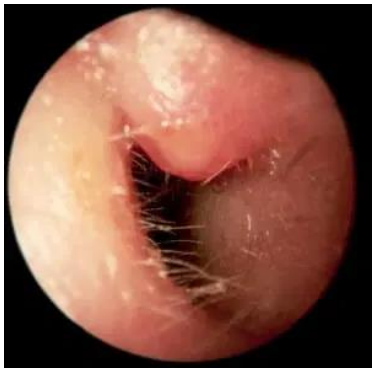


Figure - Localized Otitis Externa

ACUTE OTITIS MEDIA

DEFINITION

Acute bacterial or viral infection of the middle ear (behind the ear drum). Not common in adults.

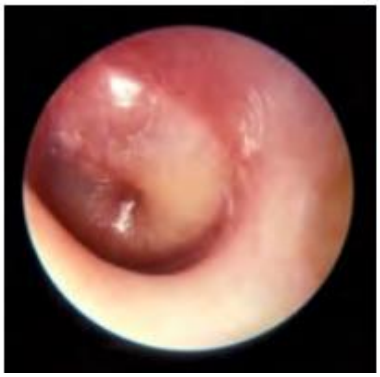


Figure - Acute Otitis Media

SIGNS AND SYMPTOMS

Rapid onset of severe pain (mostly at night), fever, ear discharge.

Ear drum: red, bulging (swollen), may be perforated with pus discharge.

Red ear drum without bulging perforation = viral otitis if have URTI symptoms e.g., sore throat, runny nose.

Air bubbles and intact ear drum without signs of acute infection = otitis media with effusion.

TREATMENT

- Treat the fever and pain with paracetamol.
- Note: Do not clean the ear with NSS if the ear drum is perforated or the ear drum cannot easily be seen and cannot confirm if normal. The NSS may enter the middle ear if the ear drum is perforated.

Antibiotics:

- Most cases of acute otitis media are caused by viruses so not everyone needs antibiotics.
- Do not give antibiotics on first presentation* if NO RISK FACTORS. Often, symptoms improve without treatment, if possible, re-examine the ear within 48-72 hours before deciding to give antibiotics.

Give antibiotics to all with RISK FACTORS:

- Children < 2 years.
- Severe infection e.g., vomiting, fever > 39°C, severe pain.
- Special circumstances e.g., malnutrition, ear malformation, immunodeficiency e.g., HIV.
- If antibiotics not given initially, re-assess at 48-72 hours, prescribe antibiotics if no improvement or worsening of symptoms.
    - **1st Line: Amoxicillin**, use dose for severe infection (Adult: 1gm TID, Child: 80-100mg/kg/day divided BID).
        - Treat for 5 days, continue for longer if severe infection or not better.
        - If not better in 72 hours (3 days) and the fever and/or ear pain is continuing, then switch to **co-amoxiclav.**
    - **If allergy to amoxicillin**, treat with **erythromycin or doxycycline.**
- It will take 4 weeks for the ear drum to look normal on physical examination.
- Parents of children with otitis media should stop smoking.

If concerned that the child will not follow up or the family will try to buy antibiotics or traditional medicine, then give antibiotics on first presentation.

COMPLICATIONS

- Same as for acute **mastoiditis**.

ACUTE MASTOIDITIS

DEFINITION

Necrosis and infection of the air cells in the mastoid bone.

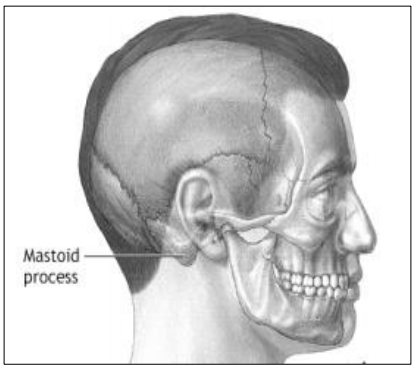


Figure - Anatomy of mastoid bone

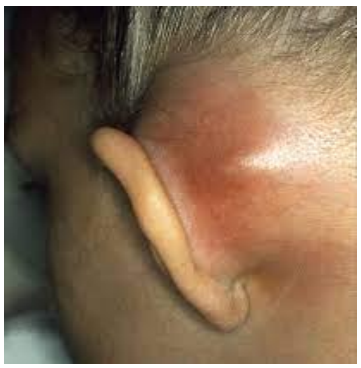


Figure - Mastoiditis

CAUSES

An acute mastoiditis can develop after persistent or inadequate treatment of acute otitis media, if patient has low immunity or if the bacteria is very virulent (strong and spreads easily in the body). The most common bacterial causes in children are ***Strep. pneumoniae, Strep.. pyogenes, and Staph. aureus.*** In adults the most common bacteria are ***Pseudomonas aeruginosa*** and ***S. aureus***. When hygiene is poor, ***E. coli, K. pneumoniae, Proteus species.***

SIGNS AND SYMPTOMS

- Persistent or increasing fever or pain when on otitis media treatment.
- Pain, especially over mastoid area, infants may have only irritability.
- Redness or swelling.
- Otitis media on examination of the tympanic membrane.
- Swelling of the posterior superior part of the ear canal in front of the tympanic membrane.
- Sometimes patients have no symptoms.

TREATMENT

- Antibiotics**:**
  - **Ciprofloxacin** 500mg BID or **Ceftriaxone** 1gm IV daily (high dose for severe infection).

  OR
  - **Benzylpenicillin** (50,000 units/kg IV QID) and **Chloramphenicol** (25 mg/kg IV or IM QID).
  - If there is not improvement or if you suspect P. aeruginosa, discuss with doctor to use a different antibiotic (e.g. Penicillin/cephalosporin +Aminoglycoside or Carbapenem + Quinolone + Aminoglycoside).
- Refer to hospital if possible. An ear nose throat (ENT) specialist doctor should perform a mastoidectomy.
- If referral is not possible, perform an incision and drainage of the abscess. If needed, change the antibiotics after you have the pus culture and sensitivity results.

COMPLICATIONS

- Osteomyelitis.
- Facial nerve palsy.
- Labyrinthitis.
- Hearing loss.
- Meningitis.
- Brain abscess.
- Venous sinus thrombosis (blood clots in brain blood vessels)

CHRONIC OTITIS MEDIA

DEFINITION

Chronic suppurative otitis media is chronic discharge from middle ear with ear drum perforation.

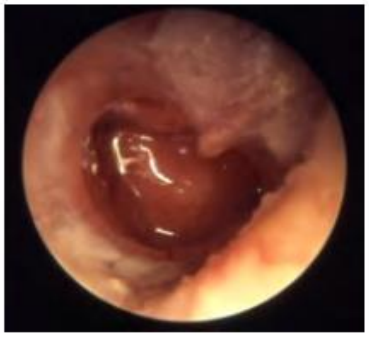


Figure - Chronic (Sappurative Otitis Media)

SIGNS AND SYMPTOMS

- Pus discharge for more than 2 weeks.
- Often associated hearing loss or deafness.
- No fever, no pain.
- Perforated ear drum with pus discharge.

TREATMENT

- If fever and pain: treat for acute otitis media.
- **Dry mop the ear**.
- **Do not send ear swab**.
- **Apply antibiotic drops** (this may not be needed)
- **Ciprofloxacin**
  - Child: 2 drops BID until no more pus/discharge usually 2-4 weeks.
  - Adult: 4 drops BID for 2-4 weeks.

- If no other options, consider **chloramphenicol** (2-3 drops 2-3 times per day).
- Apply drops after cleaning ear.
- After applying drops get the patient to lie on their side with infected ear upwards, press down on the tragus of the ear (bit of ear at front of ear canal) several times.

If no fever or pain, oral antibiotics are NOT the best treatment for chronic suppurative otitis media. The best treatment is to dry mop and clean the ear (with or without antibiotic ear.)

- If no local treatment is available, use amoxicillin oral for 2 weeks.

Cadexcin (dexamethasone and neomycin) is another option – it can cause **ototoxicity (deafness).**
Do not use more than 2 weeks.
Discuss with doctor before using, may need to try oral antibiotics before giving **cadexcin.**

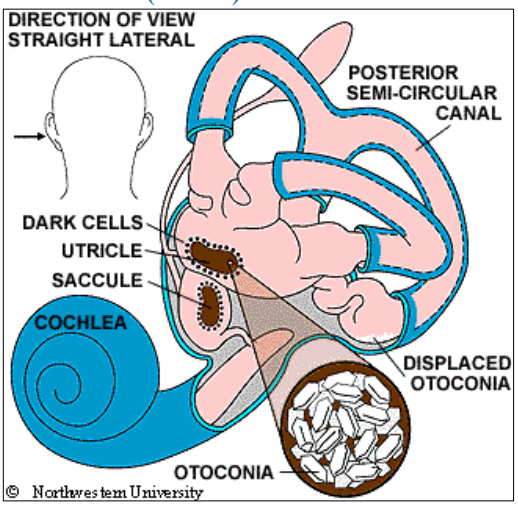
COMPLICATIONS

Mastoiditis other complications same as for mastoiditis.
Note: Think of tuberculosis if the symptoms are chronic and do not respond to treatment.

PREVENTION

Early treatment of acute ear infections may decrease the risk of chronic otitis media and mastoiditis. Parents of children with otitis media should stop smoking.

BENIGN PAROXYSMAL POSITIONAL VERTIGO (BPPV)



BPPV is a disorder arising from a problem in the inner ear, which is a vital part of maintaining balance. **BPPV** produces a sensation of spinning called vertigo that is both paroxysmal and positional, meaning it occurs suddenly and with a change in head position.
Usual onset: Age from 50 years – 70 years
Duration: Episodes less than a minute.

SYMPTOMS

- Paroxysmal (suddenly)
- Positional (change in head's position: looking up, or rolling over and getting out of bed)
- Vertigo (spinning dizziness)
- **Nystagmus** (Eye rotates towards the affected ear in a beating or twitching fashion).
- **Pre-syncope** (feeling faint).
- **Syncope** (fainting).
- Nausea.
- Vomiting.

CAUSES

- Within the labyrinth of the inner lie collections of calcium crystals known as otoconia or otoliths. In people with BPPV, the otoconia are dislodged from their usual position within the utricle, and overtime, migrate into one of the semicircular canals (the posterior canal is most commonly affected due to its anatomical position).
- The heavier otoconial debris (ear rocks) causes abnormal endolymph fluid displacement and sensation of vertigo **(canalithiasis)**.
- In rare cases, the crystals can adhere to cupula, rendering it heavier than the surrounding endolymph. Upon reorientation of the head relative to gravity, the cupula is weighted down, and the semicircular canal afferent nerves are excited immediately (**cupulolithiasis**).
- **BPPV** may be made **worse by:**
  - Lack of sleep
  - Stress
  - Diarrhoea
  - Migraine
  - Labyrinthitis
  - Head trauma
  - Meniere's disease

TREATMENT

1. **Epley maneuver** (*www.FauquierENT.net - Video*)
2. Semont **maneuver** (*www.FauquierENT.net - Video*)
3. **Brandt Daraff exercises** (*www.FauquierENT.net -Video*)
4. **Medication** may be **considered** in acute, severe exacerbation of **BPPV**.
   Antihistamine:
   1. **Meclizine** 25-100mg per day in divided doses **OR**
   2. **Cinnarizine** 25mg TDS as needed **OR**
   3. **Benadryl** (diphenhydramine) 2 tsp or 25mg every 6 hourly as needed **OR**
   4. **Promethazine** (Phenergan) 12.5 mg **TDS**.

Surgery: Labyrinthectomy.
Prognosis: Resolves in days to months.

CHOLESTEATOMA

DEFINITION

A mass made of epithelial cells in the middle ear or mastoid. The epithelial cells come from the external canal.

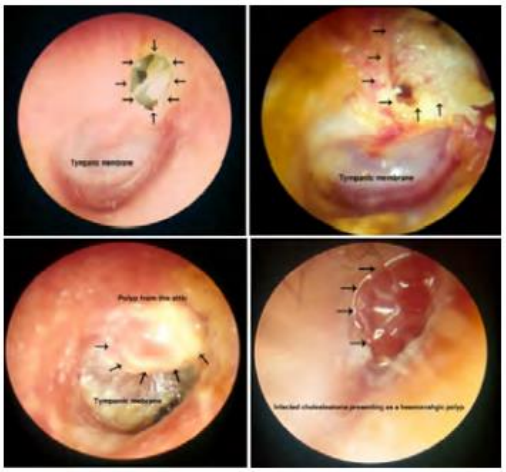


Figure - Cholesteatoma

RISK FACTORS

- Eustachian tube dysfunction (tympanic membrane is retracted)
- Recurrent otitis media.
- Tympanic membrane perforation and chronic suppurative otitis media
- Downs syndrome (often have eustachian tube dysfunction).
- Cleft palate.

SIGNS AND SYMPTOMS

- White mass behind tympanic membrane which can grow for many years. Can grow into the bone.
- Some patients have no symptoms.
- Hearing loss (especially if unilateral/one side or in children).
- Pus from ear >2 weeks after appropriate treatment.

TREATMENT

1. The main treatment is surgical, so these patients need referral to an ENT specialist if possible.
2. Antibiotics if infection suspected. Discuss antibiotic choice with doctor.

COMPLICATIONS

- Infection of the cholesteatoma ***(Staph. aureus, P. aeruginosa, Proteus species, Bacteroides, TB***).
- Hearing loss.
- Cranial nerve palsy (Abducens and Facial nerves).
- Brain abscess
- Meningitis

AURICLE AND PINNA PROBLEMS

Leprosy can cause painless nodules on the auricle.

CELLULITIS

(Also called perichondritis)

DEFINITION

Infection of the auricle caused by skin flora and sometimes ***Pseudomonas***.
The auricle is mostly cartilage so there is not much blood flow to the area. This can slow down the healing process.

SIGNS AND SYMPTOMS

- Warm
- Red
- Swelling
- Pain

TREATMENT

- **Cloxacillin** PO x 7 days. There is a risk for treatment failure because of the low blood flow to the cartilage.
- Follow up daily until there is improvement.
- If symptoms are moderate to severe or if there is no improvement, start **cloxacillin** IV.
- If not improving, consider adding antibiotics that treat pseudomonas (e.g., ciprofloxacin).

TRAUMA TO THE AURICLE

DEFINITION

Haematoma or laceration of the auricle. Chronic trauma to the ear can cause chronic **Haematoma** which becomes a painless 'cauliflower ear'.

SIGNS AND SYMPTOMS

(a) Acute Haematoma.
(b) Without treatment, the Haematoma becomes chronic and
(c) May develop into **'cauliflower ear.**

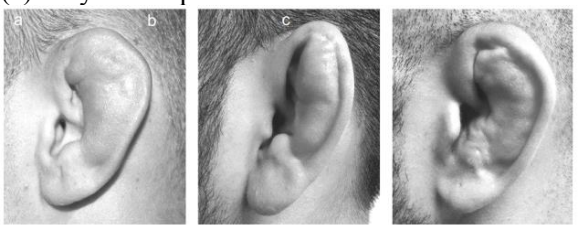


Figure - Haematoma of the auricle

TREATMENT

1. Laceartions

a. Clean well.
b. Suture using a small sized suture and needle (e.g., 5.0 or 6.0)
c. Do not use anaesthetics that contain adrenaline (epinephrine). This can cause decreased blood flow from vasoconstriction and necrosis of the auricle.

d. REMEMBER to consider tetanus vaccination. If the wound is contaminated, you may need prophylactic antibiotics or close follow up without antibiotics. For bites, think of rabies vaccine, antibiotics, and additional investigations (e.g., Hepatitis B, HIV)

2. Hematoma

a. If < 2 cm and < 48 hours from time of trauma, do needle aspiration.
b. You may refer if the hematoma is > 2 cm and or > 48 hours from the time of trauma. If possible, you can do incision and drainage. If there is still bleeding, put an 18-gauge catheter inside to let the hemato continue to drain. Remove the catheter when there the bleeding has stopped.
c. If trauma was > 7 days ago only observe the patient. They may develop 'cauliflower ear'

EYE DISEASES

Note: Some eye diseases can be treated at all clinics, and some diseases need treatment from centers that have specially trained medics and doctors.

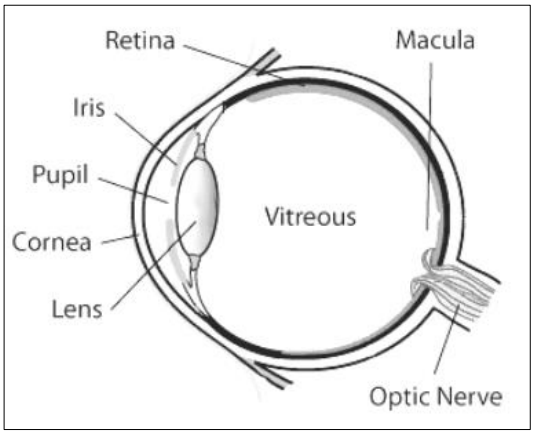


Figure - Anatomy of the eye

POOR VISION ALL OF THE TIME

Poor vision is a common problem. A person with poor vision may have a disease of the eye or needs eyeglasses. Some causes of poor vision can be diagnosed by careful examination of the eye (cornea scars, cataracts, obvious infections etc.).
Children with poor vision may have strabismus or "lazy eye" when only one eye is affected. If the poor vision is not treated with eyeglasses, the strabismus will become permanent. If both eyes are affected, there may not be any strabismus, but they should still be diagnosed and treated.

POOR NEAR VISION (LONGSIGHTEDNESS)

The patient cannot see close objects (poor near vision). Usually gets worse with age.
Longsightedness can be divided into two groups depending on age:
People under the age of 40 with poor near vision are diagnosed with **Hyperopia**. This can be corrected with plus power lens eyeglasses.
Almost all people over the age of 40 will have poor near vision. Activities such as reading and sewing become difficult or not possible. Poor near vision from old age is normal and is called **Presbyopia.** This can be helped with reading glasses (plus power lens eyeglasses).

POOR LONG-DISTANCE VISION (SHORTSIGHTEDNESS)

The patient cannot see far away objects. Close objects can be seen clearly e.g., schoolchildren who cannot read the blackboard. This is called **Myopia** and can be corrected with minus power lens eyeglasses.

POOR VISION AT DUSK AND AT NIGHT

Night blindness is one of the early signs of vitamin A deficiency. On the Thailand-Myanmar border this is often referred to as 'chicken blindness'. Night blindness is more common in young children but can also occur in adults. People with this condition suffer from particularly poor vision at dusk when it is just getting dark. For treatment, see the Vitamin A Deficiency section of these guidelines.

A PINHOLE test can help to know if a person needs eyeglasses. First test patient's vision (Snellen chart or read a paper). Then make a very small hole in a piece of paper. Test vision again with the PINHOLE. If vision improves with the pinhole, then the patient needs eyeglasses

Figure - Pinhole test to check if need eyeglasses

EYE INFECTIONS

CONJUNCTIVITIS

DEFINITION

Can be caused by a bacterial or viral infection, or an allergic reaction of the conjunctivae of one or two eyes. It is sometimes difficult to diagnose if an eye inflammation is due to infection (bacterial or viral), allergy, irritation, or other causes.

SIGNS AND SYMPTOMS

Red eye
Bacterial conjunctivitis: often pus discharge, eyelids stuck together on waking up, infection of one eye at the beginning, usually responds to Terramycin Eye Ointment (TEO).
Viral conjunctivitis: watery secretions, no itching, does not respond to TEO, usually disappears within one week without complications. In the rainy season there are often outbreaks of viral conjunctivitis. For example, this may affect up to 20- 30% of the camp population.
Allergic conjunctivitis: usually both eyes, lots of tears, eyelid oedema, itching, does not respond to

TEO, reduce symptoms by washing eyes with clean water.

Congenital conjunctivitis: due to *Neisseria gonorrhoea* or *Chlamydia* if child born to infected mother (if suspect discuss with doctor)

Figure – Conjunctivitis

Viral and allergic conjunctivitis do not respond to treatment with Terramycine Eye Ointment (TEO), but the ointment will relieve symptoms and will prevent secondary bacterial infection.

Bacterial and viral conjunctivitis can be very contagious. Wear gloves when examining and/or wash hands well afterwards

DIAGNOSIS

The diagnosis of conjunctivitis is based on the clinical examination.

TREATMENT

- First choice medication for conjunctivitis is **Terramycine Eye Ointment (TEO).**
- Although TEO contains tetracycline (similar to doxycycline), it is safe to use ointment in children, pregnant and breast-feeding women.
- Antibiotic ointment **TEO**: apply QID until two tubes are finished.
- If do not have or no response to TEO: use **chloramphenicol (1 drop 6 times per day).**
- Hot compresses may help reduce swelling.
- Show your patient how to put ointment or drops in the eye. Mothers may need to help their children putting eye ointment or drops in the eyes.
- Tell the patient to wash their hands and face before and after touching the infected eye.
- Ask the patient to return if the eye is not better after finishing treatment.
- Never patch an infected eye.

Refer If serious eye infections, infections involving the cornea and infections, refer.

PREVENTION

The patient should not touch the face or eyes with their hands.

Wash hands regularly.

TRACHOMA

DEFINITION

Trachoma is a highly contagious eye infection caused by the bacterium ***Chlamydia trachomatis*.** However, occasionally active infections are found in children, and adults who care for children. Most people will not be aware that they are infected. Trachoma is more common when sanitation and hygiene are not good. Health education and prevention are an important part of controlling infection.

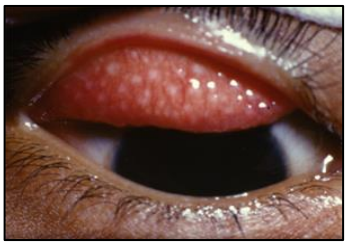


Figure: Trachoma

With repeated infections over a lifetime, trachoma can cause blindness.

SIGNS AND SYMPTOMS

There are **different stages of infection:**

Follicles (small bumps) → eye lid becomes inflamed → scar tissue forms → scarring of the cornea.

This scarring can cause loss of vision and make the eye more likely to get infected by bacteria or viruses.

DIAGNOSIS

Made by external eye examination and checking the patient's medical history. Look underneath the upper eyelid for the presence of follicles, signs of inflammation, the direction of the eyelashes and at the cornea.

TREATMENT

Treatment of (Acute phase) follicles and inflammation:

- Clean eyes and face several times per day.
- **Azithromycin:** Adult: 1g STAT, Child: 20mg/kg STAT give dose for patient and all of family.
  - Can also use TEO in early stage to make eyes more comfortable.
- If not better, give **TEO** BID for 6 weeks.

Check all other family members for possible infection.

Advise the patient to return to the clinic when treatment is finished for re-assessment, because sometimes the treatment needs to be repeated.

Treatment of (Late phase) scarring:

- In the later stages of trachoma, the primary infection may be gone but there is damage underneath the eyelid (scarring) and the eyelashes may turn in (trichiasis), causing damage to the cornea (corneal opacity).

- In most cases surgery is helpful. These patients should be referred to a medic who has had eye training.
- While waiting for surgery, you can tape eyelashes to eyelid using thin strip of sticking plaster. This protects the cornea, but it is important that the patient can blink, and the eyelid can open and close perfectly. Replace the plaster when it starts to peel off (usually once a week), continue for 3 months. If the eyelid cannot close completely when the patient blinks, the cornea will become too dry and have risk for ulceration and infection.

Note: Do not remove eyelashes with forceps. This is now not recommended.

SAFE STRATEGY: TREATMENT AND PREVENTION

The SAFE Strategy is a public health approach to try to educate on treatment and prevention of trachoma.

- **S**urgery
- **A**ntibiotics (to treat the infection).
- **F**acial cleanliness (hygiene).
- **E**nvironmental change (increase access to clean water and sanitation).

PREVENTION

The patient should not touch the face or eyes with their hands.
Wash hands regularly.
Health education on hygiene and sanitation.

CELLULITIS OF THE EYE

DEFINITION

Infection of the skin around the eye (periorbital/pre-septal cellulitis) OR of the orbit (orbital cellulitis). Periorbital/pre-septal cellulitis occurs in the area anterior to the orbital septum. Orbital cellulitis occurs in the fat and ocular muscles posterior to the ocular septum. Both can cause eyelid swelling and redness, but the prognosis and treatment are different. Orbital cellulitis is less common than periorbital cellulitis but is more severe and can cause vision loss.

CAUSES

Trauma (including orbital fracture), insect or animal bites, foreign body, upper respiratory infection, infection of the tear duct, or sinusitis. Sinusitis is the most common cause of orbital cellulitis.

SIGNS AND SYMPTOMS

- **Periorbital (pre-septal) cellulitis – anterior to orbital septum**
- Fever
- Eye pain
- If there is pain with eye movements, think of orbital cellulitis.
- Swelling and redness of the eyelid or skin around the eye.

- **Orbital cellulitis – posterior to orbital septum**.
- Fever
- Swelling and redness of the eyelid or skin around
- the eye may or may not be present.
- Double vision
- Pain with eye movement
- Eye muscle weakness causing strabismus.
- Proptosis (eyeball is pushed forward).

Swelling of conjunctiva.

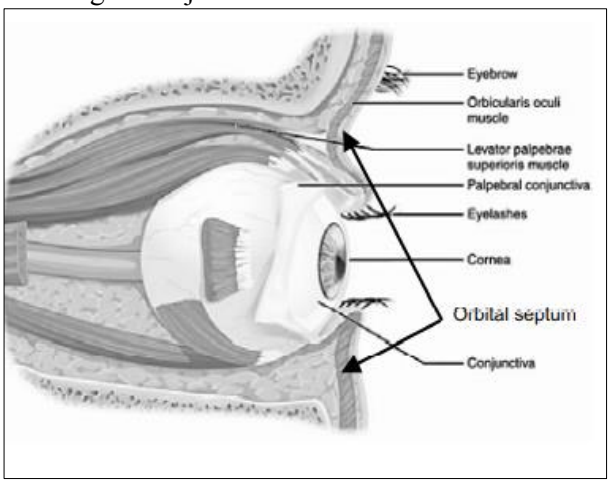


Figure - Anatomy of the orbital septum

TREATMENT

- Take routine **blood samples (e.g., CBC, CRP, blood culture).**
- If suspect periorbital/pre-septal cellulitis, treat mild infection with **Augmentin (amoxicillin-clavulanate).** Follow up should be scheduled regularly until the patient is improving. If moderate infection, admit to IPD and start **Ceftriaxone and Metronidazole.**
- If suspect orbital cellulitis admits to IPD and start **Ceftriaxone or Cefotaxime, and Metronidazole.**
- Ask every day about change in vision, double vision, and eye pain.
- Daily examination for visual acuity, pupil light reflex.
- If the patient is admitted, discuss the case with the doctor. The doctor may add or change antibiotics and may want to take other investigations.

Complications are more common with orbital cellulitis (abscess of eye or periosteum, loss of vision, thrombosis, brain abscess). There is a risk that periorbital/pre-septal cellulitis can become orbital cellulitis. **If the examination becomes worse or the symptoms are not improving with treatment, think of TB, discuss with the doctor, or refer to the hospital.**

EYE INJURIES

Injuries or trauma to the eye can cause blindness or loss of the eye.

Once the injury has occurred, you must prevent secondary infection.

IMMEDIATE FIRST AID

Clean the eye carefully with a large amount of NSS or clean water. If there has been alkali in the eye e.g., cement this can cause a very severe eye problem so wash with at least 5 liters of water and make sure all the objects are removed.

DIAGNOSIS

Need to examine the eye for any foreign bodies.

- The eye will be very painful so ideally need to use anaesthetic eye drops e.g., Tetracaine 0.5%.
- If do not have special anaesthetic eye drops can use local anaesthetic e.g., 2-3 drops lignocaine instead. (**Note:** if only have lignocaine/adrenaline combination use with caution: adrenaline will cause the pupil to dilate (get bigger) which could cause an attack of angle closure glaucoma. If you use this then you must warn the patient if they get severe pain in the eye after a few hours to come back to the clinic immediately.)

If have fluorescein dye, then look at the eye under a blue light for any corneal scratches: these will show up in yellow.

TREATMENT

- Remove any foreign bodies. Look carefully at all areas of the eye especially the cornea and under the upper eyelid as this is where most foreign bodies attach to the eye.
- Apply a large amount of antibiotic ointment **(TEO).**
- If the cornea is scratched apply a pressure patch to the eye.
- Remove the patch and re-evaluate the next morning.
- Continue treatment with ointment and patching as needed.
- Never leave a patch on longer than overnight.

If an infection develops, STOP patching. A patched eye is a good place to grow bacteria.
NEVER PATCH AN INFECTED EYE

Serious injuries, where the eyeball has been opened or penetrated, should be referred to hospital. Use an eye shield (not a patch) if a patient with an open eye injury needs to be transported to another location. Mostly, these serious injuries result in blindness or loss of the eye.

CORNEAL ULCERS

DEFINITION

An ulcer on the cornea of the eye.

CAUSES

Corneal ulcers may be caused by damage to the eye. This might be very small like a foreign body in the eye (most common cause) They may be bacterial, or fungal, and can be very difficult to differentiate between the two causes clinically.

The history is important: if the injury is caused by vegetable material it is likely that the infection is fungal.

Figure – Corneal Ulcer

SIGNS AND SYMPTOMS

Very painful eye, red and watering, and often the ulcer can be seen in the cornea as a greyish area.

DIAGNOSIS

If a drop of fluorescein dye is put in the eye and the eye examined with a blue light, the ulcer will stain yellow.

TREATMENT

- If possible, refer to an eye doctor.
- Bacterial corneal ulcers may respond to antibiotic treatment, but fungal ulcers are very difficult to treat as there are no very effective antifungal agents.
- Corneal ulcers need to be treated very intensively with topical antibiotics e.g., chloramphenicol drops every hour.

DISEASES OF THE EYE

CATARACT

DEFINITION

A cataract is a condition of the eye that affects the ability to see. It can affect all or part of the lens (the part of the eye that we see through). Cataracts are probably the leading cause of blindness.

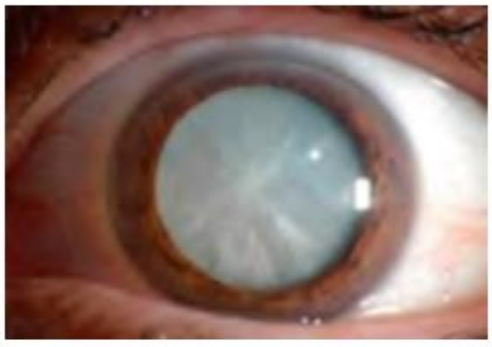


Figure - Cataract

DIAGNOSIS

When looking through the pupil: the affected lens will be cloudy white in colour. It will be difficult to see the back of the eye with an ophthalmoscope.

TREATMENT

Refer to an eye doctor who can do cataract surgery. There are no medicines that can treat cataract. Only surgery will help.

PTERYGIUM

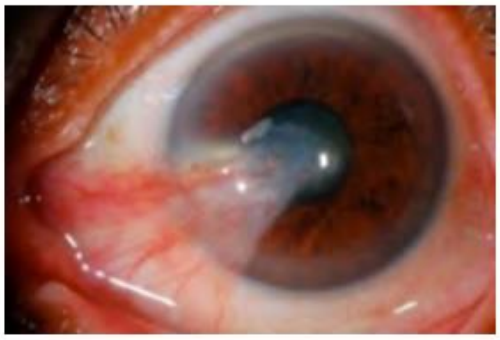


Figure - Pterygium

DEFINITION

Pterygium is the name for special tissue growth on the **cornea.** It is usually triangular in shape with the point pointing towards the center of the cornea. Most of the time the pterygium will grow onto the cornea from the nasal (nose) side of the eye. A pterygium can be white in colour, although it can also present like conjunctiva or muscle tissue. It is not known why people develop pterygium. Long exposure to sunlight is a risk factor and most patients with pterygium have a family history (genetic influence). Once a pterygium is present, it will not go away.

Pterygium is **not** an infection, there is no need to provide treatment with **Tetracycline Eye Ointment (TEO)**

TREATMENT

Surgery is the treatment and is done depending on the size of the pterygium.

- **Small pterygium:** does not need removal, because it often comes back again after surgery (in these cases it will grow back faster). Treatment for a small pterygium is to reassure the patient that this is not an infection or serious (tumour) growth.
- **Large pterygium:** can reach the pupil and affect vision. This requires surgery. When a pterygium reaches 2 or 3 millimeters from the edge of the pupil, the patient should be referred to an eye surgeon.

GLAUCOMA

DEFINITION

Glaucoma is a disease of the **optic nerve where it gets damaged because of increasing pressures inside the eye (called intra-ocular pressure (IOP)). The damage is irreversible.**

There are two types of glaucoma:

1. Acute (Closed Angle) Glaucoma: when the pressure of the eye suddenly increases which can lead to blindness within a few months. This type is much more common on the Thailand-Myanmar border.

2. Chronic (Open Angle) Glaucoma: when the eye progressively gets damaged by **high intra ocular pressure**. Some types of glaucoma are painless and progress slowly and silently.

ACUTE CLOSED ANGLE GLAUCOMA = EMERGENCY	
SYMPTOMS	Rapid onset severe pain of the eye and surrounding the eye, blurred vision, nausea, vomiting
EXAMINATION	Patient looks unwell, red eye, hazy cornea, non-reactive mid-dilated pupil usually only one eye
TREATMENT	**Acetazolamide** 500mg PO STAT and **pilocarpine 2%** 1 drop both eyes REFER PATIENT TO HOSPITAL IMMEDIATELY

DIAGNOSIS

- **Measure Intra-ocular pressure** with eye pressure tool (Schiotz tonometer): Intra Ocular Pressures (IOP) will be raised (IOP normal range 10mm - 22mmHg).
- **Check visual fields** (confrontation test): there may be visual field loss: this is irreversible.
- Look with **ophthalmoscope:** you may see optic disc cupping.
- Check **light perception** and **pupil reaction:** in advanced glaucoma, the patient has abnormal pupil reactions to light due to loss of the optic nerve.

TREATMENT

Glaucoma is an ophthalmic emergency. Patients can become blind if diagnosis and management are delayed.

- If you suspect glaucoma start treatment immediately with:
  - **Acetazolamide** (Diamox) 250mg PO QID
  - **Pilocarpine 2%** 1 drop QID for both eyes
- REFER IMMEDIATELY for surgery to avoid complete blindness.
- After surgery, patients should have regular IOP checks and control of glaucoma medication.

STRABISMUS

DEFINITION

Strabismus is when the eyes do not look in the same direction. Sometimes it is called "lazy eye"

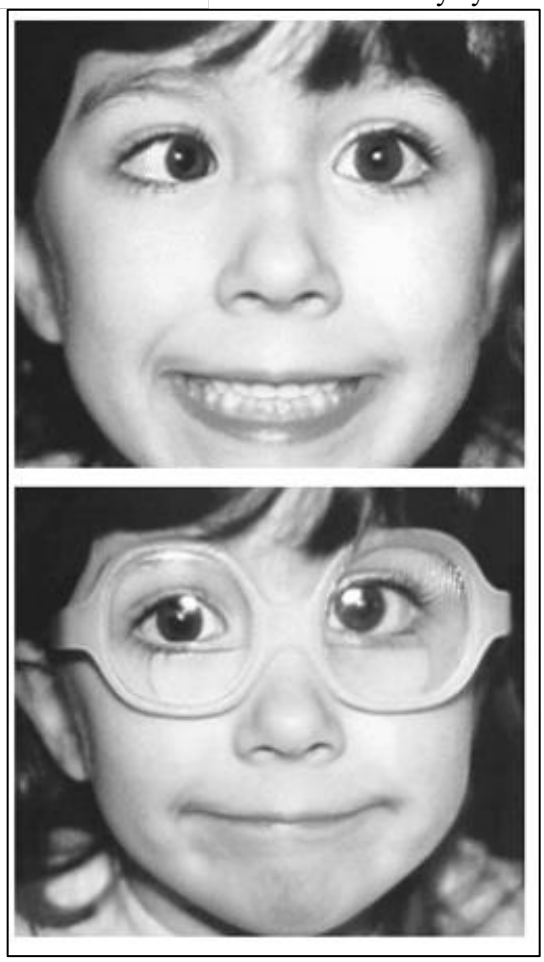


Figure: Strabismus

CAUSES

In children: Strabismus usually occurs because of poor vision but can be caused by an eye defect If not treated with eyeglasses, the strabismus may become a permanent lazy eye.

In adults: Strabismus occurs suddenly and are due to paralysis of one of the muscles. This may be caused by something very simple (abscess, Grave's disease) or be a sign of serious illness (brain cancer, TB meningitis).

DIAGNOSIS

- Often develops in a child with normal eyes when aged 3-4 years.
- Listen to the parents, as they are the most likely to notice a strabismus in an infant.
- Shine a torch from about one meter and observe the central corneal light reflex, it should appear in the same place in both eyes. The light will be nearer the nose in a divergent squint and further away in a convergent squint.
- Shine the light into the eyes while asking the patient to look at your nose, cover the eye you think is normal with your hand and observe the one you think has a squint to see if there is any movement of the eye to focus. If it does not move, there is either no squint or there is no vision in that eye.
- Children old enough to cooperate with a visual perception test should be assessed.

In children with poor vision, both eyes should move in all directions when tested. If the cause is eye muscle paralysis, the eye will not move normally during examination.

TREATMENT

If you detect a strabismus, refer the patient to an eye specialist. For children if it is not treated by 6 years of age the child can lose sight permanently in that eye.

XEROPHTHALMIA

DEFINITION

Vitamin A deficiency is a major problem (not only in diseases associated with the eyes, but also for childhood illnesses and child mortality). **Xerophthalmia** is an eye condition associated with Vitamin A deficiency. **If left untreated it can progress to irreversible blindness**. Vitamin A deficiency can occur in anyone, but usually affects children between 1 and 6 years old. Most babies who are breast-fed will not develop vitamin A deficiency.

SIGNS AND SYMPTOMS

The clinical stages of xerophthalmia:

1. **Night Blindness:** Poor vision in dusk when the sun goes down. This symptom is known as 'night blindness' or 'chicken blindness' and is often the first sign of xerophthalmia.
2. **Conjunctival dryness (Conjunctival xerosis):** Dryness of the tear layer on the conjunctiva. The conjunctiva will start to look dry and rough. Even after the patient blinks, the eyes remain dry.
3. **Bitot's spots:** Bitot's spots are bubbles or foam on the conjunctiva that usually appear close to the cornea. The spots are mostly white/grey coloured.
4. **Corneal dryness (Corneal xerosis):** It is easy to see if the cornea becomes dry as it does not reflect light well and does not look smooth.
5. **Corneal ulcer/ keratomalacia:** If the cornea stays dry too long, it is in danger of contracting bacterial or viral infections known as corneal ulcers. These can cause holes on the cornea (keratomalacia). If a patient contracts a corneal ulcer, the eye can suffer permanent vision loss.
6. **Corneal scarring:** When the cornea ulcer heals, there may be scarring which can cause blindness. Corneal scarring is permanent.

Note: Not all patients with vitamin A deficiency will develop eye complications (or the eye shows only a little drying), **but** some infections can cause

rapid deterioration and blindness can develop in just a few days. Long-term vitamin A deficiency can cause gradual damage to the eyes.

DIAGNOSIS

- Diagnosis is made by an external eye examination and investigation of the patient's medical history.
- Check for all stages of xerophthalmia in both eyes.
- Final diagnosis should be made by a medic who has been trained in eye care.
-

TREATMENT

- All cases of corneal dryness should be given 2 tubes of TEO to prevent the cornea from becoming ulcerated or infected.
- Apply BID and protect eye with an eye pad after each application.
- All patients seen with corneal ulcers/ keratomalacia must be seen by a doctor.

Vitamin A treatment

Children less than 6 months Day of diagnosis (D 1) 50,000 IU Next day (D 2) 50,000 IU One week later (D 8) 50,000 IU
Children between 6 and 11 months (<8 kg) Day of diagnosis (D 1) 100,000 IU Next day (D 2) 100,000 IU One week later (D 8) 100,000 IU
Children aged 1 year and older and adults (>8 kg) Day of diagnosis (D 1) 200,000 IU Next day (D 2) 200,000 IU One week later (D 8) 200,000 IU
Women of reproductive age 25,000 IU once a week **for 8 weeks**

Vitamin A capsules are available in two sizes: 200,000 IU (International Units) and 25,000 IU capsules. Read the bottle for the strength of the capsules. Write down carefully on the record the date and dose of treatment.

Treatment for pregnant woman

*In case of **night blindness and Bitot's spot:** Vitamin A 10,000 IU PO daily OR 25,000 IU PO per week for at least 4 weeks
*In case of **corneal dryness** and **corneal ulcer**/ **keratomalacia** risk of blindness outweighs risk to **baby:** Day of diagnosis (day 1) 200,000 IU Next day (day 2) 200,000 IU 1 Week later (day 8) 200,000 IU (This schedule should only be given by a DOCTOR) Also treat for cornea dryness with TEO as above

PREVENTION

Distribution of vitamin A capsules to each child every 6 months is effective in prevention of Vitamin A deficiency, especially in children with measles, severe diarrhoea, or severe respiratory tract infection.

PREVENTION OF XEROPHTHALMIA VITAMIN A DEFICIENCY

- Newborn
  - Vitamin A 50,000 IU at birth.
- Less than 6 months (if not given at birth)
  - Vitamin A 50,000 IU.
- Children 6 months to 1-year
  - Vitamin A 100,000 IU. Every 4-6 months.
- Children 1 year and up
  - Vitamin A 200,000 IU. Every 4-6 months.
- Women of childbearing age
  - Vitamin A 200,000 IU (give within 1 month of birth).

Document every time when giving a child **vitamin A**. Overdose can cause raised intracranial pressure, impaired consciousness, convulsions Give all children with measles **vitamin A**.

DENTAL DISEASES

DISEASES OF GUMS AND TEETH

The most common problems are infections in the tooth (dental caries) and inflammation of the gums (gingivitis).

Both disorders are the result of lack of daily cleaning of teeth and gums and may eventually cause tooth loss.

Note: For most dental conditions it is important to seek trained help from a dentist. Here is a brief overview of some conditions.

DENTAL CARIES

Cavities in the tooth that can be complicated by local infections.

RISK FACTORS

1. Sugar rich diet
2. Poor teeth strength
3. Infrequent or no teeth cleaning.

SIGN AND SYMPTOMS

1. Black coloration and tooth erosion.
2. Usually pain, especially when eating or drinking cold foods.

TREATMENT

- In cases of constant pain, look for a specific source (tooth).
- Treat the pain with paracetamol
- Treat any swelling with ibuprofen and antibiotics (amoxicillin and metronidazole). If swelling is reduced refer to dental team.
- If there is no swelling but constant pain, refer to the dental team.
- The most effective treatment is to fill the cavity OR to extract the tooth. Refer to trained dental team.

PREVENTION

- Daily cleaning of the teeth and gums.

GUM DISEASES

Gum diseases do not cause much pain, so people may not realize that there is a problem.

GINGIVITIS

Inflammation of the gums around the teeth. This is the most common oral disease.

SIGNS AND SYMPTOMS

Red and swollen gums, bleeding while brushing, bad mouth smell.

TREATMENT

1. Daily cleaning of teeth and gums.
2. Chlorhexidine 0.2% mouthwash or saltwater mouthwash.

PREVENTION

(1) Daily cleaning of teeth and gums.
(2) Removal of calculus (dental plaque) by dental team.

PERIODONTITIS

A bacterial infection of the supporting structures of the teeth.

SIGNS AND SYMPTOMS

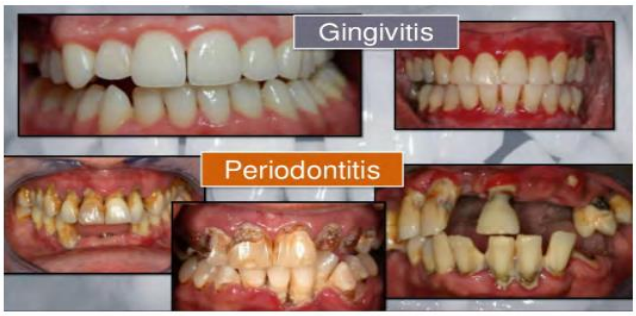
Pain, fever, swelling of the gums and/or pus Mobility of the infected tooth.

TREATMENT

(1) Daily oral hygiene.
(2) Oral amoxicillin and metronidazole
(3) Extraction of the affected tooth.

PREVENTION

1. Daily cleaning of teeth and gums.
2. Removal of calculus (dental plaque) by dental team.



GINGIVITIS AND PERIODONTITIS

LOWER MOUTH AND NECK INFECTIONS

SUBMANDIBULAR SPACE INFECTION

DEFINITION

Bacterial cellulitis of the area below the tongue (submandibular and submaxillary area). This is also called **Ludwig's angina**. The infection is located at the floor of the mouth and can spread rapidly. It is bilateral.

SIGNS AND SYMPTOMS

- Fever and chills
- Mouth pain, painful swallowing, muffled voice
- Swelling of the tongue and submandibular area
- NO lymphadenopathy
- This can be life threatening if the airway is blocked (drooling, stridor, or cyanosis)

RISK FACTORS

- Infection of dental caries
- Trauma to the bottom of the mouth
- Often patients have other diseases like HBP, diabetes or HIV.

TREATMENT

- Refer immediately if the patient has stridor or respiratory distress.

- Take CBC and blood cultures before starting antibiotics.
- Start treatment with IV antibiotics (total antibiotics IV and PO is 2-3 weeks):
  - **Ceftriaxone PLUS Metronidazole**. Can use **Clindamycin** in PCN allergic patients.

PREVENTION

Maintain good health of the teeth and gums by brushing teeth twice daily with fluoride toothpaste.

LYMPHADENITIS

DEFINITION

Infection of the lymph nodes around the ears or neck region. Lymphadenitis may be caused by many things. It is important to take a good history.

SIGNS AND SYMPTOMS

- Warm, red, or painful lymph nodes. They can be unilateral or bilateral. If the lymph nodes are very large (>1cm) consider other bacterial causes.
- Fever.
- Look for skin lesions and dental health because this may help to determine the cause of lymphadenitis.

CAUSES OF LYMPHADENITIS (OR LYMPADENOPATHY)

- BACTERIAL: THE MOST COMMON CAUSE IS Staphylococcus aureus. Other bacteria that commonly cause lymphadenitis are ***mycobacteria (TB), Group A streptococcus*** (like strep throat), or ***Bartonella henselae*** (cat scratch disease).
- Viral: Epstein-Barr virus (EBV), Herpes simplex virus.
- Other: non-painful lymphadenopathy can be caused by cancer (lymphoma).

DIAGNOSIS

- The diagnosis of lymphadenitis is made clinically. Ultrasound can help to see if the lymph node contains fluid.
- Ask about immunization status, ill contacts (e.g. viral infections or tuberculosis), exposure to animals. This can help determine the cause of lymphadenitis and what antibiotic to use.

TREATMENT

- In mild cases, no bloodwork is needed.
- If the patient appears unwell, take a CBC, CRP, and blood culture. Consider checking the patient for tuberculosis.
- Treat with Cloxacillin (oral or IV). Clindamycin is an alternative treatment in severe cases or if a patient has a PCN allergy.
- If there is no response to the above treatment, discuss with a doctor for advice on management.

TRAUMA

If a permanent tooth is knocked out it should be replaced (pushed back into the socket) as quickly as possible.

Do not replace children's milk (primary) teeth that have been knocked out.

TREATMENT

Treat the pain with **paracetamol**

1. Put permanent tooth back. Make sure that patient can close his mouth in normal position. If not, align the tooth in place.
2. Advice the patient to avoid solid food for 2 weeks so must have soft food only.

STOMATITIS

DEFINITION

A disorder of inflammation of the oral mucosa. It usually heals in about 10 days after starting treatment or removing the cause. Discuss with doctor if lesions do not disappear or return within 2 weeks, the patient may need investigation for immunodeficiency e.g., HIV.

Figure for stomatitis

SIGNS AND SYMPTOMS

- Pain with difficulty eating because of inflammation or ulcers in the mouth.
- Nausea, vomiting.

CAUSES OF STOMATITIS

1. **Fungal** e.g., candidiasis (oral thrush) white patches on tongue, inside cheek (may spread to pharynx) - occurs frequently in infants, malnourished children, diabetic patients, and immunosuppressed patients e.g., HIV, cancer. Can also occur if patients who take steroid inhaler e.g., budesonide do not wash their mouth out after using inhaler.
2. **Viral** e.g., herpes stomatitis.
3. **Vitamin Deficiencies** especially if inflammation of corners of the mouth (angular stomatitis).
4. **Trauma.**
5. **Systemic diseases.**

TREATMENT

- Maintain feeding and hydration. When necessary use nasogastric tube.
- Treat according to the likely cause of the stomatitis:

1. **Fungal infections**: like thrush **(Candidiasis): Nystatin** give 1 lozenge to be sucked QID for 7 days or 1ml of oral suspension (100,000 IU) QID for 7 days (total 400,000 IU per day). Oral suspension should be swilled around mouth and then swallowed.
2. **Viral infections:** wash the mouth with **warm salty water** and treat with **gentian violet.** If there is secondary bacterial infection, wash mouth with **chlorhexidine** 0.2% and treat with **amoxicillin.**
3. **Vitamin Deficiencies:** replace deficiencies.

Note: Viral infections such as primary and **secondary herpes** should be treated with supportive care only and these are generally self-limiting, with a two-week duration. Chlorhexidine and antibiotics do not help in viral infections and may complicate oral thrush.

PREVENTION

If taking corticosteroid inhaler e.g., budesonide advise to wash mouth out (take water in mouth and spit out water – do not swallow) after each use. Educate about good diet.

ORAL CANCER

DEFINITION

Cancer that forms in tissues of the oral cavity (the mouth) or the oropharynx (the part of the throat at the back of the mouth).

Note: Approximately 85 to 95% of all oral cancer is squamous cell carcinoma (SCC).
Other malignant lesions that can be found in the oral cavity are sarcoma, minor salivary gland tumors, mucosal melanoma, lymphoma and other metastatic disease from nearly any sites in the body.

SIGNS AND SYMPTOMS

1. Swellings on the lips, gums, cheek, or other areas inside the mouth
2. Velvety white, red, or speckled (white and red) patches in the mouth
3. Unexplained bleeding in the mouth
4. Unexplained numbness, loss of feeling, or pain/ tenderness in any area of the face, mouth, or neck
5. Persistent sores on the face, neck, or mouth that bleed easily and do not heal within 2 weeks
6. Difficulty chewing or swallowing, speaking, or moving the jaw or tongue
7. Hoarseness, chronic sore throat, or change in voice
8. A soreness or feeling that something is caught in the back of the throat
9. Dramatic weight loss

RISK FACTORS

1. Sharped tooth
2. Smoking
3. Spirit (Alcohol)
4. Syphilis
5. Spices

OTHER CAUSES OF ORAL CANCER

1. Genetics
2. Poor oral hygiene
3. Unblanced diet
4. Sun exposure

TREATMENT

Refer to Dental team for specific management.

PREVENTION

1. Advices to reduce or stop oral bad habits; Smoking, Betal chewing, Alcohol drinking
2. Inprove oral hygiene
3. Regular check-up by Dentist if possible

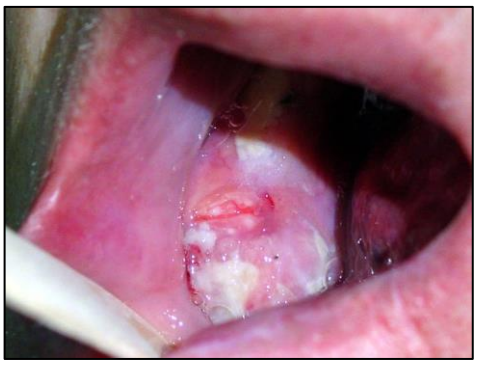


Figure 1:Oral Cancer

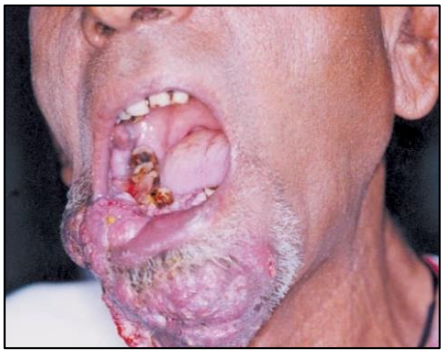


Figure 2: Oral Cancer

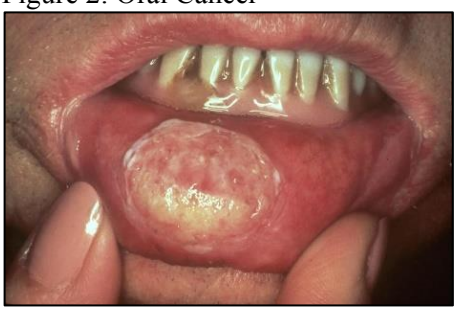


Figure 3:Oral Cancer

BASIC ECG

THE ELECTRICITY OF THE HEART

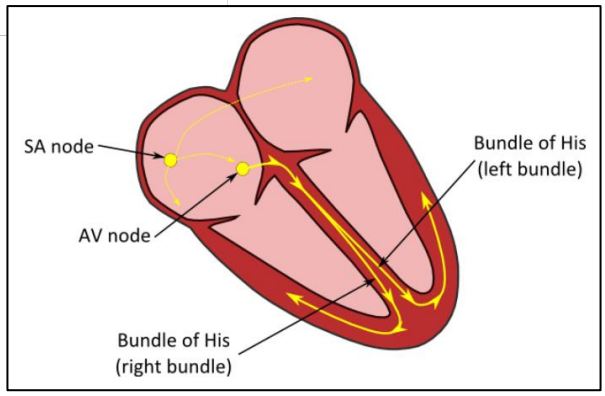


Figure: Depolarization of the heart

The contraction of any muscle is associated with electrical changes called **'depolarization'** and these changes can be detected by electrodes attached to the surface of the body. The two atria contract together, and the two ventricles contract together.

THE WIRING DIAGRAM OF THE HEART

The electrical discharge for each cardiac cycle normally starts in the Sinoatrial through node **(SA node)**. Depolarization spread through atrial muscle fibers and **atrioventricular node (AV node)** to the **bundle of His** divides in the septum between the ventricles into right and left bundle branches. Conduction spreads more slowly through specialized tissue called **'purkinje fibers**.

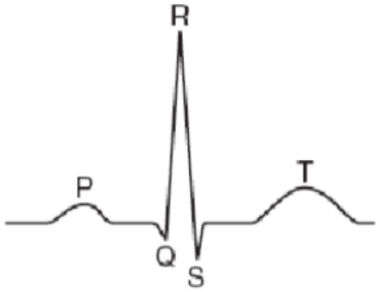
THE RHYTHM OF THE HEART

The normal heart rhythm, with electrical activation beginning in the SA node, is called 'sinus rhythm'.

THE SHAPE OF THE ECG

The muscle mass of the atria is small, and the electrical change accompanying the contraction of the atria is therefore small. Contraction of the atria is associated with the ECG wave called **'P'**.
The ventricular mass is large. Large reflection, **QRS complex**, is seen when the ventricular are depolarized. **'T'** wave is associated with the return of the ventricular mass to its resting state (repolarization).

BASIC SHAPE OF THE NORMAL ECG



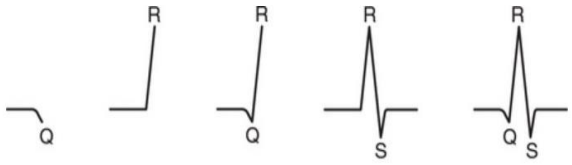


Figure: Basic shapers of the normal ECG

Any deflection below the base line following an **'R'** wave is called **'S'**.

1 small square represents 0.04s (40 ms) 1mm
1 large square represents 0.2s (200 ms) 5 mm
5 large squares represent 1s.
Heart Rate = 300/R-R interval (Large squares)

The **PR interval** is measured from the beginning of the **'P' wave** to the beginning of the **QRS complex**. It is the time taken for excitation to the spread from the **SA node**, through the atrial muscles and **AV node**, down the **bundle of His** and into ventricular muscle.
PR = 3-5 small sq.
QRS = 3 small sq.
RR = 5 large sq.
Any abnormality of conduction takes longer and causes widened **QRS** complexes.

THE 12-LEAD ECG

The six 'standard' leads, which are recorded from the electrodes attached to the limbs, look at the heart in a vertical plane (i.e., from the sides or the feet).
Leads I, II and aVL -look at the left lateral surface of the heart.
Leads III, a VF - look at the inferior surface.
Leads a VR - looks at the right atrium.

The six numbered V leads (chest leads) look at the heart in a horizontal plane, from the front and the left side. Thus, leads $\mathbf{V_1}$ and $\mathbf{V_2}$ look at the right ventricle. $\mathbf{V_3}$ and $\mathbf{V_4}$ look at the septum. V5 and V6 look at the anterior and lateral walls of the left ventricle.

THE CARDIAC AXIS

The depolarization wave normally spreads through the ventricles from **11 o'clock to 5 o'clock,** so the deflections in the **VR** lead are normally mainly downward (negative) and in the lead II mainly upward (positive).

A normal 11 o'clock-5o'clock axis means that the depolarization wave is spreading towards leads I, II and III and is therefore associated with a predominantly upward deflection in all these leads, the deflection will be greater in lead II than in I or III.

RIGHT AXIS DEVIATION (RAD)

If the right ventricle becomes hypertrophies, the axis will swing towards the right. The deflection in lead I becomes negatives (downward) and the deflection in lead III becomes more positive (upward). This is called **right axis deviation (RAD).** It is associated mainly with pulmonary conditions and congenital heart diseases.

Right axis deviation

LEFT AXIS DEVIATION (LAD)

When the left ventricle becomes hypertrophied, the axis may swing to the left, so that QRS complex becomes predominantly negative (downward) in lead III, and II. The problem is usually due to a conduction defect rather than to increased bulk of the left ventricular muscle.

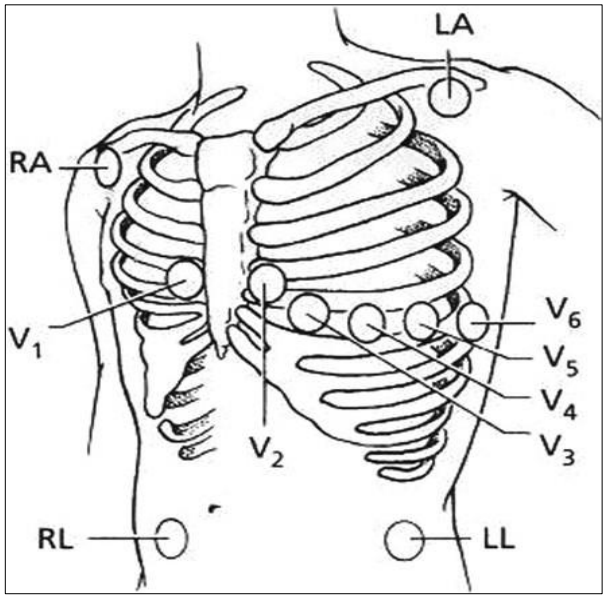


Figure: Position of the chest leads

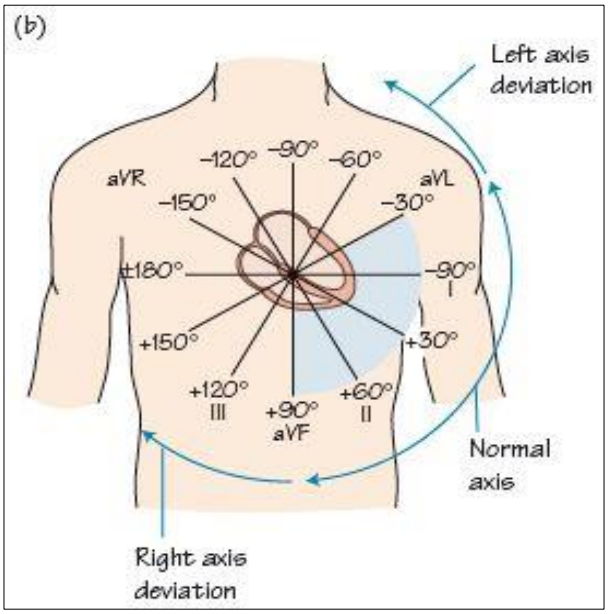


Figure: The cardiac axis

CONDUCTION PROBLEMS IN THE AV NODE AND HIS BUNDLE

The time taken for the spread of depolarization from the **SA node** to the ventricular muscle is shown by the PR interval and is not normally greater than 0.2s (one large square, 200 ms, 5mm).

FIRST DEGREE HEART BLOCK

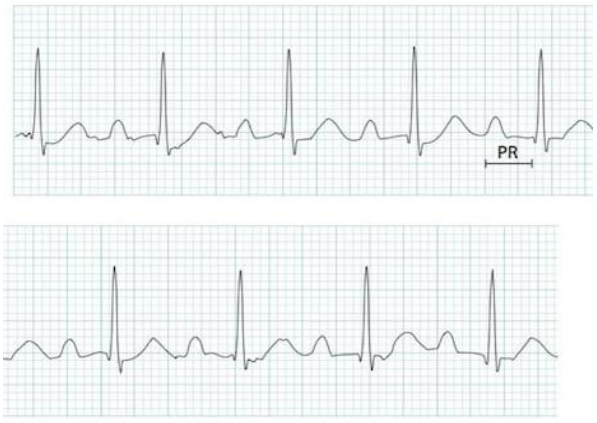


Figure: first degree heart block

One P wave per QRS complex. PR interval is 360 ms. It may be sign of CHD, acute Rheumatic carditis, Digoxin toxicity, or electrolyte disturbances.

SECOND DEGREE HEART BLOCK

Sometimes excitation completely fails to pass through the AV node or the bundle of His. There are three variations of this.

Mobitz type 2

One **'P' wave** is not followed by a QRS complex.

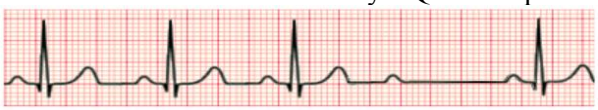


Figure: Mobitz type 2

Wenckebach type

Progressive lengthening of **PR interval** one non-conducted beat shorter **PR** interval than the preceding conducted beat.

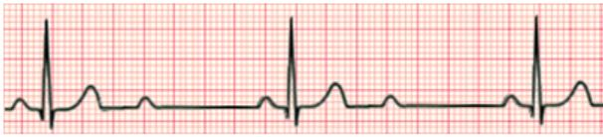


Figure: Wenckebach type

Second degree heart block (2:1 type)

Two **'P'** waves per **QRS** complex. The underlying causes of second-degree heart block are the same as those of first degree heart block.

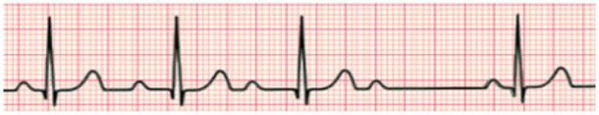


Figure: 2:1 block

THIRD DEGREE HEART BLOCK (COMPLETE HEART BLOCK)

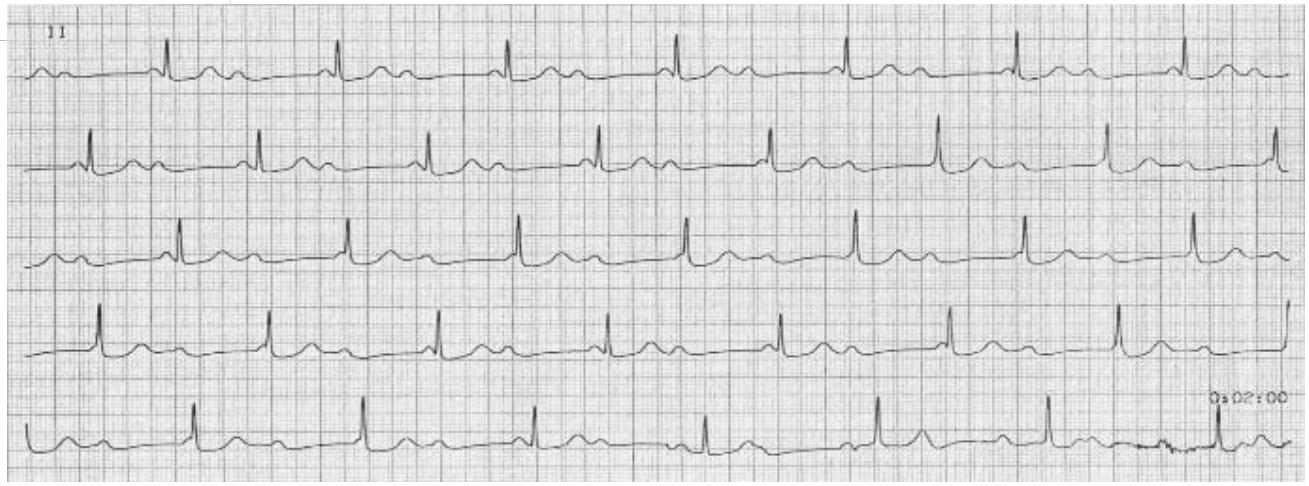


Figure: Complete heart block

Regular **'P' waves** (normal atrial depolarization). No relationship between **'P'** waves and **QRS** complexes ventricular escape is seen when the atria and ventricles is interrupted. **QRS** complexes are highly abnormal because of abnormal conduction through ventricular muscle.
Complete heart block may occur in patients with myocardial infarction or fibrosis around the bundle of His, or the block of both bundle branches.

RIGHT BUNDLE BRANCH BLOCK (RBBB)

RBBB indicates problems in the right side of the heart, but RBBB patterns with a QRS complex of normal duration are quite common in health people. But think about an **ASD**.
The right ventricle therefore depolarizes after the left because of the failure of normal conducting pathway this causes a second **'R'** wave **(R)** in lead $\mathbf{V_1}$ and a wide and deep **'S'** wave in lead $\mathbf{V_6}$. **RSR'** pattern with a QRS complex of normal with (less than 120 ms) can be a normal variant.

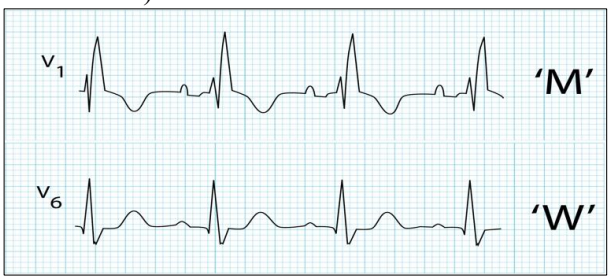


Figure: Right bundle branch block

LEFT BUNDLE BRANCH BLOCK (LBBB)

If conduction down the left bundle branch fails, the septum becomes depolarized from right to left. The right ventricle is depolarized before the left, causing 'M' pattern in lead V6 (S wave appearing only as a notch). Think about aortic stenosis and ischaemic heart disease. If the patient is asymptomatic no action is needed.

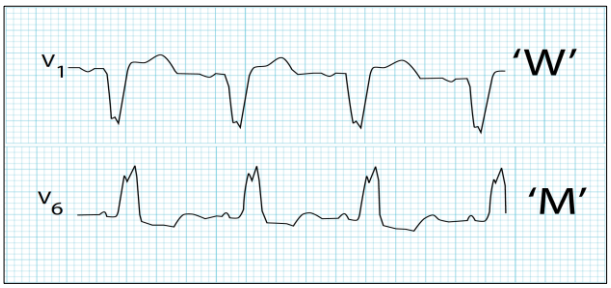


Figure: Left bundle branch block

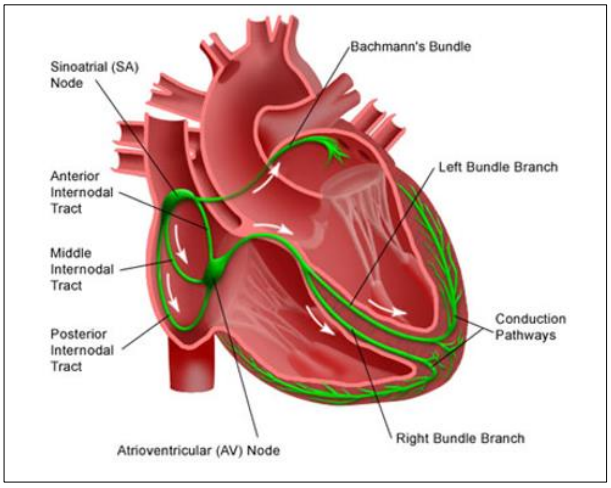


Figure: Conduction system of the heart

THE RHYTHM OF THE HEART

A sinus rhythm is any cardiac rhythm in which depolarization of the cardiac muscle begins at the sinus node. Sinus rhythm is necessary for normal electrical activity within the heart. The sinus node creates an electrical pulse that travels through your heart muscle, causing it to contract or beat. It is characterized by the presence of correctly oriented 'P' waves on the ECG.
Abnormal cardiac rhythm can begin in three places:

1. **The atrial muscle**

2. **The region around the AV node (nodal or junctional)**
3. **The ventricular muscle.**

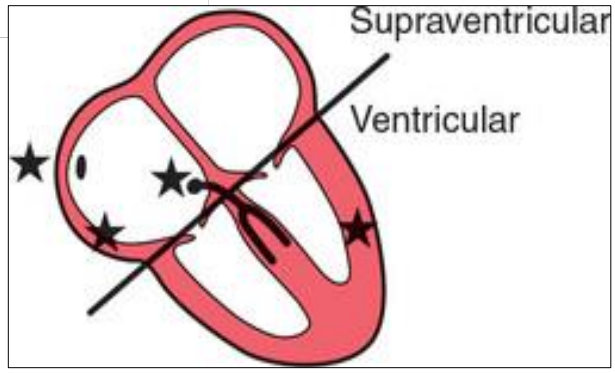


Figure: Places of abnormal cardiac rhythm

Sinus rhythm, atrial rhythm, and junctional rhythm together constitute the 'supraventricular' rhythms. In the supraventricular rhythms, the QRS complex is normal and narrow. In ventricular rhythms, the depolarization wave spreads through the ventricles by an abnormal and therefore slower, pathway through the **purkinje fibers**. The **QRS** complex is therefore wide and abnormal. Repolarization wave (**T wave**) is also abnormal.

Abnormal rhythms are:

1. The bradycardias (the escape rhythms, slow protective rhythms).
2. Extrasystoles (ectopic, premature contraction)
3. The tachycardias (the fast rhythm)
4. Fibrillation

ATRIAL FLUTTER (AF)

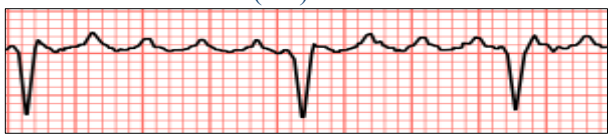


Figure: Atrial flutter

In AF, your heart's upper chambers (Atria) beat too quickly. This causes the heart to beat in a fast, but usually regular rhythm. Atrial Flutter is important not only because of its symptoms (difficulty breathing, palpitation, chest pain, LOC) but because it can cause a stroke that may result in permanent disability or death.

'P' waves give saw toothed appearance, narrow complex QRS, loss of the iso electric base line.

WOLFF-PARKINSON-WHITE SYNDROME (WPW)

WPW Syndrome is a condition in which there is an extra electrical pathway in the heart (between upper and lower chambers) that leads to periods of rapid heart rate **(tachycardia).** An episode of a fast heartbeat can begin suddenly and last a few seconds or several hours. Caffeine and alcohol trigger symptoms for some people.

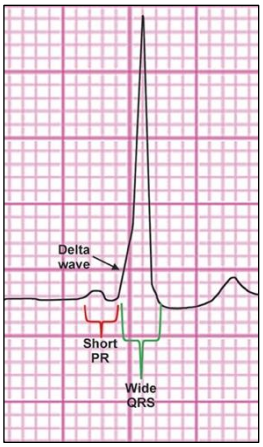


Figure: Delta Wave

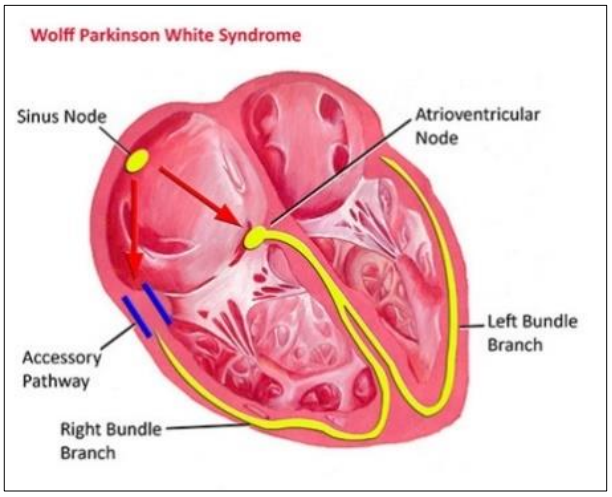


Figure: Accessory pathway in WPW Syndrome

W - Wave Delta
P - Short PR interval
W - Wide QRS

VENTRICULAR TACHYCARDIAS

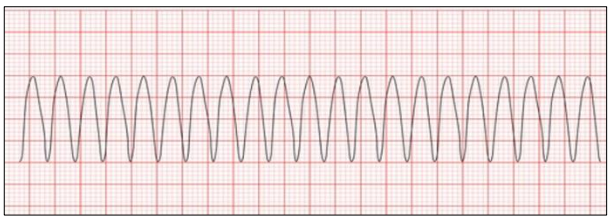


Figure: Ventricular Tachycardia

After two sinus beats, the rate increases to 150/min. The QRS complexes become broad and **'T'** waves are difficult to identify. The final beat shows a return to sinus rhythm.

VENTRICULAR FIBRILLATION

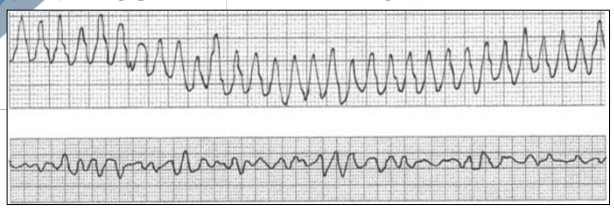


Figure: Ventricular Fibrillation

When the ventricular muscle fibers contract independently, no QRS complex can be identified, and the ECG is totally disorganized. The patient will usually have lost consciousness by the time, you have realized the change in the ECG pattern. Look at the patient, not the ECG.
Wire loop no QRS complex

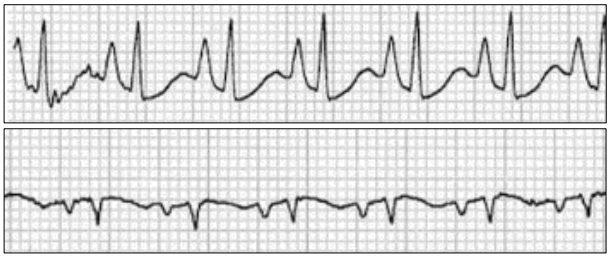
INTERPRETING ON ECG

1. The rhythm
2. 'P' wave abnormality
3. The cardiac axis
4. The QRS complex
5. The ST segments
6. 'T' waves
7. 'U' waves

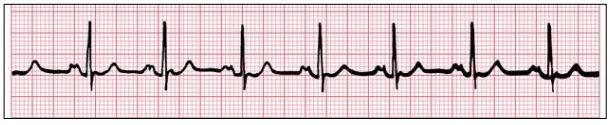
1. RHYTHM

Normal sinus rhythm one **'P'** wave per **QRS** complex is the rhythm of a healthy heart. Cardiac arrhythmia refers to bradycardia, or tachycardia, or irregular heartbeat (Flutter or fibrillation). Narrow QRS complex (<120 ms) in supraventricular rhythms (except with bundle branch block and **WPW** syndrome) wide **QRS complexes** (>120 ms) with abnormal **'T'** wave in ventricular rhythms.

2. 'P' WAVE ABNORMALITY



Peaked, tall – right atrial hypertrophy



Bifid, Notched, Broad-left atrial hypertrophy

3. THE CARDIAC AXIS

Normal axis: QRS complex predominantly upward in lead I, II and III.
Right Axis: QRS complex predominantly downward in lead I.
Left Axis: QRS complex predominantly downward in leads II and III.

4. ABNORMALITIES OF THE QRS COMPLEX

The normal **QRS** complex has **four characteristics:**

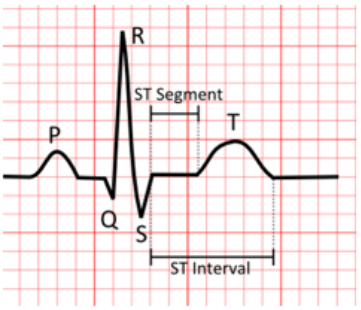
1. Its duration is not greater than 120 ms (three small squares)
2. In a right ventricular lead (V_1), the **'S'** wave is greater than **'R'** wave.
3. In a left ventricular lead (V_5 or V_6), the height of the **'R'** wave is less than 25 mm.
4. Left ventricular leads may show 'Q' waves due to septal depolarization, but these are less than 1mm across and less than 2 mm deep. 'Q' waves greater than one small square in width and at least 2 mm deep indicate a myocardial infarction. Once a **'Q'** wave has developed it is usually permanent.

Abnormalities of the width of the QRS complex.

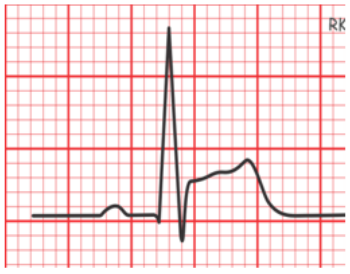
- **QRS complexes** are abnormally wide in the presence of bundle branch block or when depolarization is initiated by a focus in the ventricular muscle causing ventricular escape beats, extrasystoles or tachycardia.
- **Increased height of the QRS complex.**
- **In RVH**, the height of the **'R'** wave exceeds the depth of the **'S'** wave especially in V_1. There will be a deep 'S' wave in lead V_6. In LVH, tall 'R' wave (greater than 25 mm) in lead V_5 or V_6 and deep **'S'** wave in lead V_1 or V_2.

5. THE ST SEGMENT

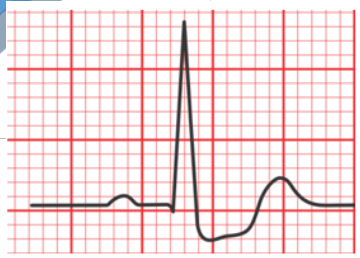
The **ST** segment lies between the QRS complex and the **'T'** wave. It should be isoelectric that is at the same level as the part between the **'T'** wave and the next **'P'** wave, but it may be elevated or depressed.



ST segment



Elevated ST segment



Depressed ST segment

Elevation of ST segment is an indication of acute myocardial infarction usually due to either to a recent infarction or to pericarditis.

V_1 V_2 V_3 = Anterior septal
V_1 V_2 = Anterior
II, III, V_F = Inferior
V_3 V_4 = Septal
I, VL, V_5, V_6 = Lateral
I, VL, V_4 V_5 V_6 = Antero lateral

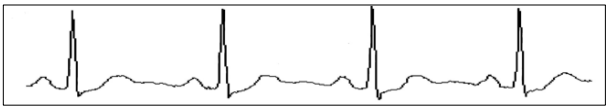


Figure: ST depression

Depression of the ST segment associated with an upright 'T' wave, is usually a sign of ischemia. The administration of digoxin causes 'T' wave inversion, characteristically with sloping depression of the ST segment.

6. 'T' WAVES

Peaked in hyperkalemia
Flat, prolong in hypokalemia
Inverted:Normal in some leads **(VR, V1)**
Ischaemia
Infarction
LVH, RVH
Pulmonary embolism (lead III)
Digoxin effect
Bundle branch block

7. 'U' WAVE

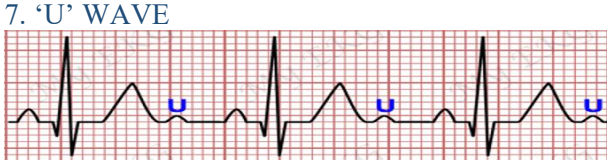


Figure: U Wave

The **'U' wave** comes after the 'T' wave of ventricular repolarization and may not always be observed as a result of its small size. 'U' waves are through to represent repolarization of the **purkinje fibers.** However, the exact source of the 'U' wave remains unclear. 'U' wave can be normal or can be seen in **hypokalemia**.

HYPERTENSION

HYPERTENSION, OR HIGH BLOOD PRESSURE (HBP) is a Systolic BP (SBP) equal or greater than 140mmHg and/or Diastolic BP (DBP) equal or greater than 90mmHg (≥ 140/90mmHg).

Hypertension is a risk factor for stroke, heart attack, and kidney failure.
The cardiovascular risks of HBP are greater if there are other risk factors such as age (>60 years), gender (males > females), poor diet, smoking, high blood cholesterol, diabetes mellitus and if the patient already has heart disease or kidney disease.

- MALIGNANT HYPERTENSION is very high blood pressure (SBP >180 OR DBP >120) that acutely affects one or more organs.

- PRE-ECLAMPSIA is a very severe condition in pregnant women with HBP near the end of pregnancy. It can also occur post-partum. This condition is very different from essential hypertension and treatment is also different. (See detailed in obstetric guidelines)

CAUSES

95% of HBP is unknown, called "Essential hypertension".
5% of HBP has known causes, called "Secondary hypertension", includes:

1. High alcohol intake and smoking
2. Obesity
3. Pregnancy (Pre-eclampsia)
4. Kidney diseases
5. Diseases of adrenal gland or other glands
6. Drugs (Prednisolone, oral contraceptive pills, amphetamines (YaBa), NSAIDs, salbutamol)
7. Pain and anxiety
8. Congenital heart disease

SIGNS AND SYMPTOMS

Most patients do not have any symptoms. Some patients suffer from headache, dizziness or fatigue.

COMPLICATIONS

Complication of ACUTELY high BP (EMERGENCY)
Malignant Hypertension
This is a condition of very high blood pressure (SBP >180 OR DBP >120) where there is damage to organs (brain, retina, kidneys or heart) because of the lack of blood flow. This **Causes**

- General
  - nausea, vomiting
- Brain

- neurological changes e.g., temporary loss of speech or vision, numbness, confusion, restlessness, convulsion, coma, or stroke
- Retina
  - acute visual problems
- Kidneys
  - Acute kidney failure
- Heart
  - acute heart failure, aortic dissection (tear in aorta – causes severe chest pain, may cause different BP measurements in right and left arms)

Complication of CHRONICALLY high BP
If patients have high blood pressure for a long time, then they may get complications/symptoms below:
Peripheral blood vessels
HBP may damage blood vessels causing pain in the legs when walking **(claudication).**

Central Nervous System
Stroke is a common complication of **HBP**. Transient ischemic attacks and subarachnoid haemorrhage are more common in patients with HBP.

Eyes
Damage to the retina which becomes more severe if the HBP is more severe. This leads to bad eyesight, but blindness is rare.

Heart
There is a higher incidence of heart disease associated with HBP mainly because of ischemic heart disease. HBP puts a lot of pressure on the heart and may lead to left ventricular hypertrophy (thickening of the heart muscle so it does not work as well). Severe hypertension can cause left heart failure. Atrial fibrillation (irregular heart rhythm) is common.

Kidneys
Kidney disease can cause HBP, but chronic HBP can also cause chronic kidney failure.

DIAGNOSIS

You can diagnose only HBP after only abnormal values three different days. Severe (Malignant) Hypertension (systolic BP >180 OR diastolic > 120) AND/OR complications. Note: It is recommended that healthy adults should have their BP checked every 3 years. Severe hypertension (systolic BP > 180 OR diastolic BP > 120) AND/OR complications.

HOW TO TAKE BLOOD PRESSURES
The patient should sit quietly for at least 5 minutes before measuring the BP (in the sitting position). Measure the BP always on the same arm for the same patient (write on the chart which arm you use).

ASSESSMENT OF HBP
1. BP measurements 3 times at 3 different days.
2. Identify risk factors/underlying cause (History taking and examination).
3. Urine dipstick for blood/protein/glucose.
4. Fasting Blood Sugar (FBS).
5. If available check cholesterol (Total cholesterol, LDL, HDL, and Triglycerides).
6. In **< 40 years** old consider investigating for secondary causes and discuss with doctor.

TREATMENT

Explanation to patient
- Explain to patients that hypertension is a disease that may not have any symptoms, but it puts them at higher risk for problems like stroke and heart attack.
- This risk can be reduced by lifestyle changes and in some cases medication.
- The medication will not cure the problem but will decrease the risk. They will have to take medication and follow up for the rest of their life.

Lifestyle advice for all patients
- Reduce the amount of **salt** in diet.
- **Healthy diet** e.g., avoid fatty foods / eat more vegetables and fruit.
- **Lose weight** if overweight or obese.
- **Alcohol:** Advise the patient to stop or if unable to stop at least to reduce.
- **Smoking:** Advise the patient to stop or if unable to stop at least to reduce.
- **Exercise** at least 30 minutes most days of the week.

When to start medication for HBP
- (If suspect HBP because of anxiety or because patient is unwell wait until the patient is calmer or better and repeat)
- Only start medication if the patient has HBP 3 times on 3 different days. This means that the high BP is likely not to be a single episode, and if the patient follows up every week it is a sign that they will be more likely to follow up and take their medications safely.
- The patient needs to take the medication regularly. If they do not take it regularly this can be more dangerous for the patient (especially with beta blockers).
- Once BP is stable on one or two medications then continue the same dose.
- Do **ECG** before starting new drug.

When following up:

- If the patient is not attending regular follow up then STOP the medication.
- Before increasing the dose or changing the medication make sure you check that the patient has been taking the drug every day as instructed.
- Before starting Enalapril do a pregnancy test for females.
- If BP too low with medication, then reduce dose by same amount you increased it by e.g., if on enalapril 5mg OD reduce to enalapril 2.5mg OD.

SBP	DBP
140-159	90-99
Treatment	
Stage 1 hypertension Check for co-morbidities (diabetes, heart problems, kidney disease, previous stroke) Investigate for end organ damage (kidney, heart, eyes). Calculate cardiovascular risk with online calculator. Decide if BP medication should be started. Use protocol if you decide to start medication.	

SBP	DBP
> 160	>100
Treatment	
Stage 2 hypertension Check for co-morbidities (diabetes, heart problems, kidney disease, previous stroke) Investigate for end organ damage (kidney, heart, eyes). Calculate cardiovascular risk online calculator. Start BP medications	

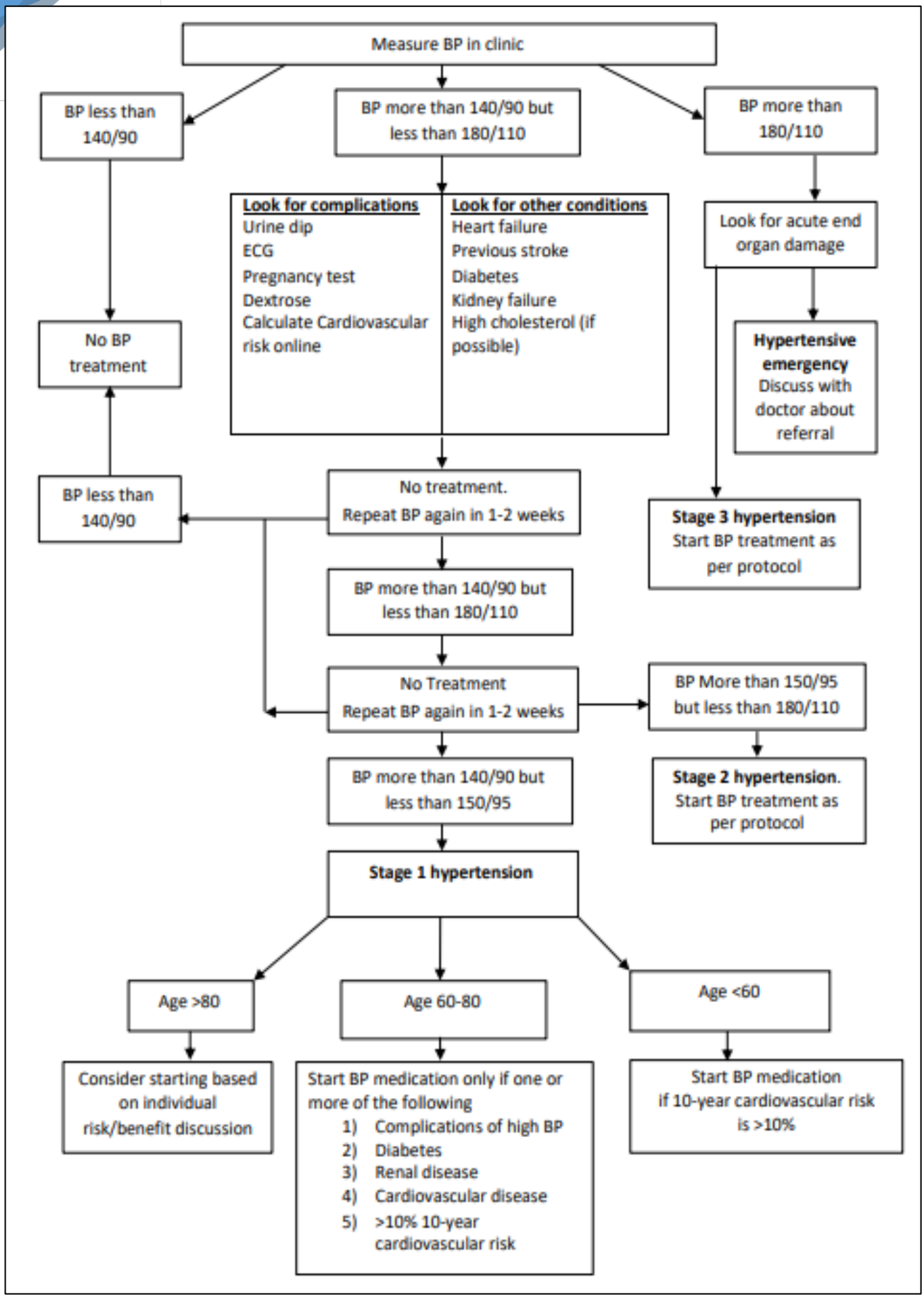
SBP	DBP
> 180	>110
Treatment	
LOOK FOR ACUTE END ORGAN DAMAGE eyes (papilledema, haemorrhage), pulmonary oedema, heart failure, myocardial infarction (ECG) aortic dissection (check BP in both arms), encephalopathy, stroke, rapidly progressive renal failure (urine dip), eclampsia.	

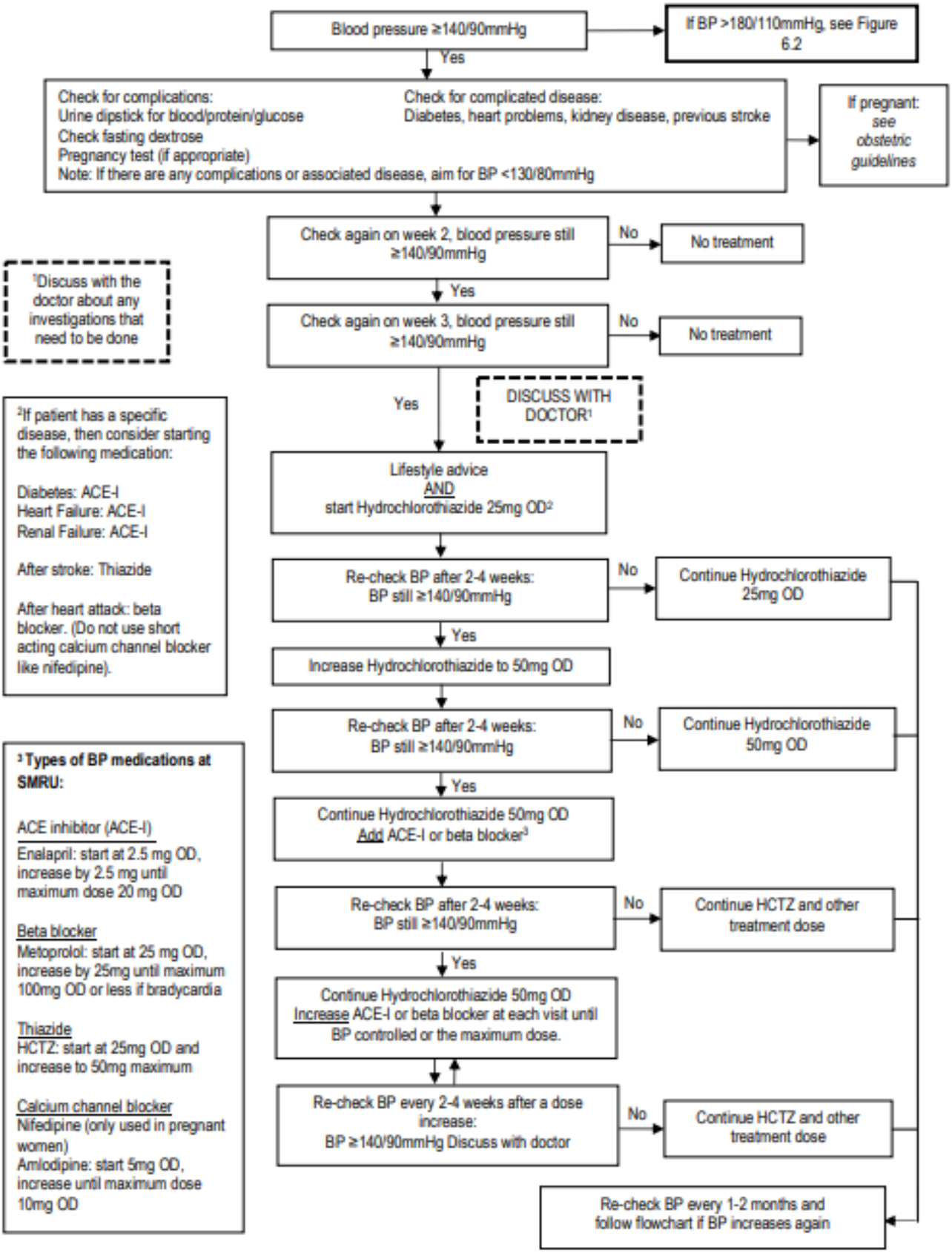
If have acute end organ failure this is a hypertensive emergency. See treatment box below. Consider referral. Discuss with doctor.
No evidence of end organ damage
This is not an emergency (stage 3 hypertension)
Manage with oral BP medication
- Start oral medication as per protocol and follow up next day.
Admit to IPD if needed.

Hypertensive emergency
If suspect malignant hypertension (BP >180 OR DBP >120 AND signs of damage to organs):
THIS IS AN EMERGENCY – NEED TO REFER PATIENT (Discuss with doctor)
Treatment:
If possible, give the patient **furosemide** 20mg PO before referral
Aim for 25% BP decrease in first few hours then more slow decrease afterwards
If cannot refer discuss risks of complication with patient. They need IV BP treatment.
****Note:** if suspect patient has had a stroke do not lower blood pressure. This can make stroke worse. Discuss with doctor**

ACE inhibitors (i.e., **enalapril, Lisinopril**) are first line treatment for patients < 55 years old. ACE inhibitors can cause kidney malformation in the fetus, so only give with family planning. Calcium channel blockers (i.e., **long acting diltiazem/nifedipine, amlodipine**) are first line for > 55 years old.

Aspirin may not benefit patients with low cardiovascular risk because of the risk of bleeding. The benefit of aspirin is higher if patients have known cardiovascular disease. Consider aspirin for the patient case by case.
Other drugs like **ACE inhibitors** and **long-acting calcium channel blockers** are better treatments for high BP but are more expensive.


Measure BP in clinic
BP less than 140/90
BP more than 140/90 but less than 180/110
BP more than 180/110
Look for complications
Urine dip
ECG
Pregnancy test
Dextrose
Calculate Cardiovascular risk online
Look for other conditions
Heart failure
Previous stroke
Diabetes
Kidney failure
High cholesterol (if possible)
Look for acute end organ damage
No BP treatment
Hypertensive emergency
Discuss with doctor about referral
BP less than 140/90
No treatment.
Repeat BP again in 1-2 weeks
Stage 3 hypertension
Start BP treatment as per protocol
BP more than 140/90 but less than 180/110
No Treatment
Repeat BP again in 1-2 weeks
BP More than 150/95 but less than 180/110
BP more than 140/90 but less than 150/95
Stage 2 hypertension.
Start BP treatment as per protocol
Stage 1 hypertension
Age >80
Age 60-80
Age <60
Consider starting based on individual risk/benefit discussion
Start BP medication only if one or more of the following
1) Complications of high BP
2) Diabetes
3) Renal disease
4) Cardiovascular disease
5) >10% 10-year cardiovascular risk
Start BP medication if 10-year cardiovascular risk is >10%

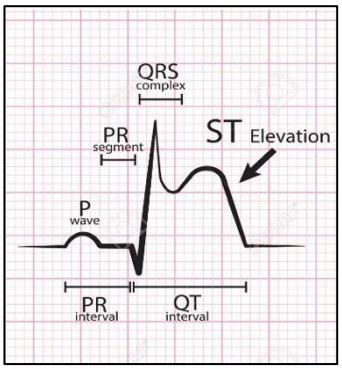

Blood pressure ≥140/90mmHg
If BP >180/110mmHg, see Figure 6.2
Yes
Check for complications:
Urine dipstick for blood/protein/glucose
Check fasting dextrose
Pregnancy test (if appropriate)
Check for complicated disease:
Diabetes, heart problems, kidney disease, previous stroke
Note: If there are any complications or associated disease, aim for BP <130/80mmHg
If pregnant: see obstetric guidelines
Check again on week 2, blood pressure still ≥140/90mmHg
No
No treatment
Yes
Check again on week 3, blood pressure still ≥140/90mmHg
No
No treatment
Yes
DISCUSS WITH DOCTOR[1]
[1]Discuss with the doctor about any investigations that need to be done
Lifestyle advice
AND
start Hydrochlorothiazide 25mg OD[2]
[2]If patient has a specific disease, then consider starting the following medication:
Diabetes: ACE-I
Heart Failure: ACE-I
Renal Failure: ACE-I
After stroke: Thiazide
After heart attack: beta blocker. (Do not use short acting calcium channel blocker like nifedipine).
Re-check BP after 2-4 weeks:
BP still ≥140/90mmHg
No
Continue Hydrochlorothiazide 25mg OD
Yes
Increase Hydrochlorothiazide to 50mg OD
Re-check BP after 2-4 weeks:
BP still ≥140/90mmHg
No
Continue Hydrochlorothiazide 50mg OD
Yes
Continue Hydrochlorothiazide 50mg OD
Add ACE-I or beta blocker[3]
Re-check BP after 2-4 weeks:
BP still ≥140/90mmHg
No
Continue HCTZ and other treatment dose
Yes
Continue Hydrochlorothiazide 50mg OD
Increase ACE-I or beta blocker at each visit until BP controlled or the maximum dose.
Re-check BP every 2-4 weeks after a dose increase:
BP ≥140/90mmHg Discuss with doctor
No
Continue HCTZ and other treatment dose
Re-check BP every 1-2 months and follow flowchart if BP increases again
[3] Types of BP medications at SMRU:
ACE inhibitor (ACE-I)
Enalapril: start at 2.5 mg OD, increase by 2.5 mg until maximum dose 20 mg OD
Beta blocker
Metoprolol: start at 25 mg OD, increase by 25mg until maximum 100mg OD or less if bradycardia
Thiazide
HCTZ: start at 25mg OD and increase to 50mg maximum
Calcium channel blocker
Nifedipine (only used in pregnant women)
Amlodipine: start 5mg OD, increase until maximum dose 10mg OD

AMI

DEFINITION

Acute myocardial infarction is the medical name for a heart attack. A heart attack is a life-threatening condition that occurs when blood flow to the heart muscle is abruptly cut off, causing tissue damage. This is usually the result of a blockage in one or more of the coronaries arteries.

DIAGNOSIS



- Clinical signs and symptoms
- There is a specific blood test released by the heart that shows that there is damage to the muscle.
- **ECG** shows ST elevation.
- **AMI** (Acute Myocardial Infarction) should exclude in young and older patients as well as diabetic patients presenting with unexplained cardiac, respiratory and neurologic symptoms. Characteristics of the atypical

AMI presentation include:

1. Personality traits (low anxiety, calmness, independence).
2. Behavior pattern (low rates of physician presentation for past medical issues, the patient with denial).
3. Higher pain thresholds.
4. Major depression or Psychosis.
5. Demented patients.
6. Physician and patient misinterpretation of symptoms and signs resulting from AMI.
7. Sensory, motor and autonomic neuropathy.
8. Impaired CNS recognition of the ischemia.

- **Anginal equivalent complaints:** dyspnea, nausea/vomiting, weakness, dizziness, cough, syncope, sweating. Anginal equivalent syndromes: delirium, confusion, CVA. Anginal equivalent finding: cardiac arrest, new onset, dysrhythmia, new onset congested cardiac failure, unexplained tachycardia, peripheral oedema.

TREATMENT

- This is an emergency.
- Give Aspirin 300mg PO STAT.
- Refer immediately to hospital – this patient needs stronger drugs to break down the clot and may need surgery to open up the arteries.
- Immediate release dihydropyridines (e.g., nifedipine) are contraindicated in the patient with AMI.

ISCHAEMIC HEART DISEASE

DEFINITION

Angina (also known as ischemic heart disease) is when there is a narrowing of the arteries in the heart, often due to atheroma (fatty patches). This means that there is not enough supply of oxygen to the heart muscle which causes chest pain. Patients with angina are at higher risk of having a heart attack. Angina can be stable or unstable (high risk of turning into a heart attack).

SYMPTOMS

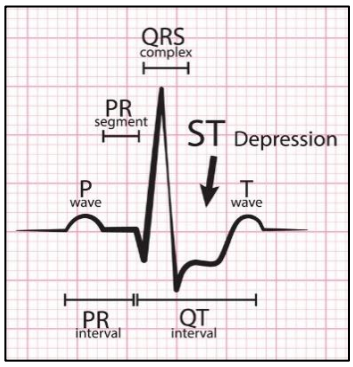
The patient will complain of chest pain. It is important to classify the angina:

1. Stable Angina: chest pain (left or central chest) that comes on with exercise and stops when you sit down/stop exercising.

2. Unstable Angina: chest pain (left or central chest) that happens at rest – This is at very high risk of developing into a heart attack.

DIAGNOSIS

- Clinical history
- **ECG** may show **ST** depression.
- Check **Hct** – **anemia** can cause chest pain.



TREATMENT

Lifestyle

Advise patients to:

- Reduce the amount of **salt in diet.**
- Avoid **fatty foods** / Eat more vegetables and fruit.
- **Lose weight** if overweight or obese.
- **Alcohol:** Advise the patient to stop or if unable to stop at least to reduce.
- **Smoking:** Advise the patient to stop or if unable to stop at least to reduce.
- **Exercise** at least 30 minutes most days of the week.

Medications

- Discuss with the doctor about what treatment is appropriate for each case.

- If unstable angina discuss with doctor about referral to hospital as there is a very high risk of developing into a heart attack.
- **Treatments to be considered are:**
  - **Aspirin** (with omeprazole for protection of stomach): reduces stickiness of platelets so they don't get stuck to the inside of the blood vessels and to each other and block blood flow to the heart.
  - **Clopidogrel** is another guideline – recommended anti platelet agent and has been shown to be superior to aspirin in preventing composite vascular events and reducing haemorrhagic complications.
  - **Beta-blocker e.g., Propranolol:** increase the force and rate of the heart pumping.
  - **ACE-Inhibitor e.g., Enalapril:** prevent a build-up of fluid.
  - **Nitrates e.g., Isosorbide Mononitrate:** relaxes blood vessels to allow good blood flow to heart muscle.
  - **Cholesterol modifying medication**: Statin, Niacin, Fibrates.

HEART FAILURE

DEFINITION

Heart failure occurs when the heart fails to pump enough blood and provide enough oxygen or energy to the organs. In cases where there is doubt about the diagnosis, response to a therapeutic trial will make the diagnosis clear. Heart failure can be chronic and come on slowly or can be acute and present as an emergency. The two sides of the heart can be affected together or separately (left sided or right sided heart failure). Both have different symptoms.

SIGNS AND SYMPTOMS

Chronic Heart Failure:

Left sided heart failure:

Breathing difficulties when exercising, which get progressively worse, until difficulties are experienced even when at rest. Difficult breathing when lying on the back. The patient uses more pillows to sleep (orthopnoea). Dry cough mainly at night +/- pink frothy sputum. Crackles (crepitations at lung bases).

Right sided heart failure:

Abdominal pain, anorexia, nausea, bloating, Jugular vein distension , Hepatomegaly (enlarged liver) sometimes painful Lower leg oedema, or lower back oedema if lying flat

Acute Heart Failure: (may not have all symptoms)

- Sudden worsening of breathing or cough
- Increased JVP
- Lots of crepitations bilaterally
- More oedema
- Low SpO2, fast RR
- Cannot breathe when lying flat
- May have history of heart failure (or symptoms of heart failure)

Also, do not forget to ask about:

- Alcohol/drug use
- Diet (check for B1 deficiency)
- History of chest pain/palpitations

CAUSES

Common causes of heart failure

1. Hypertension Check BP
2. Anaemia Check Hct/Hb
3. Beriberi (Vitamin B1 deficiency)
4. Hyperthyroidism (Check lab. TSH)
5. Alcohol, drug addiction.
6. Myocardial infarction (heart attack) Check ECG.
7. Arrhythmia (irregular heartbeat) Check ECG.
8. Congenital heart disease.
9. Valvular disease (heart valves too tight or loose).
10. Rheumatic heart fever (Check ASO titre)

INVESTIGATIONS

- For all patients check: **Hct, BP, ECG**, **fasting dextrose,** and **thyroid tests** if available.
- A blood test called BNP (Brain Natriuretic Peptide) and an **echocardiogram** (ultrasound of the heart) can confirm the diagnosis of heart failure.
- You need to diagnose from symptoms and clinical exam.
- An improvement of symptoms with treatment also helps to confirm the diagnosis.
- If not sure if breathing problems are due to other causes then a **Chest X-ray** may help you, discuss with the doctor to see if appropriate.

TREATMENT

ACUTE HEART FAILURE

Note: For all unwell patients a full DRS AB-CABDE/S assessment and treatment should be done. You should ALWAYS assess for everything and TREAT any abnormality BEFORE moving to the next step.

Figure: DRS ABCDE for acute heart failure

	ASSESS FOR	TREATMENTS LIKELY TO BE NEEDED FOR **ACUTE HEART FAILURE**
DRS	Danger Response Send for help	Gloves Safe place Call for help
A	Airway obstruction Speaking, stridor, swelling, secretions	Oxygen
B	RR, SpO2, cyanosis Chest indrawing tracheal tug Listen to chest	Salbutamol or Adrenaline nebulizers if wheeze ****Caution: increased heart rate can worsen heart failure**** Position patient: If dyspnea **sit up right**
C	HR, BP, Cap refill Urine output, Temp Listen to HS	**IV cannula** (biggest size possible 16G or 18G) Take bloods e.g., **Hct, Creatinine, BUN, CBC**, MS, dextrose etc. ****If signs of heart failure DO NOT GIVE FLUID BOLUS**** Insert catheter and monitor fluid balance (fluid IN/OUT) every hour
D	Check dextrose Seizures Pain	**Give** diuretics e.g**., furosemide IV** Adults**: 40mg** Child: **1mg/kg** (max 40mg) Repeat the same dose after 30 minutes if no improvement/has not passed urine. Discuss repeat doses with doctor. Consider **vitamin B1 100mg IM** injection Give **digoxin PO only** if atrial fibrillation on ECG (irregular pulse >120 per minute)
E	GCS/BCS/AVPU Expose and examine	History, further investigations, treatment plan
DISCUSS WITH DOCTOR		

A treatment dose of **vitamin B1 100mg IM** should be considered. Give diet advice or vitamin B1 tablets should be given to prevent Beriberi, especially in alcoholics and heart failure patients. When the patient is becoming stable, look for the cause of the acute episode and treat it.

Post Emergency Treatment:

- Bed rest.
- Stop smoking.
- Check weight daily in IPD.
- Monitor fluid input and output.
- Continue **furosemide PO** daily.
- Adjust dose to weight and blood pressure.
- If oedema still continues consider adding another diuretic e.g., **hydrochlorothiazide**.
- If patient on beta blockers e.g., **metoprolol** **do not give when in acute heart failure**

Re-start when acute attack better.

- If available, start treatment with **enalapril**.
- If available start **spironolactone** before discharge.

CHRONIC HEART FAILURE

Assessment:

Most of the time, acute heart failure is a complication of a chronic condition. Remember that in the early stages of the disease, the patient will feel OK most of the time. He/she may consider night cough to be bronchitis or lower leg oedema as nothing serious. Once you have made the diagnosis of chronic heart failure you must see the patient regularly (at least monthly) as they will need life-long treatment and care.

Make a detailed clinical exam:

Check heart sounds: listen for new murmur or gallop and compare to previous heart sounds in lemma. Check BP, pulse, SpO2, weight. Left HF signs: crackles in lungs. RHF signs: oedema, jugular veins enlarged, enlarged and painful liver. Grade the dyspnoea following the International American Heart Association:

Grade 1: no symptoms

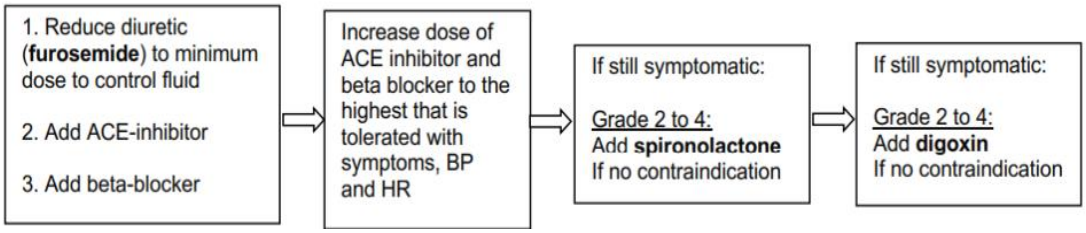
Grade 2: dyspnoea for major efforts (Describe the activity which caused the dyspnoea)

Grade 3: dyspnoea for minor efforts (How many meters can the patient walk or how many kilos can they carry before feels dyspnoea?)

Grade 4: symptoms at rest (Shortness of breath even when doing nothing)

Furosemide will make the patient feel better but will not increase how long they live but ACE-I, spironolactone and beta blocker will increase the patient's life

Treatment



1. Lifestyle advice: stop smoking, lose weight, low salt, healthy diet, decrease/stop alcohol and drugs.
2. Restrict fluid intake e.g., 1.5L/day.
3. Check baseline renal function and discuss with doctor if abnormal.
4. Diuretics e.g., **furosemide** to remove the fluid and improve symptoms – check electrolytes 2 weeks after starting and re-check depending on case by case (discuss with doctor).
5. Add ACE-I e.g., **enalapril, lisinopril or captopril.**
6. If no contraindications add cardio-selective beta blocker e.g., **atenolol, metoprolol, or carvedilol.**
7. If still grade 2-4 add **spironolactone.** This can improve the patient outcome.
8. If still grade 2-4 consider adding **digoxin**. This can improve how the patient feels.

CARDIAC MEDICATIONS (you may need to use alternative treatments if these drugs are not available)

1. **Furosemide:** start 40mg PO OD, maintenance 20-40mg, if resistant oedema 80-120mg daily.
2. **Enalapril:** start with 2.5mg OD for 2 weeks, increase the dose every 2 weeks to aim for 10-20mg BID if tolerates (max 20mg BID) (**Note:** enalapril OD for High BP and BID for heart failure) monitor BP closely when giving with furosemide. If enalapril is not available, you should use another ACE-I, but the drug doses will be different.
3. **Metoprolol:** Start at 25mg OD, increase to 50mg BID if HR and BP allow. Monitor HR closely. Do not give if patient has asthma. If metoprolol is not available, you can use atenolol or carvedilol but beta blockers other than these 3 should not be used. Not all beta blocker drugs have the same activity so different beta blocker drugs will be used for different diseases (e.g., propranolol for portal hypertension but not for heart failure)
4. **Spironolactone:** if on ACE-I start at 12.5mg, normal maintenance dose 50mg, (if not on ACE-I start 50mg. maintenance dose 100-200mg).
5. **Digoxin:** For heart failure **start** 62.5-125mcg OD (elderly start at 62.5mcg); for atrial fibrillation: 750mcg1000mcg over 24hrs (given in divided dosages) then maintenance 125-250mcg. Digoxin can cause severe side effects so to be very careful when using this drug, especially if there is renal failure.

When to change the treatment? Discuss with doctor if you are not sure

- **If the weight is increasing and oedema is appearing:** Increase the treatment or add new drug.
- **If the grade of the dyspnoea is rising:** Increase the treatment or add new drug.
- **If the BP is getting low (SBP <90mmHg):** decrease diuretic treatment and/or **enalapril.**
- **If you find digoxin intoxication signs:** stop digoxin for a few days and when signs have disappeared start again with lower dose. Signs of digoxin intoxication are confusion, irregular pulse, decreased appetite, nausea, vomiting, diarrhoea (GI disturbance), hyperkalaemia and life-threatening dysrhythmias with very fast heartbeat.
- **High risk for digoxin toxicity** more likely in elderly and patients with renal impairment.
- **If there is hyperkalaemia:** stop the enalapril and spironolactone.
- If the patient is improving or stable: **do not reduce the dose of medication.**

PREVENTION

Encourage patients to change their lifestyle. Give aspirin if there was a heart attack. Give all patients diet advice and vitamin B1 supplementation.

RHEUMATIC FEVER

DEFINITION

Rheumatic fever is an inflammatory disease which sometimes follows a group ***A Streptococcus*** pharyngeal infection. It follows pharyngitis / tonsillitis by 2 to 6 weeks (average 20 days). It is most common in children between 5 and 15 years old. Only 2% of people who have a Streptococcus pharyngitis (non-treated or not well treated) will develop rheumatic fever.

SIGNS AND SYMPTOMS

Rheumatic fever affects the joints, heart, brain, and skin) and during an attack, the patient can have any combinations of these symptoms: **J ♡ N E S (J -**

joints (arthritis), ♡ - cardiac, **N** – nodules, **E** – erythema marginatum, **S** – Sydenham chorea: see below for Jones criteria). It is very rare to see patients with acute rheumatic fever. Usually by the time they come to hospital the fever has ended but they present because of symptoms due to permanent damage to the heart valves. They may remember the symptoms of the acute rheumatic fever (maybe months or years before) so it is important to ask their medical history.

- Inflammation of more than one joint **(poly-arthritis),** especially the larger joints (knees, ankles, elbows, wrists).
- Pain and inflammation 'travel' from one joint to another **(migratory arthritis).** It is more common in adult patients. There may be only pain, or sometimes swelling, redness, tenderness. No deformity.
- Heart murmur.
- Congestive cardiac failure, heart Pericardial rub.
- **Chorea:** rapid, involuntary, uncoordinated movements (especially of head, face, hands, and feet), which disappear during sleep.
- **Nodules** under the skin: small (few millimeters to 2cm), mobile and painless nodules especially over bony surfaces and tendons (near the elbows, knees, wrists, ankles, over Achilles tendons, vertebrae).
- **Erythema marginatum:** non-itchy, non-painful rash with a raised edge and clear Centre, especially on trunk, thighs, and arms. The lesions change frequently.

Other symptoms: There can also be fever, abdominal pain, nosebleed or arthralgia (joint pain).

DIAGNOSIS

There is no one single symptom, sign or investigation which is characteristic of rheumatic fever. Here, the diagnosis is based on the 'Revised Jones Criteria'. This has 3 parts:

(1) Evidence of recent Streptococcal infection

- Increase in **anti-streptolysin O (ASO)** titre.
- Positive throat culture for group A beta-haemolytic streptococcus.

(2) Major criteria:

- Heart symptoms as above: carditis
- Polyarthritis
- Chorea
- Subcutaneous nodules
- Erythema marginatum

(3) Minor criteria

- Arthralgia
- Fever
- Increased CRP
- Previous rheumatic heart disease or rheumatic fever
- Prolonged P-R interval on ECG (if available)

To make **a diagnosis of rheumatic fever there must be:**

1. Evidence of a recent streptococcal infection AND **2 major criteria,**

OR

2. Evidence of a recent streptococcal infection AND **1 major criterion and 2 minor criteria.**

Disease Course

The average course of an attack is about 3 months. Less than 5% of the attacks are longer than 6 months.

COMPLICATIONS

- **Reactivation of rheumatic fever** (5-50%).
- **Chronic rheumatic heart disease** (deformity of one or more heart valves). This is the only long-term problem of rheumatic fever. If severe enough, this can lead to chronic heart failure. Chronic rheumatic heart disease usually has no symptoms for years or decades after the initial episode of rheumatic fever.
- **Death** from congestive heart failure.

TREATMENT

- Bed rest for 2 weeks

Benzathine penicillin
Child:
50,000 IU/kg IM STAT (max 1.2 million IU)
Adult:
1.2 million IU IM STAT

If benzathine penicillin is not available give **penicillin V** 500mg QID or 15mg/kg QID for 10 days.
If your patient is allergic to penicillin, give **erythromycin** 2g or 50mg/kg divided TID for 10 days.

Aspirin 50-100mg/kg/day until all symptoms have gone:
Decrease dose if side-effects occur ototoxicity, hyperventilation, abdominal problems.

Prednisolone
Treat with prednisolone if there are signs of cardiac problems or if aspirin is not enough to control the joint inflammation:
Child: 1-2mg/kg OD for 2-3 weeks, then slowly decrease over 4 weeks.
Adult: 60-120mg OD for 2-3 weeks, then slowly decrease over 4 weeks.

It may be helpful to use CRP or ESR to guide when you should start to decrease. When decreasing continue aspirin for 2-3 weeks after stopping prednisolone to avoid a relapse. Consider giving **Omeprazole** 20mg OD with the prednisolone to protect the stomach lining.

For Chorea: Rest
Diazepam or **phenobarbital.**
Treat **heart failure** if the patient has symptoms.

PREVENTION (PROPHYLAXIS)

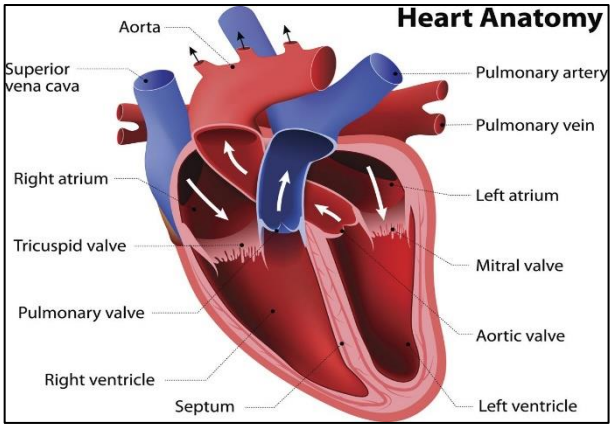
Primary prevention (primary prophylaxis):
To prevent development of acute rheumatic fever:
All patients with suspected streptococcal tonsillitis should be treated with PO Penicillin V for a full 10-day course or a single IM benzathine penicillin dose.
Secondary prevention (secondary prophylaxis):
To prevent recurrent attacks (reactivation):
All patients who had one attack of rheumatic fever should receive IM benzathine penicillin (same dose as treatment) every 4 weeks.

How long to continue giving benzathine penicillin every 4 weeks?
There is no agreement about how long the secondary prophylaxis should be continued. Most guidelines advise continuing at least until the patient is 21 years old and at least 5 years after an acute attack. Some books advise continuing prophylaxis for life if there was heart involvement.

VALVULAR HEART DISEASE

ANATOMY

The heart has 4 chambers – right and left atrium at the top and right and left ventricle at the bottom. Valves connect the chambers and the major blood vessels. The picture below shows the direction of the blood flow of the blood through the heart by the black arrows.



DEFINITION

The valves in the heart can have problems if they are too stiff and block blood flow **(stenosis) or** if they leak **(regurgitation)** meaning that the heart has to pump harder which can lead to heart failure.

CAUSES

1. Congenital abnormalities.
2. Infections e.g., Rheumatic fever, endocarditis, syphilis.
3. Heart Disease e.g., Angina (ischaemic heart disease), high BP, cardiomyopathy.

SYMPTOMS

- Difficult/fast breathing.
- Tiredness.
- Dizziness.
- Chest pain/angina.
- Palpitations.
- Symptoms of heart failure: oedema, orthopnoea, frothy pink sputum.
- Children/infant: poor feeding, sweating, poor weight gain, chest indrawing.
- Aortic stenosis: sudden collapse during exercise.

DIAGNOSIS

Clinical:
Listen to the heart sounds:
Normal Heart Sounds:
If the heart is normal, when you listen to the heart sounds there should be two separate sounds:

Normal First heart sound: Caused by mitral and tricuspid valves closing

Normal Second heart sound: Caused by pulmonary and aortic valves closing.

Systole: the period between the first and second heart sounds
Systolic murmur: Murmur heard during systole. Can be caused **by aortic/pulmonary stenosis, mitral/tricuspid regurgitation, or VSD.**

Diastole: the period after the second heart sound before the first heart sound
Diastolic murmur: Murmur heard during diastole. Can be caused by **mitral/tricuspid stenosis or aortic/pulmonary regurgitation.**

Examine for heart failure e.g., oedema, raised JVP, crepitations both bases, raised RR, low SpO2, cyanosis
Echocardiogram (heart ultrasound): Is the only definitive way of knowing if there is a problem with the valve.

TREATMENT

Often a valve that is not working needs surgery to replace it. If possible, refer to hospital for further management. Complications of valvular heart disease are congestive heart failure, endocarditis, and heart failure during pregnancy.

INFECTIVE ENDOCARDITIS

DEFINITION

Infection of the heart which can lead to damage to one of the valves of the heart and lead to complications such as sepsis and death. Infective endocarditis can have a slow onset (subacute endocarditis) or come on quickly (acute endocarditis).

CAUSES

Bacterial cause is most common (most common bacteria is Staphylococcus aureus)

- Fungal e.g., candida (more common in immunosuppressed patients).
- Viral (uncommon).

RISK FACTORS

- Immunosuppressed e.g., HIV, malnutrition, diabetes.
- Intravenous drug use.
- Artificial heart valves.
- Abnormalities of the heart.
- Dental procedures.

SIGNS AND SYMPTOMS

Think about infective endocarditis if there is a fever of unknown cause , and a new or changing heart murmur .

Often symptoms are non-specific:

- New murmur on auscultation
- Fever
- Chills
- Headache
- Muscle pain
- Splinter haemorrhage under nails
- Blood in urine (glomerulonephritis)
- Weight loss
- Shortness of breath
- Cough
- Night sweats
- Joint pains
- Osler's nodes on the tip of the finger or toes and painful. Janeway lesions occur on palms and soles and are non-painful.

DIAGNOSIS

Blood cultures should be taken when the patient has fever. Take from 3 different sites at 3 different times. Echo shows 'vegetation' (lump/cluster of bacteria attached to heart valve).

TREATMENT

- Antibiotics (for many weeks) e.g., IV ampicillin (4 weeks) and gentamicin (2 weeks). Discuss with the doctor about which antibiotics to use. This will depend on the likely organism and also depends on the risk factors.
- If possible, repeat blood cultures so you know when the bacteria are not in the blood anymore. This will help to decide how long to give IV treatment. Do not use oral treatment for infective endocarditis because the drug concentration will not be high enough to treat the heart valves.
- Surgery may be needed.
- If possible, do frequent ECGs to monitor for any damage to the heart.

PALPITATION

To understand this chapter, you may need to ask a doctor for help.

DEFINITION

A palpitation is the feeling of an abnormally strong or fast heartbeat. This is a common complaint in patients.

CAUSES

- Abnormal fast rhythms of the heart.
- Congenital heart disease.
- Anaemia.
- Thyroid problems.
- Anxiety or harmless extra beats of the heart.

SIGNS AND SYMPTOMS

Palpitations can come and go. You will need to take a careful history. Ask the following questions:

- When the symptoms started.
- How often the palpitations occur.
- What makes the palpitations worse or better?
- Medication history, alcohol and caffeine use, and smoking.

Complications from palpitations:

- Loss of consciousness
- Chest pain
- Difficulty breathing

Risk factors:

- Diabetes
- High BP
- Previous stroke or heart attack
- Kidney disease
- Smoking or alcohol use

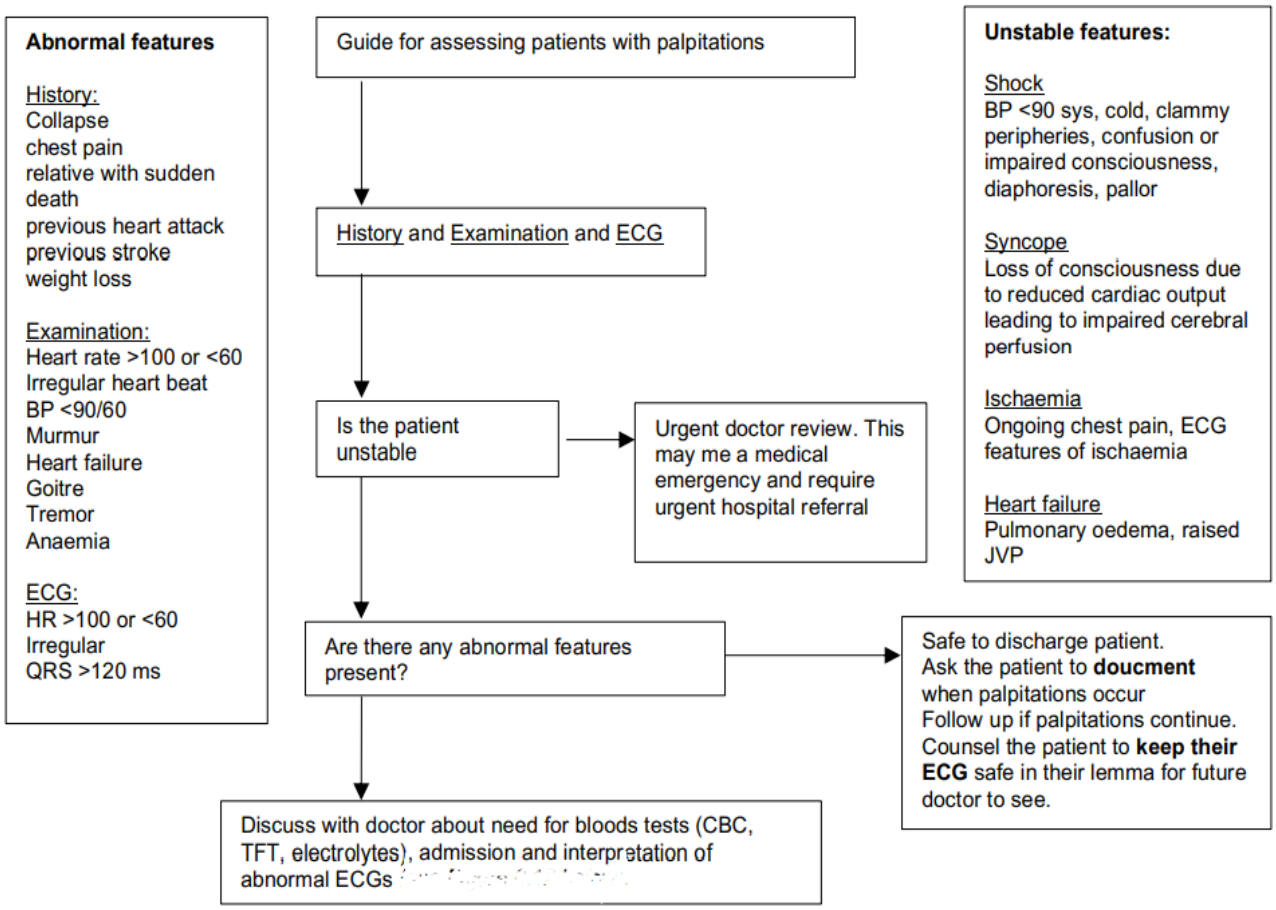
DIAGNOSIS

1. **Do a careful physical examination.** Look for harmful causes of palpitations.

Table ABCDE approach for causes of palpitations

A	Normal.
B	▪ Hypoxia. ▪ Basal crepitations.
C	▪ Pulse rate (count pulse for 1 minute). ▪ Determine if pulse is regular or irregular. ▪ Blood pressure. ▪ Peripheral perfusion (Cool and clammy peripheries, capillary refill time increased). ▪ Auscultation for heart murmurs. ▪ Raised jugular venous pressure (JVP).
D	▪ Cerebral perfusion – new confusion, altered GCS. ▪ Blood glucose.
E	▪ Peripheral oedema. ▪ Tremor. ▪ Goiter. ▪ Anaemia.

Figure: How to diagnose and manage patients with palpitations.



2. ECG – best way to diagnose heart arrhythmia. ECG can be normal if the patient is not having palpitations or tachycardia during the ECG. Try to repeat the ECG when the patient has palpitations. If the patient is having palpitations and the pulse rate is normal, this means they do NOT have a tachycardia.

3. Investigations

- CBC: look for anaemia.
- Thyroid function tests: Hyper and hypothyroidism can cause palpitations.
- Serum electrolytes (sodium, potassium, magnesium).
- If possible, echocardiogram: especially if heart murmur is heard on examination.

Table: Classification of tachycardia

QRS duration	Regular RR interval	Irregular RR interval
<120 ms (narrow)	1. Sinus tachycardia 2. AVNRT (AV node re-entry tachycardia) 3. AVRT (AV re-entry tachycardia) 4. Atrial flutter with regular AV block **A**	1. Atrial fibrillation (AF) 2. Atrial flutter with variable AV conduction block **B**
>120 ms (broad)	1. Ventricular tachycardia (VT) 2. Super-ventricular tachycardia with bundle branch block **C**	1. Ventricular fibrillation 2. AF with pre-excitation 3. AF with bundle branch block 4. Polymorphic VT **D**

The management of tachycardia depends on the type of tachycardia diagnosed on ECG. Most of the treatments are not available at everywhere, but we do have some treatments that may help the patient.

A. Regular RR interval, narrow complex tachycardia.

1. <u>Sinus tachycardia:</u>

- This is not an arrhythmia.
- Treat underlying cause (pain, anxiety, shock, sepsis, anaemia, thyroid disorder, etc.)

2. <u>Non-sinus narrow complex tachycardias (AVRT, AVNRT, Atrial flutter with regular AV block)</u>

- Start with vagal maneuvers.
  - Try blow into and inflate a syringe or balloon.
  - Carotid sinus massage with doctor supervision. DO NOT PERFORM IN CHILDREN.
- If vagal maneuvers fail give **IV adenosine,** if available.
  - Only do with ECG monitoring and DCCV (Direct current cardioversion) facilities available because there is risk of causing heart block and death.
  - Start with 6mg IV.
  - Repeat with 12mg IV if heart rhythm is still tachycardia.
- If adenosine is not available give **metoprolol PO 50-100mg STAT.**
  - Repeat metoprolol if there is no effect by 2 hours.
- If medical management fails discuss about referral for DCCV.

B. Irregular narrow complex tachycardia.

1-2. <u>Atrial fibrillation or atrial flutter:</u>

- Treat causes of AF (sepsis, heart failure, electrolyte abnormalities (especially potassium and magnesium).
- Rate control.
  - **Beta-blockers** or **calcium channel blockers.**
    - **Metoprolol:** initial dose 50mg, increase to 150mg BID depending on BP and heart rate.
    - Try to keep heart rate of **< 110 bpm.**
  - If have heart failure or hypotension, consider **digoxin**. Digoxin can cause severe side effects so to be very careful, especially if there is renal failure.
- These patients are at risk for blood clots forming in the heart and need life-long anti-coagulation treatment. The risk of anti-coagulation treatment is bleeding. Consider the risk and benefit for each patient before referral.

C. Regular broad complex tachycardia.

1. <u>Monomorphic Ventricular tachycardia (VT).</u>
  - Refer

2. <u>Supraventricular tachycardia with bundle branch block:</u>
  - Follow treatment for regular narrow complex tachycardia.
  - **Note:** if not sure of diagnosis, then treat like monomorphic VT and refer.

D. Irregular broad complex tachycardia.

1. <u>Ventricular fibrillation (VF).</u>
  - VF will cause death.
  - Start cardiac arrest management

2. <u>AF with pre-excitation.</u>
  - There is high risk to become VF.
  - Refer.

3. <u>AF with bundle branch block.</u>
  - Treat as AF
  - **Note:** if not sure of diagnosis then treat like AF with pre-excitation and refer.

4. <u>Polymorphic VT (torsade de pointes).</u>
  - Refer

CONGENITAL HEART DISEASE

ATRIAL SEPTAL DEFECT (ASD)

A hole connects to the atria

SIGN AND SYMPTOMS

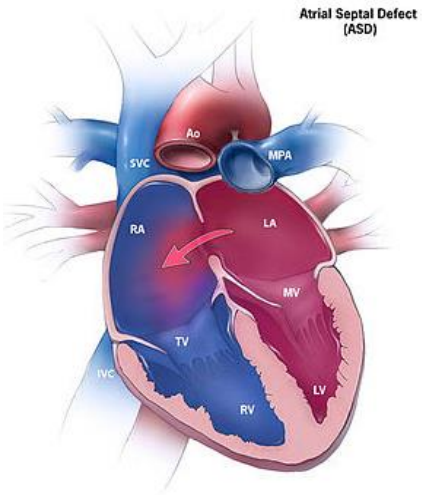
- AF
- Increase JVP
- murmur
- Pulmonary hypertension such as dyspnea, cyanosis, chest pain, ankle swelling
- Reversal to left to right shunt and
- paradoxical embolism as complication

DIAGNOSIS

- ECG
- CXR
- ECHO

TREATMENT

- Surgical closure is recommended before age 10yrs.
- In adult, closure is recommended if symptomatic.



VENTRICULAR SEPTAL DEFECT (VSD)

A hole connecting the two ventricles

SIGN AND SYMPTOM

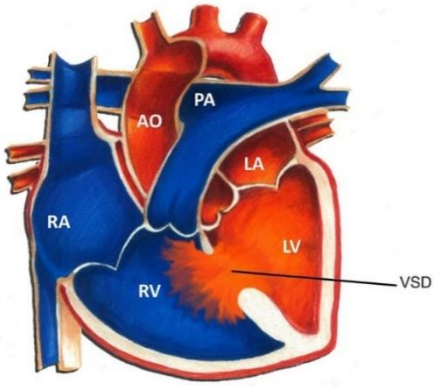
- May present with severe heart failure in infancy or remain asymptomatic
- Heart murmur
- May get Left parasternal heave
- pulmonary hypertension as association
- Aortic regurgitation and
- Infective Endocarditis as complication

INVESTIGATION

ECG, CXR, Cardiac catheter

TREATMENT

Medical, at first many VSD close spontaneously. Surgical closer- failure of medical therapy.



COARCTATION OF THE AORTA

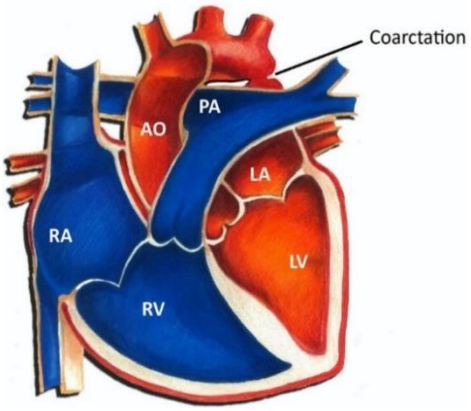
Congenital narrowing of the descending aorta

SIGN

- Systolic murmur
- Radio femoral delay
- Weak femoral pulse
- BP
- Scapular bruit
- Heart failure,
- infective endocarditis as complication

TREATMENT

Surgery



TETRALOGY OF FALLOT

MAJOR DEFECTS

1. Pulmonary Stenosis
2. Right Ventricular Hypertrophy
3. Overriding Aorta
4. Ventricular Septal Defect

SYMPTOMS

- Murmur
- Cyanosis
- Rapid breathing

INVESTIGATION

- **ECHO**
- Cardiac catheterization

TREATMENT

Surgery

ELECTROLYTE ABNORMALITIES

DEFINITION

Our bodies carefully control the amount of electrolytes in our body. If the level is too high or too low, this can be dangerous.

POTASSIUM

Potassium is important for the heart and other muscles to work. The reference range is **3.5-5.1mmol/L**.

For potassium, mmol/L is the same as **mEq/L**. A conversion formula is not needed.

HYPERKALAEMIA

High potassium can be an emergency because it can cause abnormal rhythms in the heart. Do ECG if available. **>6.5mmol/L is an emergency or >6 mmol/L with changes on the ECG**

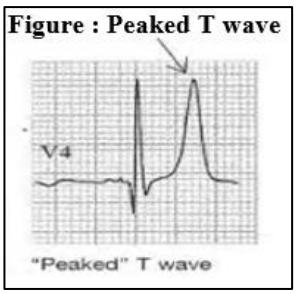
DEFINITION

High potassium is **>5.1mmol/L**

CAUSES

1. Renal Failure.
2. Medications e.g., ACE-inhibitor (e.g., enalapril), spironolactone, NSAID's.
3. Endocrine diseases e.g., Addison's disease (failure of adrenal gland with low cortisol).
4. Haemolysis (breakdown of red blood cells that release potassium).
5. Burns, heat stroke, rhabdomyolysis (break down of muscles).
6. Metabolic acidosis e.g., severe shock.
7. Pseudohyperkalaemia (if red blood cells break down when taking blood then the level of potassium can be falsely high).

Figure : Peaked T wave



SIGNS AND SYMPTOMS

- Asymptomatic, sometimes non-specific tiredness, muscle weakness.
- Abnormal heart rhythm – may cause tachycardia, palpitations, chest pain.
- If severe may cause death.
- ECG can show peaked T waves.

TREATMENT

- Stop any medications that may be causing the problem. Treat the underlying cause.
- If renal function is normal and no other obvious cause, consider repeating the potassium as it may be falsely high from the breakdown of the red blood cells when taking blood.
- If **potassium >6.5 or >6** with changes on ECG, there is a high risk of sudden death. If available, try the treatments below and **refer immediately**.
  - **Calcium Gluconate** 10% 10ml **SLOW IV** over at least 10 minutes (stabilization of membrane potential).
  - **Salbutamol** 5 mg with 3-4 ml saline nebulize over 10 minutes (shifting ECF potassium into the ICF).
  - **Regular Insulin** 10 units I.U with 50 ml of 50% glucose (shifting ECF potassium into the ICF).
  - **Resonium A** 15 mg orally 4-6 hours (Remove potassium from the body).

HYPOKALAEMIA

DEFINITION

Low potassium is **<3.5 mmol/L.**

CAUSES

1. Medications
   e.g., furosemide, hydrochlorothiazide, insulin.
2. Gastrointestinal loss e.g., diarrhoea (also vomiting).
3. Metabolic alkalosis.
4. Low intake in diet e.g., malnutrition.
5. Endocrine diseases e.g., **Conn's syndrome** (too much aldosterone production).
6. Low magnesium (can be caused by to penicillin).

SIGNS AND SYMPTOMS

- Usually, asymptomatic.
- Severe hypokalaemia will cause muscle weakness, myalgia, muscle cramps and constipation.
- Paralysis can occur.
- If severe can cause death.

TREATMENT

- Stop any medications that may be causing the problem. Treat the underlying cause.
- Encourage patient to eat bananas, tomatoes, leafy green vegetables, coconut water, lemons, limes, oranges. These foods have high potassium content.
- Potassium can be replaced by tablets (swallow tablets whole during meals with lots of fluid) or IV depending on level of potassium:

Mild Hypokalaemia	**3.0-3.4 mmol/L**	PO **one tablet* BID for 1 week** and re-check potassium.
Moderate hypokalaemia	**2.5-3.0 mmol/L**	PO **two tablets* TID for 3 days** and re-check potassium If not increasing, give **magnesium** and try two tablets QID and consider admission for IV potassium.
Severe hypokalaemia	**< 2.5 mmol/L**	****Note:** IV replacement can be dangerous and should be done with cardiac monitoring. Refer patient immediately if possible** ****All the potassium IV replacement is to be supervised/instructed by the doctor. Use a pulse oximeter to monitor the pulse during the IV infusion****

*Dose for Slow **K** (600mg tablet = 8mmol or mEq potassium)

If cannot correct the potassium, then the magnesium may be low. You need to increase the magnesium first before the potassium can be corrected.

CALCIUM

Calcium is important for muscles to work. The reference range is 2.15-2.55mmo/L.

Conversion formula for mg/dL and mmol/L (calcium)
mmol/L = mg/dL * 0.2495
mg/dL = mmol/L ÷ 0.2495

HYPERCALCAEMIA

DEFINITION

High calcium is a calcium >2.55mmol/L or 10.5mg/dL..

Mild Hypercalcaemia	10.5-11.9 mg/dL	2.6-2.9 mmol/L
Moderate Hypercalcaemia	12-13.9 mg/dL	3-3.5 mmol/L
Severe/Crisis	>14mg/dL	>3.6 mmol/L

CAUSES

1. Medications e.g., hydrochlorothiazide.
2. Renal failure.
3. Tuberculosis.
4. Cancers e.g., bone, lung.
5. Endocrine disorder e.g., hyperparathyroidism.

SIGNS AND SYMPTOMS

'Stones, Bones, Abdominal Moans and Psychic Groans'

- **Stones** – kidney stones or gallstones.
- **Bones** – bone pain.
- **Abdominal moans** – constipation, nausea and vomiting, abdominal pain.
- **Psychic groans** – depression, confusion.

TREATMENT

- Stop any medications that may be causing the problem. Treat the underlying cause.
- The most important treatment is to rehydrate with IV fluids (NSS 0.9% bolus until diuresis >20cc/hour) – be careful of fluid overload if the patient has renal failure.
- Diuretics e.g., furosemide can also help to decrease the calcium – do **NOT** give if the patient is dehydrated.
- Other medications e.g., bisphosphonates can be used but may not be available.

HYPOCALCAEMIA

DEFINITION

Low calcium is a calcium of<2.15mmol/L or 8.6mg/dL

CAUSES

1. Low oral intake of calcium
2. Medications/toxins e.g., diuretics, gentamicin, alcohol.
3. Low vitamin D (or not enough sun exposure e.g., rickets), hypoparathyroidism.
4. Sepsis.
5. Other electrolyte disturbances: High phosphate, low magnesium.

SIGNS AND SYMPTOMS

- Tingling around the mouth and lips and in the hands and feet.
- Tetany (strong contractions of the hands and large muscles).
- Positive Chvostek (muscle spasm when tapping the facial nerve just before the ear) and Trousseau (arm cramps when getting the BP).

TREATMENT

- Stop any medications that may be causing the problem. Treat the underlying cause.
- Increase dairy products e.g., milk, yogurt.
- Calcium PO replacement.
  - Calcium carbonate (**Calcium carbonate** 500 mg/1000 mg tablets) OR
  - Calcium carbonate combined with Vitamin D3 (**Calcium carbonate** 500mg **+Vitamin D3** 200IU)
- If severe low calcium (<1.9mmol/l) OR patient has symptoms, discuss with doctor.
  - **Calcium Gluconate** 10% 10ml SLOW IV over 10 minutes – can repeat until patient symptoms stop.

SODIUM

Sodium is important for maintaining fluid balance in the body. The reference range is **136-145mmol/L**.

For sodium, mmol/L is the same as mEq/L. A conversion formula is not needed.

HYPERNATRAEMIA

DEFINITION

High sodium is >145mmo/L

CAUSES

1. Dehydration
2. Endocrine disorder e.g., diabetes insipidus (problem with controlling water balance in the body.

SIGNS AND SYMPTOMS

- Lethargy, weakness, irritable.
- Oedema.
- Seizures, coma.

See Figure Differential Diagnosis for hypernatraemia

TREATMENT

- Treatment depends on the cause. Discuss with doctor.
- **Treat** for **hypernatraemia**
- Best way to correct is to let the patient drink water or give by NGT. If IV D5W must be used, monitor for hyperglycaemia.

It is very important to correct the sodium to normal very slowly. A rapid decrease in the sodium can cause brain damage.

HYPONATRAEMA

DEFINITION

Low sodium is **<136mmol/L.**

CAUSES

1. Fluid overload e.g., heart failure, ascites.
2. Medications e.g., furosemide, ACE inhibitors.
3. Endocrine problems e.g.,SIADH, hypothyroidism.
4. Tuberculosis.
5. Prolonged vomiting & diarrhoea.
6. Drinking too much water (psychogenic polydipsia).

SIGNS AND SYMPTOMS

- If not severe can be asymptomatic.
- Nausea, vomiting, headache, loss of appetite.
- Lethargy, confusion, memory loss.
- Convulsions, coma.

TREATMENT

Stop any medications that may be causing the problem. Treat the underlying cause. Discuss with doctor.

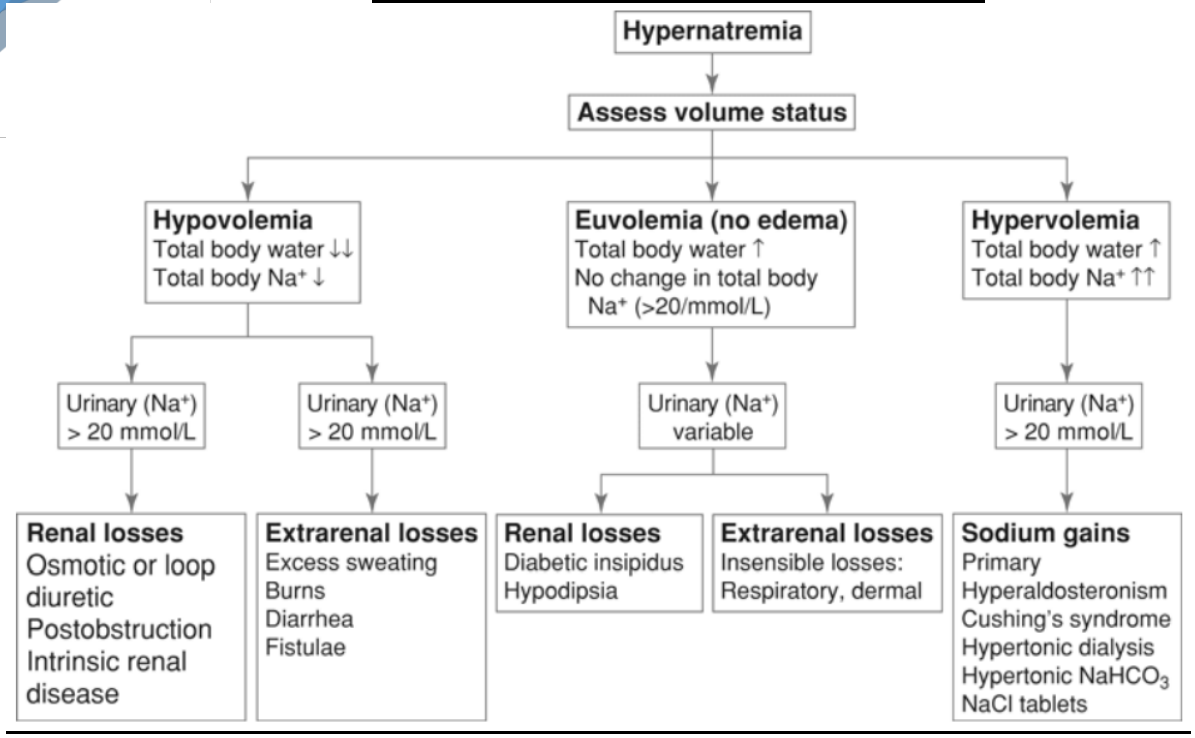
Treatment depends on the cause and includes:

- Fluid restriction and/or
- Sodium replacement.

Sodium levels should not increase more than 8-9mmol/L per 24 hr or 1mmol/L per 1 hr.

It is very important to correct the sodium to normal **very slowly. A rapid increase in the sodium can cause brain damage.**

Figure Differential diagnosis for hypernatraemia



RESPIRATORY DISEASES

CHEST EXAMINATION

On listening (auscultation) to the chest, you may hear some examples of **abnormal breath sounds. Breath sounds must** be compared between the left and right lung, and the different lobes of each lung.

Quantity: Breath sounds may be reduced or absent over areas of the lung where less air is entering because of disease.

Quality: Normal breath sounds are 'vesicular' in the lungs (a) and 'bronchial' over the trachea (b) and main bronchi (c). Bronchial breath sounds heard in the lungs are a sign of pneumonia.

See Figure lung anatomy.

LUNG ANATOMY

The most common abnormal sounds heard are:

Crepitation: are crackles made when air enters the alveoli [g] and small bronchi [d] and makes them open. Crepitation is also the sound of air bubbling through mucus or fluid in the alveoli [g]. If crepitation disappears after coughing, they are probably not significant.

Wheeze: is a whistling sound caused by air passing through narrowed airways [d and e]. Wheeze can be caused by asthma, chronic obstructive pulmonary disease (COPD) and sometimes pulmonary oedema. It can be associated with infection, especially in children < 2 years (bronchiolitis [e]). If wheezing is heard only in one small area of the lung, and it does not disappear after coughing, it may be caused by a tumour or foreign body causing partial obstruction of a bronchus [c].

Stridor is a sound that comes from the vocal cord area (glottis and epiglottis).

Pleural Rub: is a rough creaking sound usually heard in only one area during inspiration and expiration. It is caused by movement of the two pleural surfaces [b] over each other when the surfaces are rough because of inflammation (e.g., pleurisy caused by pneumonia, TB).

ACUTE RESPIRATORY INFECTIONS

Acute respiratory infections (ARI) can be divided into:

1. Upper Respiratory Tract Infections (URTIs): ear, nose, throat, tonsils, sinuses.
2. Lower Respiratory Tract Infections (LRTIs): lungs.

UPPER RESPIRATORY TRACT INFECTIONS

DEFINITION

Upper Respiratory Tract Infections (URTIs): infections of the upper airways which include the ear, nose, throat, tonsils or sinuses. Most of these infections are caused by viruses (so do not need antibiotics) and last for a short time only. The lungs are not affected. If the symptoms are severe and/or last for more than a week, this may be a sign of a more severe bacterial infection or influenza.

COMMON COLD

DEFINITION

Common cold is a mild URTI caused by a virus. It is very common and not dangerous. It can be an early sign of another infection (e.g., measles or influenza) or complicated by a bacterial infection (e.g., otitis media or sinusitis). In any community, a lot of people will have a cold at the same time.

SYMPTOMS

Nasal discharge or block, sore throat, cough, mild or no fever, lacrimation (more tears in the eyes). In children under 5 years, routinely check the tympanic membranes to look for an associated otitis media.

TREATMENT

Paracetamol 3 days and advise when to come back to clinic. Symptomatic treatment with cough and cold medications. Patients can find these in any pharmacy. These drugs should be avoided in children.

SINUSITIS

DEFINITION

Acute sinusitis is an infection of the sinuses with pus discharge from nose or around teeth. This may develop into chronic sinusitis. Most acute sinus infections are viral and resolve spontaneously within 10 days. Acute bacterial sinusitis may be a primary infection, a complication of viral sinusitis or of dental origin. Especially in children, bacterial sinusitis can spread to the bone, eye or meninges (causing meningitis) so it is important to treat.

SYMPTOMS

- Unilateral or bilateral discharge, nasal obstruction.
- Facial unilateral or bilateral pain that increases when bending over, painful pressure either side of nose or behind forehead.
- Usually, no fever or mild fever.
- **Sinusitis likely if symptoms:**
  - Continue for more than 10-14 days AND/OR.
  - Worsen after 5-7 days AND/OR.
  - Are severe (severe pain, high fever, deterioration of general condition).

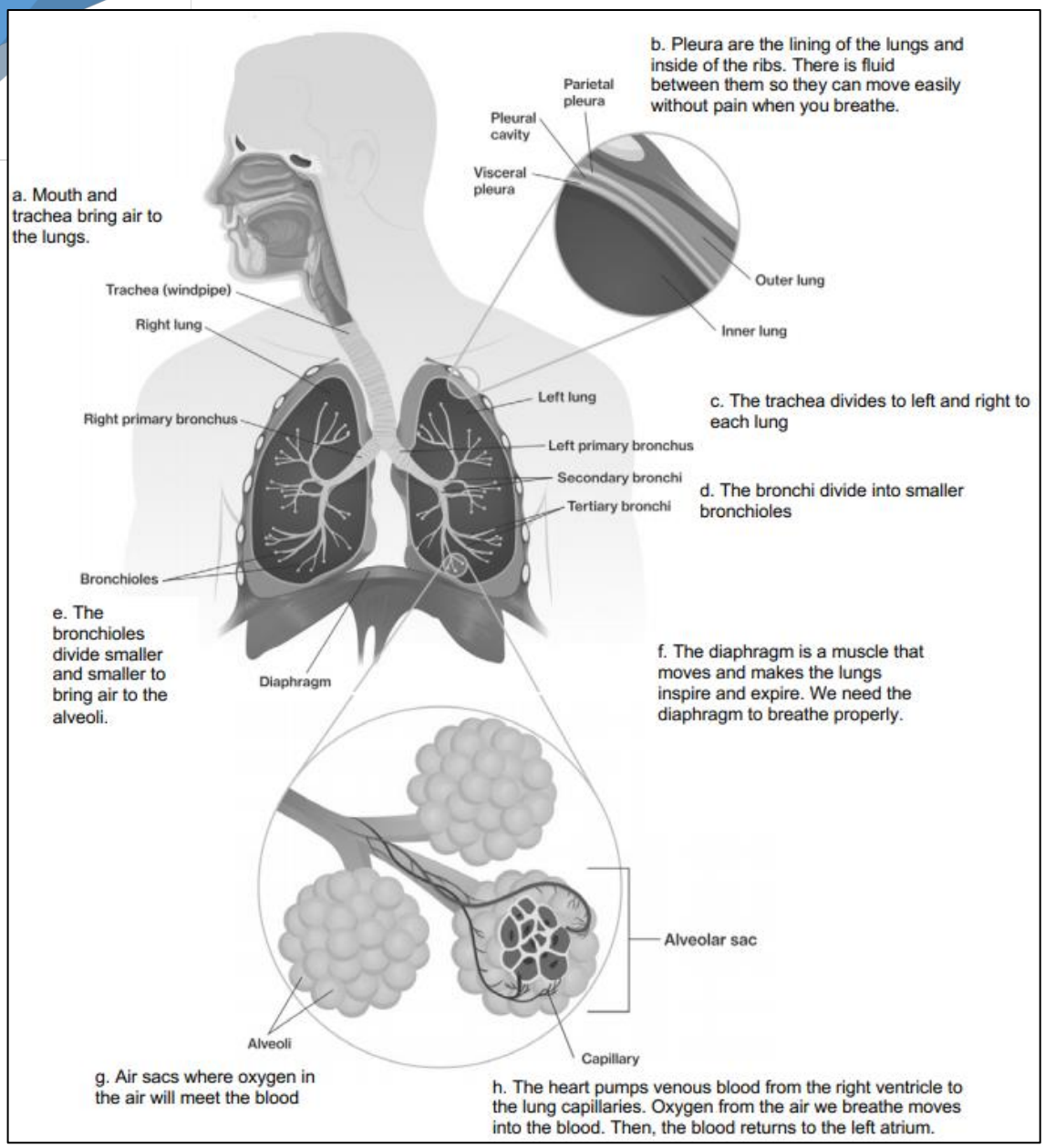


Figure: Lungs Anatomy

TREATMENT

- **Paracetamol** and NS drop
- **Amoxicillin** Adult: 500mg TID, for severe infection, use up to 1 g TID. Child: 15 mg/kg TID, can increase up to 30 mg/kg TID (if needed) for 7-10 days.
- If no response within 48 hours considers switching to **co-amoxiclav** PO for 7 to 10 days. To calculate dose, use the amoxicillin (not the clavulanate):
- Children < 40 kg: 25 mg/kg 2 times daily. AND
- Children ≥ 40 kg and adults:
    - 2 tablets of 500/62.5 mg 2 times daily OR
    - 1 tablet of 875/125 mg 2 times daily

PHARYNGITIS

DEFINITION

Inflammation of the pharynx (throat), it is very common.

SYMPTOMS

- Sometimes a sore throat is the only symptom. It may also be painful to swallow.
- The throat may be red with or without whitish exudate. Fever may or may not be present.
- In patients over 14 years, the probability of bacterial pharyngitis is low.
- Symptoms typically get worse over 2 to 3 days and then gradually go, usually within a week.

Note: if there is a grey membrane on the back of the throat suspect diphtheria.

TREATMENT

Analgesia (pain treatment) e.g., **paracetamol.**
No antibiotics.

TONSILLITIS

DEFINITION

Tonsillitis is an infection of the tonsils at the back of the mouth, which is most commonly due to a bacterial or viral infection.

SYMPTOMS

- Similar to pharyngitis but more severe, in particular, fever and generally feeling unwell tend to be worse than pharyngitis symptoms.
- Sore throat is worse on swallowing or turning the head.
- Swollen neck glands are common.
- Pus may appear as white spots on the tonsils.
- Most cases of viral tonsillitis improve after 3 to 4 days.

The following symptoms make bacterial tonsillitis more common:

1. Absence of cough.
2. Fever >38°C.
3. At least one enlarged and painful anterior cervical lymph node.
4. Presence of pus on tonsils.

COMPLICATIONS

Peritonsillar abscess
Rheumatic fever
Acute glomerulonephritis

TREATMENT

Treatment with antibiotics if suspect bacterial cause, can help prevent complications. Treat the fever and advise the patient to drink plenty of fluids.
See Table Treatment of Tonsilitis

PERITONSILLAR ABSCESS

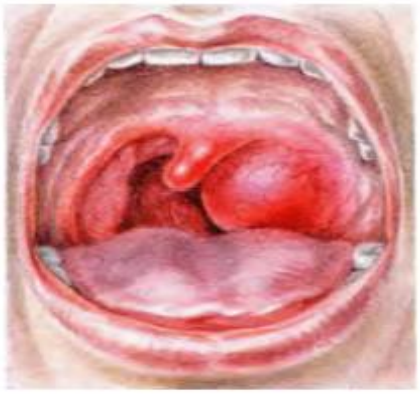
DEFINITION

Abscess located along the outside of the tonsils. This may look similar to cellulitis of the tonsil and pharyngeal area.

SIGNS AND SYMPTOMS

- Severe sore throat and pain with swallowing.
- Muffled voice.
- Trismus (neck muscle spasm).
- Neck swelling and pain, pain in the ear on the same side as the abscess.
- This can be life threatening if the airway is blocked (drooling, stridor, or cyanosis).

Table: Treatment of Tonsilitis



PERI TONSILLAR ABSCESS

RISK FACTORS

- Recent tonsillitis or pharyngitis.

TREATMENT

- **Needle aspiration and drainage of the abscess is necessary**. If this is not available, the patient should be referred to the hospital. If the patient does not have respiratory distress, you can try to start antibiotics to see if there is improvement (especially if the diagnosis is cellulitis and not abscess).
- If severe, treat with **IV ampicillin or IV clindamycin.**
- If moderate, treat with oral **Coamoxiclav or clindamycin.**

DIPHTHERIA

DEFINITION

Diphtheria is an infectious disease caused by the bacteria Corynebacterium diphtheriae. It spreads from person to person by respiratory droplets from the throat through coughing and sneezing. The diphtheria bacteria produce toxins throughout the body.

SYMPTOMS

- Tonsillitis with grey sticky membranes in the throat.
- High fever >39°C.
- Oliguria, cervical oedema, enlarged cervical lymph nodes.

Signs of haemorrhage e.g., purpuric rash, epistaxis, bleeding gums**.**

COMPLICATIONS

1. Myocarditis
2. Neuropathies
3. Renal failure
4. Pneumonia

TREATMENT

- **Immediate strict isolation. Refer quickly if possible, especially for laryngeal obstruction (needs urgent intubation), cardiac or neurologic complications.**
- Nose and throat samples for culture if available.
- If strong suspicion starts antibiotic treatment.
  See Table Treatment of Diphtheria
-

Table: Treatment of Tonsilitis

If the patient can take PO tablets and can eat and drink:

Adult:	**Penicillin V PO 500mg QID x 10 days** **OR Benzathine penicillin** IM 1.2 million IU STAT
Child:	**Penicillin V PO 15mg/kg QID x 10 days** **OR Benzathine penicillin** IM 25,000-50,000 IU/kg (max 1.2 million IU) STAT

Note: shorter courses of penicillin V do not prevent Rheumatic Fever, must finish 10 days treatment.

If allergic to penicillin

Adult:	**Erythromycin 500mg QID PO x 5 days**	**OR**	**Azithromycin 500mg OD PO x 3 days**
Child:	**8 - 18 yrs 250 - 500mg QID** **2 - 8 yrs 250mg QID** **1m - 2 yrs 125mg QID**		**20mg/kg (max 500mg) OD** **20mg/kg (max 500mg) OD** **20mg/kg (max 500mg) OD**

****Double dose in severe infection****

If the patient cannot take tablets and cannot eat or drink, admit to IPD and give IV fluids and treat with antibiotics as follows:

Adult:	**Benzathine penicillin** IM 1.2 million IU STAT. OR **Benzyl penicillin** IV 1.2g QID. **OR Ampicillin IV 1g QID.**
Child:	**Benzathine penicillin** IM 50,000 IU/kg STAT (max 1.2 million IU) OR **Benzyl penicillin IV 25mg/kg QID.** **OR Ampicillin IV**

Change to **penicillin V PO** when the patient can swallow. Treat for a **total of 10 days.**
Note: Monitor for rash: if gets rash may be because diagnosis is **Epstein Barr Virus (EBV)** as the virus reacts with ampicillin causing a rash.

Table: Treatment of Diphtheria

Adult:	**Benzathine penicillin** IM 1.2 million IU STAT OR **Benzyl penicillin** IV 2.4g QID x 7 days.
Child:	**Benzathine penicillin** IM 50,000 IU/kg (max 1.2 million IU) STAT OR **Benzyl penicillin** IV 50mg/kg QID x 7 days

If allergic to penicillin: **Erythromycin** PO Adult: 500mg QID; Child: dose as for tonsillitis x 7days.

- Give antitoxin serum (see below).
- **Antitoxin serum** should be given with caution, because of common allergic reactions:
- Give 0.1ml SC. Wait 15 min. If no allergic reaction or erythema around the injection site give 0.25ml SC.
- Observe for further 15 min before injecting the rest IM or IV.
- Same dose for adults and children • Give IV if more than 20,000 units in 200ml NSS over 4 hours.

Laryngitis or **pharyngitis**	20,000 - 40,000 units
Rhinopharyngitis (inflammation nasal and pharyngeal mucosa)	40,000 - 60,000 units
Serious form or **>48hours after onset of symptoms**	80,000 - 100,000 units

Having the disease does not give you immunity, you need to update the vaccination after patient has recovered

PREVENTION

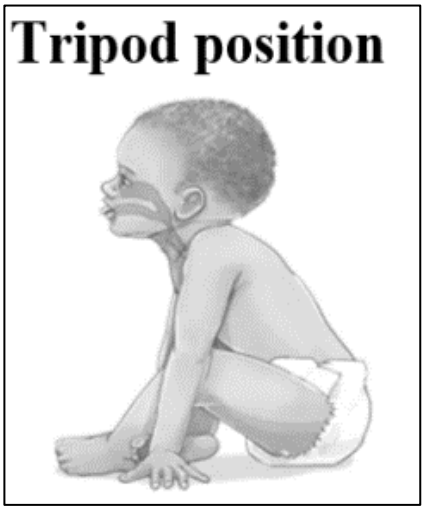
- Routine vaccination and mass vaccination in an epidemic.
- Close contacts (e.g., Family members, children in the same class at school, medical personnel).
- Treat with **benzathine penicillin** (single dose IM) or **erythromycin** (7 days orally) (as per treatment dose).
- If possible, quarantine and do daily monitoring (throat exam and temperature) for 7 days and no school or work until 48 hours after finishing antibiotics.

Check vaccination status:

- If less than 3 vaccines: **complete course.**
- If received 3 injections and had last injection more than one year before: give a **booster dose**.
- Medical personnel in direct contact with patients: give a **booster dose**.

ACUTE EPIGLOTTITIS

Severe bacterial infection of the epiglottis seen in the children.



SIGNS AND SYMPTOMS

- Sudden onset of symptoms.
- Sore throat.
- High fever (Temp > 38.5 ·C)
- Stridor.
- Lack of immunization.
- Danger signs are rapidly becoming severe, drooling, **'tripod'** position (patient keeps his air way open).

TREATMENT

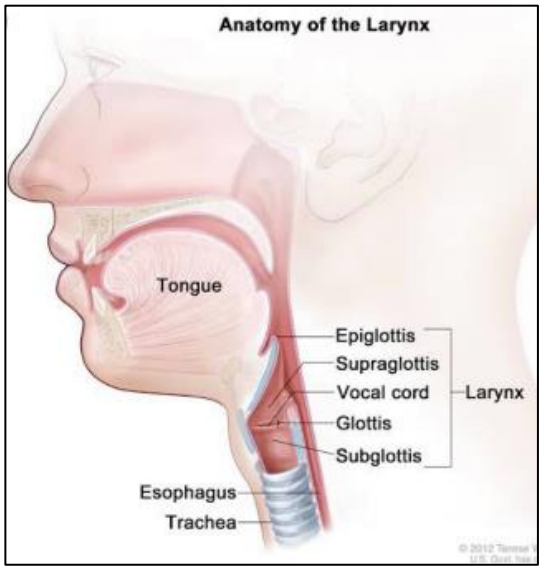
- **Prednisolone** 2 mg/kg (Max 40 mg).
- **5 ml adrenaline** nebulized.
- **Ceftriaxone** 50 mg/kg IM or IV.
- If cannot transfer, **Adrenaline nebulized PRN**, **Ceftriaxone 10 days**. Can change to **Coamoxiclav** when afebrile and well.

VIRAL CROUP

(Acute Laryngotracheobronchitis ALTB)

AETIOLOGY AND EPIDEMIOLOGY

- A clinical syndrome characterized by barking cough, inspiratory stridor, hoarse voice and respiratory distress of varying severity.
- A result of viral inflammation of the larynx, trachea and bronchi, hence the term ***laryngotracheobronchitis.***
- The most common pathogen is parainfluenza virus (74%), (types 1, 2 and 3).



CLINICAL FEATURES

- Children aged 3 months to 4 years.
- Low grade fever, cough and coryza for 12-72 hours, followed by:
- Increasing bark-like cough and hoarseness. (**https://www.youtube.com/watch?v=vDdJo0RPKa8&ab_channel=EMTprep**)
- Stridor that may occur when excited, at rest or both.
- Respiratory distress of varying degree.

DIAGNOSIS

- **Croup is a clinical diagnosis**
- **In severe croup**, it is advisable to examine the pharynx under controlled condition, i.e., in the ICU or Operation Theatre.
- A neck Radiograph is not necessary, unless the diagnosis is in doubt, such as in the exclusion of foreign body.

ASSESSMENT OF SEVERITY

Clinical Assessment of Croup (Wagener)

- **Severity**
  - **Mild:** Stridor with excitement or at rest, with no respiratory distress.
  - **Moderate:** Stridor at rest with intercostal, subcostal or sternal recession.

- **Severe:** Stridor at rest with marked recession, decreased air entry and altered level of consciousness.

- Pulse oximetry is helpful but not essential.

MANAGEMENT

Indications for hospital admission

- Moderate and severe viral croup.
- Age less than 6 months.
- Poor oral intake.
- Toxic, sick appearance.
- Family lives a long distance from hospital; lacks reliable transport.

See Algorithm for Management of Viral Croup

Footnote

- The decision to intubate under controlled conditions (in Operation Theatre or Intensive Care Unit, with standby for tracheostomy) is based on clinical criteria, often from increasing respiratory distress.
- Indication for oxygen therapy include: **1. Severe viral croup; 2. Percutaneous Spo_2 < 93%.**
- With oxygen therapy, **Spo_2** may be normal despite progressive respiratory failure and a high **$PaCO_2$.** Hence clinical assessment is important.

Algorithm for the management of Viral Croup

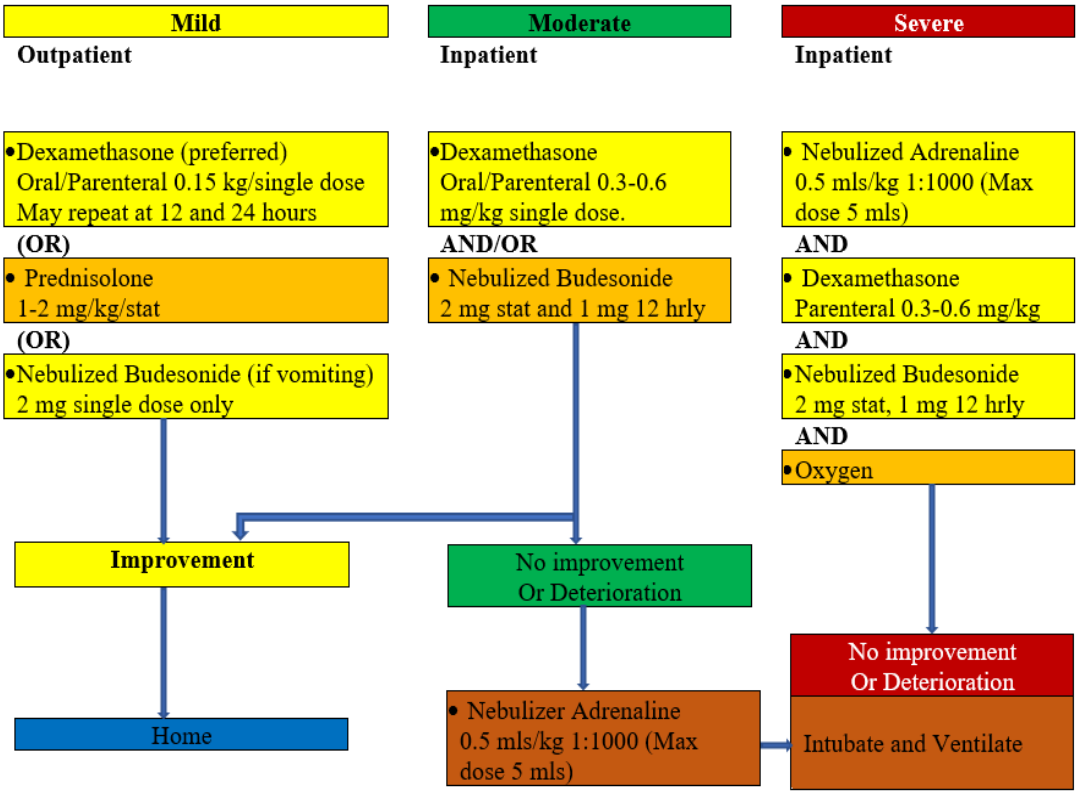
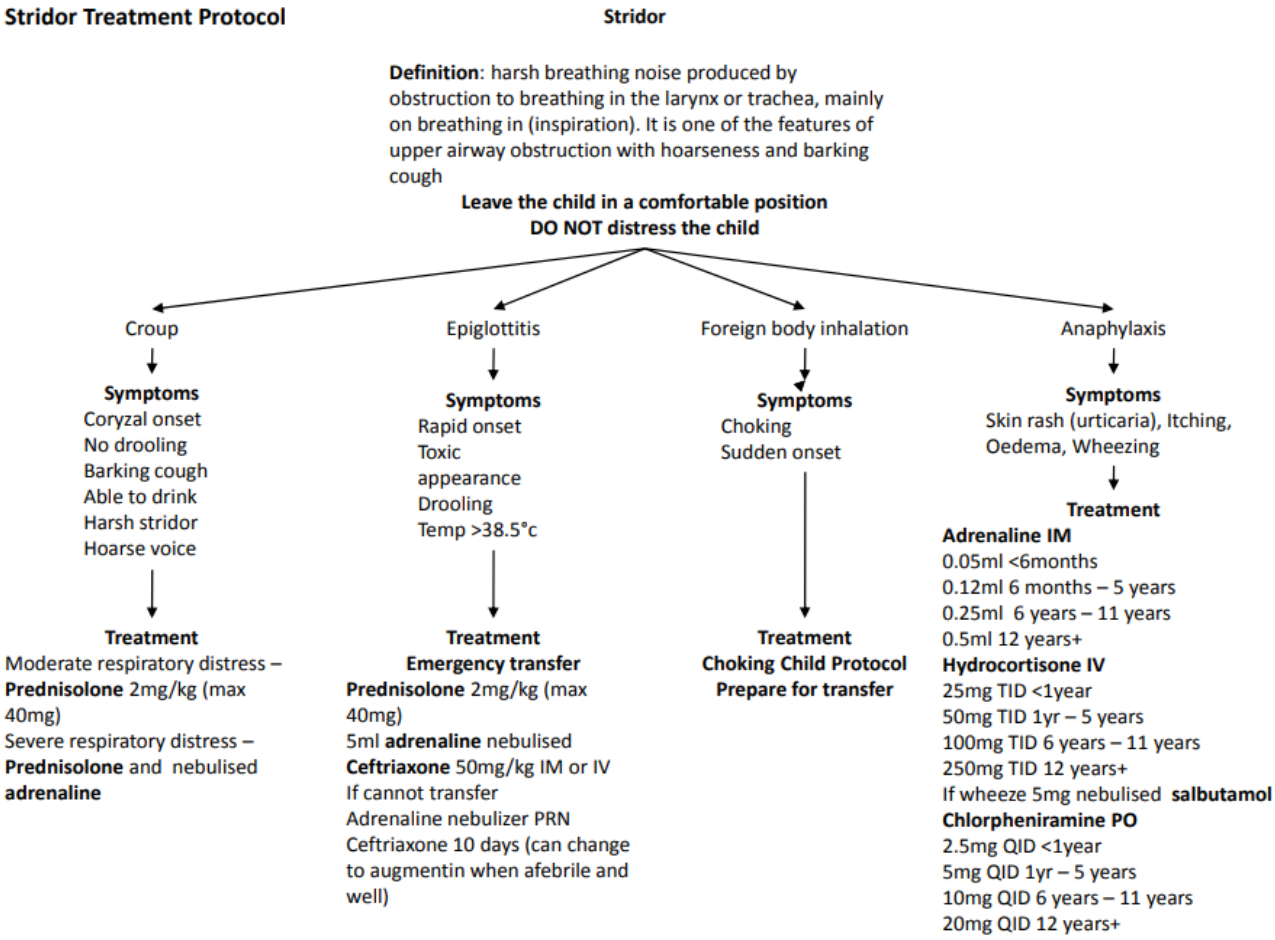


Figure: for Management and treatment of stridor in children



PERTUSSIS

DEFINITION

Pertussis is also known as whooping cough, is a highly contagious disease that is caused by the bacterium ***Bordetella pertussis***. It is transmitted through inhalation of droplets spread by infected individuals e.g., coughing, sneezing. Pneumonia can be a complication.

SYMPTOMS

- Most cases are in non-vaccinated or incompletely vaccinated individuals.
- Initially mild ARI symptoms.
- After one to two weeks coughing is followed by an inspiratory 'whooping' sound mostly at night, and vomiting.
- Fever is often absent or not too high, and the clinical exam may be normal between episodes of coughing.
- After weeks or months, the symptoms gradually resolve.

TREATMENT

- Admit infants less than 3 months (observe 24 hours because risk of apnoea)
- Admit severe cases
- Try to isolate patients (airborne isolation) until the patient has received 5 days of antibiotic treatment.
- Hydration and nutrition: Ensure children are well hydrated, breastfeeding should continue, feed the child frequently in small quantities after coughing episode, monitor the weight and consider food supplements.
- **Antibiotics:** give in first **3 weeks after onset of cough.**
  - **First line: Azithromycin** PO
    - Adult: D1 500mg STAT, D2-D5 250mg OD
    - Child: 10mg/kg OD (max 500mg) x 5 days
  - **Second line: Erythromycin** PO
    - Adult: 500mg QID x 7 days
    - Child: dose as for tonsillitis x 7days

PREVENTION

- Isolate patients in IPD and OPD so they cannot spread the infection to others.
- Pertussis vaccine can prevent severe disease in young children.
- Antibiotic prophylaxis (azithromycin same dose as treatment for 5 days) for unvaccinated/ incompletely vaccinated infants.

INFLUENZA

DEFINITION

Influenza is a viral infection that can be very contagious. Often there is close contact with someone who has similar symptoms. Different strains of influenza occur such as the avian influenza (H5N1). Common influenza is self-resolving, but some dangerous strains can become pandemics (epidemic that spreads across countries) and have high morbidity and mortality.

SIGNS AND SYMPTOMS

- Fever, muscle pain, headache.
- Respiratory symptoms (cough, sore throat and runny nose).
- Diarrhoea.
- Shortness of breath (dyspnoea).
- Clinical pneumonia.

DIAGNOSIS

Clinical diagnosis initially, NPA result can help confirm.

TREATMENT

- **Paracetamol** for fever and pain.
- Antibiotics not required.
- Encourage sufficient oral hydration.

PREVENTION

- Infection prevention: the patient should wear a mask and should cover his/her mouth with a cloth while coughing or sneezing and wash their hands afterwards.
- Hand hygiene.
- Isolate patients in IPD and OPD so they cannot spread the infection to others.

LOWER RESPIRATRY TRACT INFECTIONS

BRONCHIOLITIS

DEFINITION

A viral infection of the tiny airways, called the bronchioles, especially in children less than 2 years of age.

SIGNS AND SYMPTOMS

- Fever (usually low grade).
- Increased RR or difficult breathing.
- Cough and coryza.
- Prolonged expiration phase, wheeze and/or crepitation throughout the lungs (not focal).

DIAGNOSIS

- Diagnosis is usually clinical.
- Chest X-ray: peri bronchial thickening, hyperinflation or flat diaphragms.
- WBC and CRP will usually be normal (can help differentiate bronchiolitis from bronchopneumonia).

TREATMENT

1. Salbutamol or adrenaline inhalation or nebulizer. Use the treatment that the patient responds to better.
2. No antibiotics unless the clinical condition becomes worse, or investigations are abnormal.
3. If the patient is on oxygen and difficult to wean or if there have been many episodes of bronchiolitis, you can try using prednisolone 1 mg/kg/day for 3-5 days.

PREVENTION

Counsel the family to keep the child away from smoke (e.g., cigarettes, cheroot, cooking fire or when burning the fields for farming.

Figure: for Management of bronchiolitis in children < 1 year

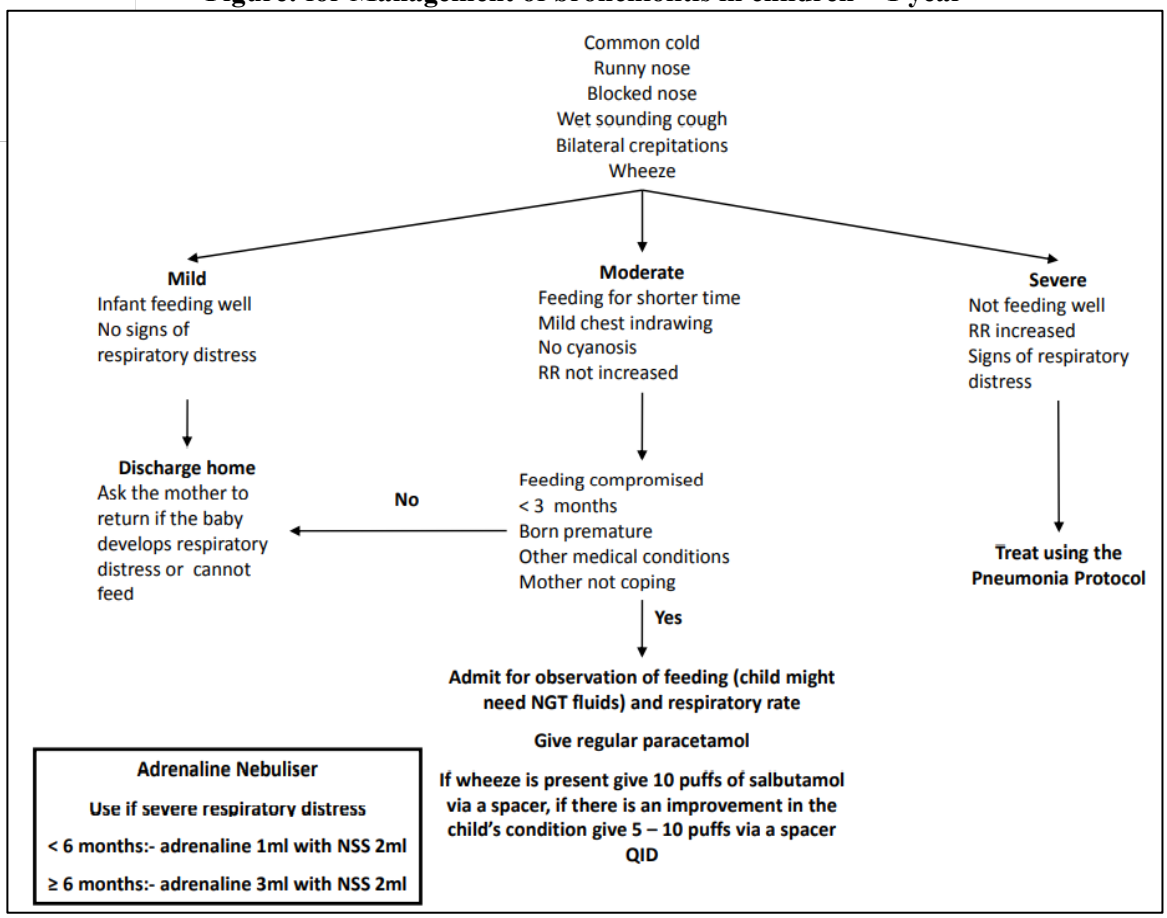
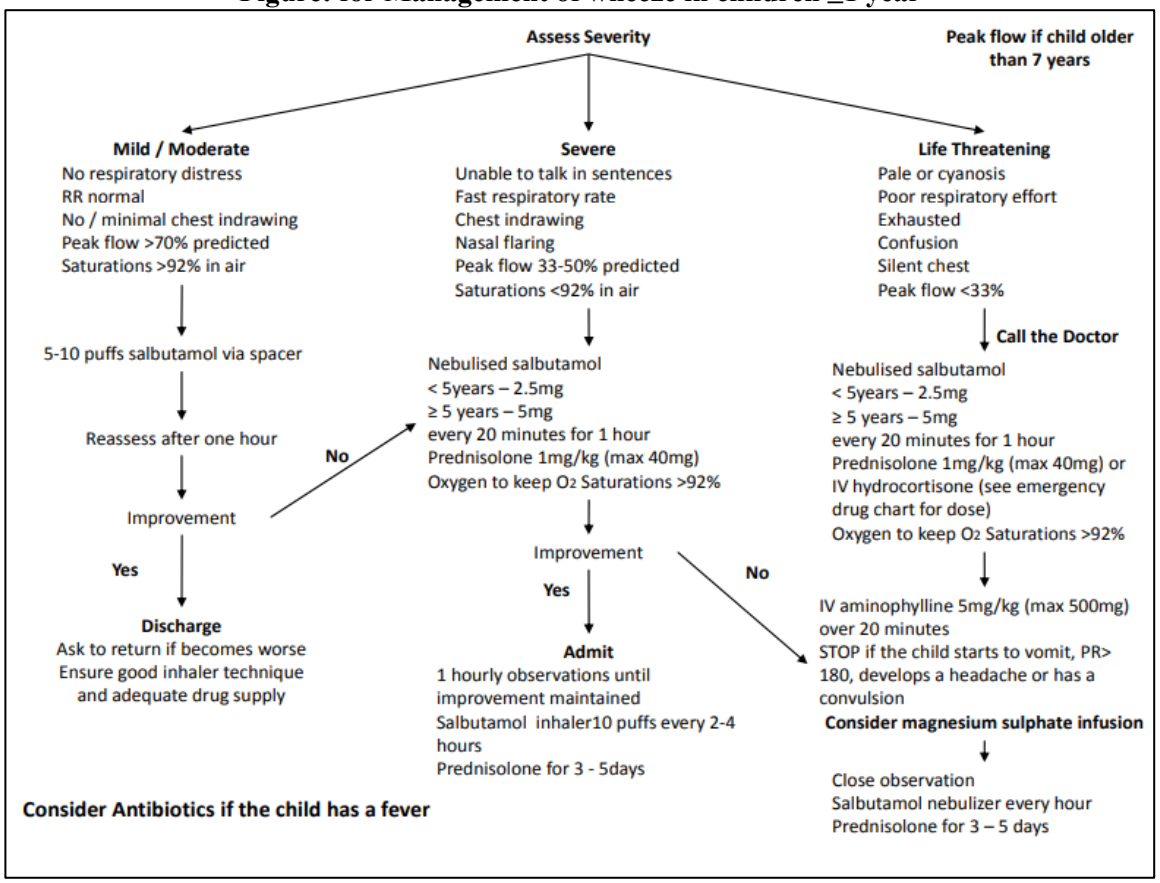


Figure: for Management of wheeze in children ≥1 year



PNEUMONIA

DEFINITION

Pneumonia is an infection affecting the lungs and smaller airways. These can be viral, bacterial, parasitic or fungal infections.

SIGNS AND SYMPTOMS

SYMPTOMS

- Cough, sputum: yellow or green (may have blood)
- Dyspnoea, fast breathing
- Chest pain (with cough and deep breaths)

SIGNS

- Inspection: cyanosis, nasal flaring, chest indrawing, superficial or asymmetric breathing.
- Percussion: dullness.

Auscultation: abnormal breath sounds.

In addition, patients with pneumonia may have general signs and symptoms of infection:

- Fever, rigors
- Generally unwell, tired
- Tachycardia
- Dehydration, low blood pressure

Signs of severity in adults

Rapid breathing	(RR >30/min)
Cyanosis	(blue colour of lip or nails, CRT>2 seconds)
Reduced consciousness or confusion	Especially in elderly
Low blood pressure	(SBP<90 mmHg or DBP<60 mmHg)
High pulse Rate	(>120 beats/minute)
Low **SpO_2**	(<94%)
Chest indrawing or nasal flaring	

DIAGNOSIS

To diagnose an adult with pneumonia they must have:

1. Fever AND
2. Cough AND
3. Abnormal chest sounds

Chest X-ray can confirm a pneumonia if diagnosis is not clear e.g., not responded to antibiotics.

Note: Think about Beriberi if there is sudden fast breathing **and no or low-grade fever.** After birth, **beri beri** most commonly presents at 4 months old.

RISK FACTORS FOR ADULTS

- Aged 65 years or more.
- Patient with malnutrition or severe anaemia.
- Patient with heart failure.
- Patient with measles.
- Patient with splenectomy or sickle cell disease.
- Immunocompromised e.g., HIV with CD4 <200.

If a young adult patient has **one or more signs OF SEVERITY** treat as **SEVERE** pneumonia. If from the '**patient at risk group'** treat case by case – likely need to treat as severe pneumonia

TREATMENT

Treatment is different depending on:

1. The presence of signs of severe illness.
2. If the patient is from the '**at risk group'.**

MILD PNEUMONIA = no signs of severe pneumonia

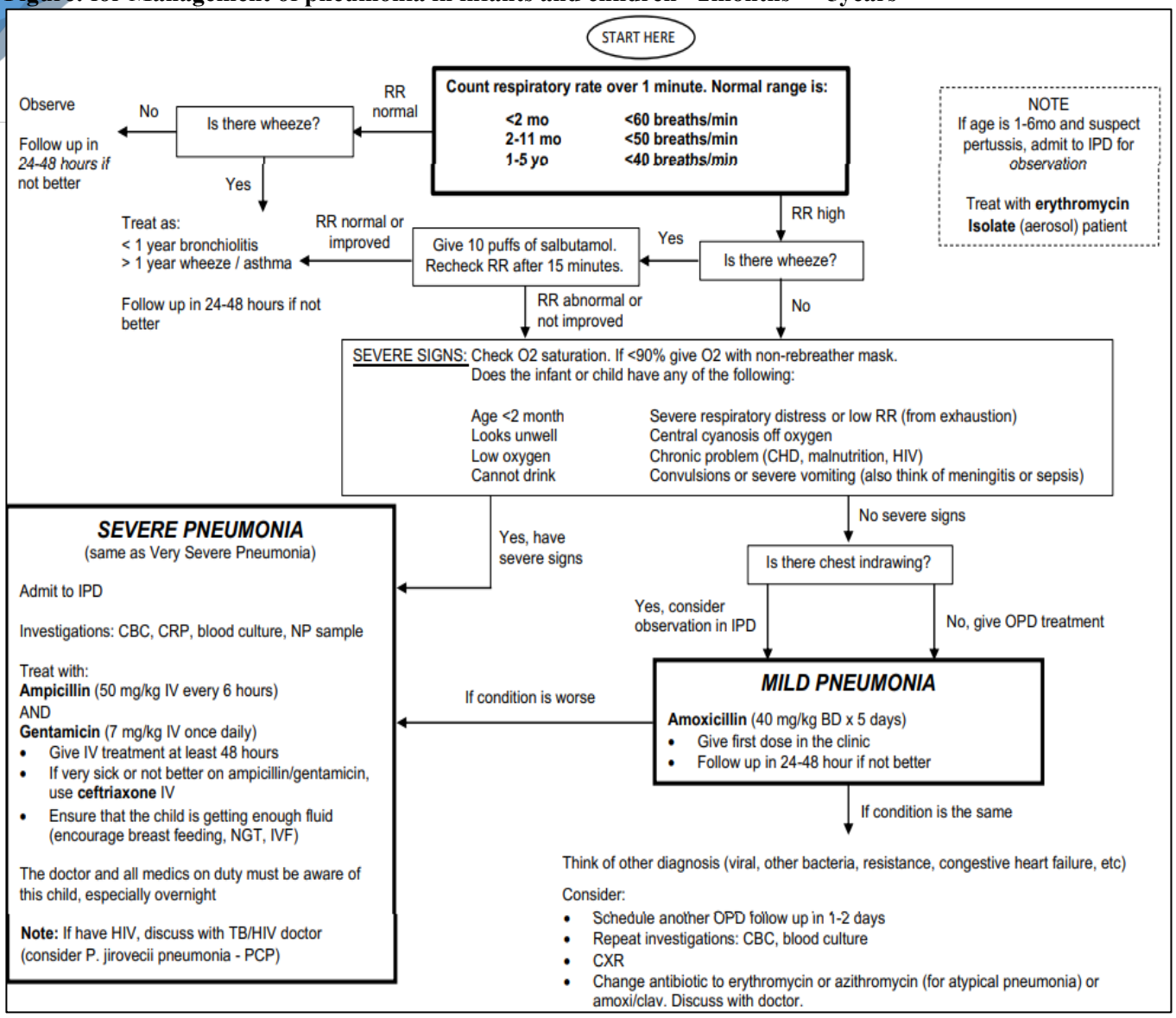
- Adults: **Amoxicillin** PO Adult: 500mg TID x 5-7 days.
- Child: **Amoxicillin** 40mg/kg BID x 5 days.
- **Paracetamol** for fever, increase oral fluid intake.
- **Follow-up** in 24 to 48 hours or sooner if the child's condition deteriorates:
  - If the condition is improving continue with the same antibiotic to complete treatment.
  - If there is no improvement after 3 days of correct administration: change antibiotic to erythromycin or azithromycin (for atypical pneumonia) or Coamoxiclav.
  - If the condition is worse: hospitalize and treat as severe pneumonia.

SEVERE PNEUMONIA = signs of severe pneumonia

- **Adults:** continue to the POST EMERGENCY TREATMENT section below for IV antibiotics.
  - If have risk factors, discuss with doctor.
  - You can try oral antibiotics first but observe closely.
- **Children: Ampicillin** IV 50mg/kg QID and **Gentamicin** IV 7mg/kg daily until no fever x 48 hours; change to Amoxicillin 40mg/kg BID to total 7 days of antibiotics.

See Figure: for Management of pneumonia in infants and children >2months - <5years

Figure: for Management of pneumonia in infants and children >2months - <5years



EMERGENCY TREATMENT

Note: For all unwell patients a full DRS AB-CABDE/S assessment and treatment should be done. You should ALWAYS assess for everything and TREAT any abnormality BEFORE moving to the next step.

POST-EMERGENCY TREATMENT

- **Admit to IPD**, treat the fever, keep the patient in a sitting position.
- **Give maintenance IV fluids** if patient cannot eat or drink.
- **Give oxygen** if required – keep O2 saturations above 94%, wean oxygen when improved.
- **Give vitamin A** treatment dose to all children < 12 years.

Antibiotics for adults:

- **Ampicillin** IV 1g TID.
- You may need to give **Additional Antibiotic Treatment**.
- If have risk factors, consider using **Ceftriaxone** IV 1g OD.
- Switch to PO **amoxicillin** Adult 500mg TID when condition improves (total 7 days of antibiotics).

Antibiotics for children

- **Ampicillin** IV 15mg/kg QID **AND** **Gentamicin** IV 7mg/kg OD.
- Use IV treatment at least 48 hours. When no fever for 48 hours changes to **amoxicillin** 15mg/kg TID to finish total 7 days of antibiotics.
- Check temperature, pulse rate and respiratory rate regularly to see if the patient is getting better or worse.

Table: DRS ABCDE for pneumonia

	ASSESS FOR	TREATMENTS LIKELY TO BE NEEDED FOR **SEVERE PNEUMONIA**
DRS	Danger Response, Send for help	Gloves Safe place Call for help
A	Airway obstruction Speaking, stridor, swelling, secretions	**Oxygen** (maintain SpO2 >94%)
B	RR, SpO2, cyanosis Chest indrawing/ tracheal tug Listen to chest	**Nebulizers** if have wheeze If dyspnoea **sit up right**
C	HR, BP, Cap refill Urine output, Temp Listen to HS	Put in **IV cannula** – take bloods e.g., Hct, CBC, MS, BC, dextrose etc. If signs of shock give fluid bolus **NSS** 500ml
D	Check dextrose Any drugs needed e.g., antibiotics, paracetamol	**Ampicillin** IV Adult: 1g; Child 50mg/kg +/- **additional antibiotic** (see below) Consider **ceftriaxone** IV if condition is severe. **Paracetamol** 1g. Give dextrose if low
E	AVPU/GCS Expose and examine all over body	Review notes and charts History, further investigations, treatment plan
DISCUSS WITH DOCTOR		
ASSESS RESPONSE – continue cycle with CABDE/S assessment		

PREVENTION AND VACCINATION

For patients without a spleen, **amoxicillin** should be given at the first sign of ARI. These patients should also receive pneumococcal vaccination. **Co-trimoxazole** should be given to individuals with HIV with low CD4 count.

PARAGONIMUS

DEFINITION

Paragonimus is a 'fluke' (short flat worm) that mainly affects the lungs. It is caused by eating infected, undercooked, fresh water crabs and crayfish.

SYMPTOMS

2 most common symptoms are:
Productive cough >2 weeks.
Intermittent hemoptysis (rusty-brown colour).
Signs and symptoms are **very like pulmonary TB** and include:

- Cough with sputum.
- Fever.
- Blood (rust coloured) in sputum.
- Haemoptysis.
- Chest pain.
- Pleural effusion.

DIAGNOSIS

Definitive diagnosis is by finding eggs on microscopy of unstained sputum (you can also find eggs in the stools if the patient coughs up and swallows the eggs).

TREATMENT

Treat children > **2yrs** and adults with: praziquantel PO 25mg/kg TID for 3 days. **Praziquantel** can be given in 2nd and 3rd trimester of pregnancy.

CHRONIC RESPIRATORY DISEASE

There are many chronic diseases affecting the lungs. It is important to try and diagnose which one the patient has as the treatment is different. An x-ray (if available) may be helpful.

GENERAL MANAGEMENT AND TREATMENT TREATMENT

Aims of Treatment of Chronic Lung Disease

- Slow the progress of the disease
- Relieve symptoms
- Improve capacity for exercise
- Give patient the best quality of life that is possible
- Prevent exacerbations
- Prevent complications
- Educate the patient to understand the disease
- Psychosocial support
- Reduce number of clinic attendances

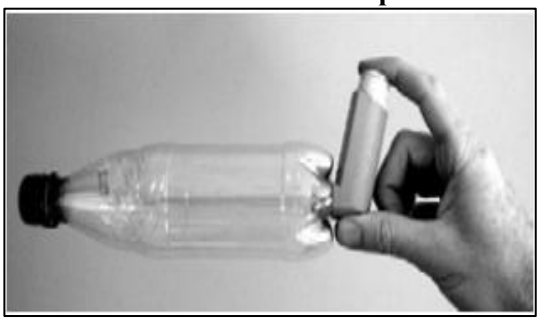
Some treatment is the same for all chronic lung disease
Educate the patient on the disease.
Unfortunately (except for asthma) these are diseases that are not reversible, so it is likely that their symptoms will become worse.

1. **STOP SMOKING,** if family smoke advises them to smoke away from the patient e.g., outside
2. **Treat bacterial infections** quickly – educate the patient on the signs of pneumonia and when to go to clinic. Advise them that if they have a change in the amount of dyspnoea, colour of sputum they must come to OPD.
3. Consider **prophylactic antibiotics** for those with repeated infections.
4. **Pulmonary rehabilitation:**
   - Breathing exercises to increase respiratory muscle strength.
   - Gentle exercise to stay healthy.

MANAGEMENT - INHALER TECHNIQUE

- When using inhalers, it is very important to do it properly to make sure that the medication gets down to the lungs. Always use a spacer device to help as using an inhaler alone is very difficult.
- To make a spacer device: use a 500ml plastic bottle (Fanta, Coca Cola, Sprite etc.) Make a hole in the bottom of the bottle to fit the mouth piece of the inhaler (the seal should be as tight as possible).

How to use an inhaler with a spacer:



1. Remove cap and **shake inhaler**.
2. Place mouthpiece of inhaler into hole in the bottom of the spacer try to get as tight a seal as possible.
3. **Breathe out** completely.
4. **Put mouthpiece of spacer/bottle in mouth** and make a tight seal using the lips
5. As you begin to breathe in slowly and deeply, **press canister down and continue to inhale steadily and deeply.**
6. Continue **5-10 breaths**.
7. **Remove** device from mouth.
8. If giving 2 puffs wait about 30 seconds before **repeating process again.**
9. **Wash** the spacer with soap and water, leave to dry naturally, do not use a towel.

It is important to rinse mouth out with water (spit water out, do not swallow) after using inhaled steroids to prevent **oral candida**

MANAGEMENT - PEAK FLOW METERS

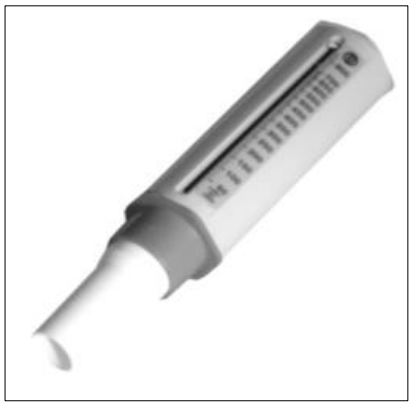
A **peak flow meter** is a cheap and simple device and should be available in all clinics.

It can be used for **asthma** and **COPD to:**

1. Assess how bad the lung damage is – compared to the patient's peak flow result to the normal expected values for height and age.
2. Assess if there is any reversibility in the lung diseases e.g., in asthma (check peak flow before and after giving salbutamol treatment – if the peak flow improves diagnosis of asthma is likely).
3. Response to treatment (check peak flow before starting treatment and at follow up. Use this to help you decide on changing treatment).

Record peak flow measurements at each consultation.

Note: do not expect a child of less than 5-7 years to be able to perform a peak flow.



How to use a peak flow meter

1. Move the marker to the bottom of the numbered scale.
2. Stand up straight.
3. Take a deep breath in.
4. Hold your breath while you place the mouthpiece in your mouth, between your teeth and make a tight seal.
5. Keep the peak flow horizontal.
6. Blow out as hard and fast as you can in a single blow.
7. Repeat three times and write down the highest number the patient reaches.

A Peak Flow Chart

Height in inches	Average peak flow	Yellow Zone 50-80% of average peak flow	Red Zone less than 50% of average peak flow
43	147	74 - 118	< 74
44	160	80 - 128	< 80
45	173	87 - 139	< 87
46	187	94 - 150	< 94
47	200	100 - 160	< 100
48	214	107 - 171	< 107
49	227	114 - 182	< 114
50	240	120 - 192	< 120
51	254	127 - 203	< 127
52	267	134 - 214	< 134
53	280	140 - 224	< 140
54	293	147 - 234	< 147
55	307	154 - 246	< 154
56	320	160 - 256	< 160
57	334	167 - 267	< 167
58	347	174 - 278	< 174
59	360	180 - 288	< 180
60	373	187 - 298	< 187
61	387	194 - 310	< 194
62	400	200 - 320	< 200
63	413	207 - 330	< 207
64	427	214 - 342	< 214
65	440	220 - 352	< 220
66	454	227 - 363	< 227

MEN

Age	Height 60″	65″	70″	75″	80″
20	554	602	649	693	740
25	543	590	636	679	725
30	532	577	622	664	710
35	521	565	609	651	695
40	509	552	596	636	680
45	498	540	583	622	665
50	486	527	569	607	649
55	475	515	556	593	634
60	463	502	542	578	618
65	452	490	529	564	603
70	440	477	515	550	587

PEAK FLOW VALUES IN LITERS/MIN

WOMEN

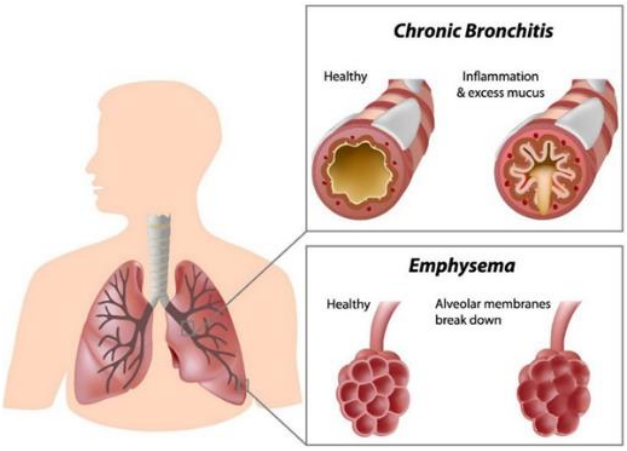
Age	Height 55″	60″	65″	70″	75″
20	390	423	460	496	529
25	385	418	454	490	523
30	380	413	448	483	516
35	375	408	442	476	509
40	370	402	436	470	502
45	365	397	430	464	495
50	360	391	424	457	488
55	355	386	418	451	482
60	350	380	412	445	475
65	345	375	406	439	468
70	340	369	400	432	461

CHRONIC OBSTRUCTIVE PULMONARY DISEASE

DEFINITION

Chronic Obstructive Pulmonary Disease (COPD) is a form of chronic lung disease that causes the narrowing of the airways, so ventilation is poor. Smoking is the primary cause of COPD. This term covers many respiratory conditions:

- **Chronic bronchitis:** inflammation of the bronchi.
- **Emphysema:** damage to the smaller airways and alveoli.
- **Chronic obstructive airways disease**: sometimes caused by allergy and environmental factors.



COPD patients often have lower oxygen saturations.

Patients with COPD have lower oxygen levels than normal people. If you give them too much oxygen (e.g., when they are acutely unwell) the brain tells their body to breathe less which makes them worse. The clinical features of oxygen toxicity are due to high CO2 content in the blood (hypercapnia). Keep O2 saturations 88-92% and not to give more than 5L.

SIGNS AND SYMPTOMS

The signs and symptoms of COPD are similar to asthma, but in **COPD the damage is permanent,** and the **symptoms are persistent.**

SYMPTOMS

- Cough with sputum gradually getting worse. (Remember: TB is also a cause for chronic cough).
- Breathlessness and wheezing on exertion, gradually getting worse. These symptoms will eventually occur even when the patient is at rest.
- Sputum, because the damaged airways create a lot of mucus.

SIGNS

- Fast RR.
- Accessory muscle working on expiration.
- Hyperventilation.
- Reduced chest expansion.
- Resonant or hyper resonant percussion note.
- Quiet breath sounds.
- Wheeze
- Cyanosis.
- Signs of heart failure (because of the back pressure on the heart from the lung disease).
- Low SpO2.

The patient may always have a fast RR/ wheeze/ cyanosis/ low SpO2, but it is important to know when the patient comes in to the clinic if the symptoms are **worse or different to normal** e.g., sputum colour normally white but now green, or normally dyspnoea when walking but now dyspnoea at rest. If the patient is having an **acute attack**, they need **emergency ABCDE treatment**

DIAGNOSIS

Clinical, a chest X-ray may show hyper-expansion of the lungs +/- bullae.
Do not forget to **rule out TB.**

EMERGENCY (ACUTE) TREATMENT

Note: For all unwell patients a full DRS AB-CABDE/S assessment and treatment should be done. You should ALWAYS assess for everything and TREAT any abnormality BEFORE moving to the next step.

POST EMERGENCY (CHRONIC) TREATMENT

In COPD the changes to the lung are permanent (lung tissue will not get better). Decide with the doctor to wean oxygen as soon as possible.

1. Assess for discharge

Before discharge from the hospital, check the patient on the following criteria:

- Inhaled Salbutamol < 4 hourly.
- Can walk across the room without difficulty breathing.
- Can eat and sleep without frequent stopping from to breathing difficulty.
- Clinically stable for 12-24 hrs.
- Patient and caregiver can understand correct medication use.

2. Post discharge

A. Complete 7 days of antibiotics.
B. Complete 5 days of 40mg prednisolone.

3. Lifestyle and general advice

- Stop smoking and advise family members to not smoke around the patient.
- Exercise as much as possible, as much as their breathing allows.
- Breathing exercises.
- Advise the patient if their breathing or cough changes to seek medical attention quickly.

4. Medication

- Inhaled **salbutamol** 2 puffs PRN (max QID) when having dyspnoea.
- **Note:** unlike asthma, oral or inhaled steroids are not recommended for chronic treatment of COPD.
- Only slow-release low dose **theophylline** is recommended (dose depends on the brand of tablet (see specific manufacturer instructions).
- Mucolytic, e.g., **bromhexine** can be considered but may not be available. These helps break down the mucous to make it easier to cough it up.

Figure: DRS ABCDE for acute COPD attack

	ASSESS FOR	TREATMENTS LIKELY TO BE NEEDED FOR **COPD ATTACK**	
DRS	Danger Response Send for help	Gloves Safe place Call for help	
A	Airway obstruction Speaking, stridor, swelling, secretions	**Oxygen** maintains saturations 88-92% **Note: too much oxygen can be dangerous in these patients. Give no more than 5L.**	
B	RR, SpO2, cyanosis Chest-indrawing/ tracheal tug Listen to chest	**Salbutamol Inhaler** 10 puffs OR **If low SpO2/cyanosis/cannot speak: Salbutamol Nebulizer 5mg STAT Sit upright, observe HR for tachycardia.**	
C	HR, BP, Cap refill Urine output, Temp Listen to HS	Put in **IV cannula** – take bloods e.g., Hct, CBC, MS, BC, dextrose etc. If signs of shock give fluid bolus **NSS** 500ml	
D	Check dextrose, Any drugs needed e.g., antibiotics, paracetamol	**Antibiotic:**	**Ampicillin** IV 1g OR **Amoxicillin** PO 500mg. (give IM ampicillin if cannot put in cannula)
		Steroid:	**Prednisolone** PO 40mg for 5 days (may need longer course) OR **Hydrocortisone** IV 100mg if unable to take PO
		Note: IV aminophylline is not recommended for COPD attack Give dextrose if low	
E	AVPU/GCS Expose and examine all over body	Review notes and charts History, further investigations, treatment plan	
DISCUSS WITH DOCTOR			
ASSESS RESPONSE – continue cycle with CABDE/S assessment			
Antibiotics for COPD Acute Attack: Most acute attacks of COPD should be given antibiotics. (Only mild acute exacerbations may improve with inhaled salbutamol and not require antibiotics). **Note:** This is different to asthma when antibiotics should only be given if there is evidence of infection e.g., temperature, productive cough etc.			

COMPLICATIONS

- Recurrent chest infection.
- Reduced exercise tolerance.
- Poor nutrition and weight loss.
- Heart failure.
- Raised haematocrit (polycythaemia).
- Respiratory failure.
- Pneumothorax.
- Lung cancer (secondary to smoking).

BRONCHIECTASIS

DEFINITION

Bronchiectasis is a chronic disease of the bronchial tubes. The bronchial tubes become widened so mucous stays in the bronchial tubes, resulting in recurrent infections. These infections lead to blockage of the tubes. The blockage causes the alveoli to collapse.

SIGNS AND SYMPTOMS

- Cough with a lot of sputum every day.
- Haemoptysis.
- Wheezing.
- Chronic sinusitis.
- Many loud crepitation in inspiration and expiration.

DIAGNOSIS

Clinical, CXR may be helpful, but a CT scan is needed to confirm diagnosis which is not available in the clinics.

TREATMENT

There is no specific treatment for bronchiectasis. The patient may get recurrent infections, so you need to educate them on the symptoms and when they should come in to the clinic to get antibiotics. Larger doses and longer courses are required. They may need prophylactic antibiotics to stop those getting recurrent infections.

Physiotherapy: Deep breathing followed by forced expiration (the 'active cycle of breathing' technique)

helps to make secretions move from dilated bronchi to the trachea, then can cough secretions out.

INTERSTITIAL LUNG DISEASE

DEFINITION

Interstitial lung disease is a disease of the soft tissue of the lung that causes damage to the walls of the alveoli. The alveolar walls become thick, so gas exchange is poor. Small blood vessels in the lung can also be affected, so blood supply to the lungs is poor. In most cases the lungs will gradually get worse, and breathing will become more difficult for the patient.

CAUSES

- No cause (idiopathic fibrosis).
- Exposure to substances like silicon.
- Some medications e.g., nitrofurantoin, methotrexate, amiodarone.
- Chronic diseases e.g., rheumatoid arthritis.

SIGNS AND SYMPTOMS

- In the early stages, no signs and symptoms.
- Dry cough.
- Difficulty breathing start slowly then later becomes more and more severe.
- Cyanosis.
- Fast respiratory rate at rest.
- Raised jugular venous pressure.
- Clubbing (enlarged fingertips and a loss of the normal angle at the nail bed).
- Reduced expansion of the lung.
- Fine inspiratory crepitation on both lungs.

DIAGNOSIS

This is a clinical diagnosis.

CXR can be very helpful if available, it may show reticulo-nodular shadowing in the parts of the lung affected.

TREATMENT

Some interstitial lung disease may respond to steroids. It is important to deworm before giving steroids, and to warn the patient that there are side effects of steroids. Try to manage the patient's symptoms with the lowest dose of steroids. Oxygen may help breathlessness.

ASTHMA

DEFINITION

Asthma is a chronic inflammation problem of the airways with acute reversible airflow obstruction. This means airflow on expiration is blocked but can open again if control triggers and give medications. Acute asthma attacks can be triggered by different things in different people (i.e., allergies, viral infection, smoke). Asthma is most common in children and young adults.

Triggers: asthma attacks can be triggered by:

1. **Allergens** e.g., pollen, animal fur – often have a history of other allergies and eczema.
2. **Infections**.
3. **Air particles** (e.g., cigarette smoke, cooking fires, burning fields).
4. **Drugs** e.g., aspirin, NSAIDs, beta blockers, diazepam, codeine.
5. Other: acid reflux, cold air, exercise, emotion, stress (e.g., maybe worse in holidays vs work/school).

Asthma can kill people and cause failure to grow in children.

SIGNS AND SYMPTOMS

- Coughing (either during day or at night, but often worse at night and with exercise and activity) Shortness of breath.
- Wheezing when breathing out/expiration **(persistent or frequent episodes without no other causes).**
- Chest feels tight.
- Symptoms occur or get worse if there are **triggers**.
- **For chronic asthma, your PEFR is 50% to 80% of your personal best, an indication that your asthma is getting worse.**

DIAGNOSIS

1. **History** – What symptoms? Worse at any time of year/time of day e.g., cough at night? Any history of eczema/ allergies? Previous wheezing episodes – hospital admissions, emergency visits, ICU admissions? Current medication? Any family members have eczema/allergies/asthma?
2. **Examination** - in patients with chronic asthma, the lungs may be normal between exacerbations
3. **Peak flow** – peak flow variability for diagnosis and OD/BID checks to monitor chronic asthma. The OD/BID result is compared to the patient's personal best value (highest result they ever had). Normal: 80-100%, moderate attack: 50-80%, and severe attack <50% of the personal best value.
4. **Improvement of symptoms/peak flow with treatment** e.g., salbutamol inhaler. **Note:** Children < 5 years might have recurrent wheezing, but not asthma. In children > 5 years old, asthma should be suspected if cough is >3weeks, occurs at night, comes during specific season, or triggered by specific exposure (cold air, exercise, laughing, crying, or allergies). If the patient has fever, haemoptysis (coughing up blood) or green sputum then asthma cannot be the ONLY diagnosis, consider infection/TB. Asthma is commonly

mistaken for a cold or chest infection which is taking time to resolve (e.g., longer than 10 days). Often it is difficult to diagnose if a patient has asthma. Use the following as a guide to help you make the correct diagnosis:

Diagnosis of asthma is **MORE** likely if:

- Above symptoms occur worse at night or in early morning, or after exercise or triggers (see above).
- Symptoms worse after taking aspirin, NSAIDs or beta blockers.
- Personal history of other allergy or eczema.
- Family history of other allergy or eczema.
- Widespread wheeze on auscultation.
- Improvement in symptoms or peak flow with adequate treatment.
- Eosinophilia with no other cause.

Diagnosis of asthma is **LESS** likely if:

- Symptoms with colds only.
- Isolated cough with no wheeze or shortness of breath.
- History of wet/productive cough.
- Dizziness, light headedness, peripheral tingling (suggests hyperventilating from anxiety).
- Repeatedly normal examination of chest when patient feels has symptoms.
- Normal PEF when has symptoms.
- No response to treatment.
- Clinical features of other diagnosis e.g., significant smoking, heart disease.

Peak flow meter can be used to help diagnosis and treatment response. In patients with asthma the PEF can change a lot because of airway inflammation. In addition to personal best PEF, you can check peak flow after waking up in the morning and before bed (do both at the same time every day). If the PEF from morning and night <u>is **more than 20% different**</u>, the diagnosis is asthma or worsening of chronic asthma.

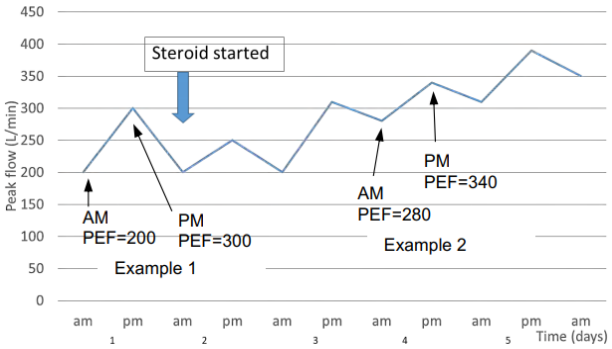


Figure: Peak expiratory flow (PEF) record in a patient with asthma.

- Normally, the morning PEF is lower than evening before bed.
- When calculating the difference between 2 PEF results, use the better (or personal best) result as the baseline.

Example 1: Morning PEF = 200 and Evening PEF = **300**
% change = 300-200 / **300** = 33% **33% different** is more than 20%
So diagnosis is **worsening asthma**
After starting steroid on day 2, the PEF improve

Example 2: Morning PEF = 280 and Evening PEF = **340**
% change = 340-280 / **340** = 18% **18% different** is less than 20%
And is acceptable
What is the % difference on day 5?

ACUTE ASTHMA ATTACK

DEFINITION

An acute asthma attack is a **sudden deterioration in the asthma symptoms.** Acute asthma attacks can cause death, so it is important to check these patients carefully and give quick treatment.

EMERGENCY ACUTE TREATMENT FOR ASTHMA ATTACK

Note: For all unwell patients a full **DRS AB-CABDE/S** assessment and treatment should be done. You should ALWAYS assess for everything and TREAT any abnormality BEFORE moving to the next step.

TREATMENT

1. Use **DRS-ABCDE/S** to manage emergency cases.
2. Decide the severity of the attack :

- The treatment is different for the severity.
- Vital signs and measure: PR, RR, O2 saturation, Peak flow value.
- Degree of difficulty breathing.
- How many words the person can say in one breath.
- Presence or absence of wheeze.
- Presence or absence of chest indrawing.

Remember that people with asthma can also have other illnesses such as bronchitis, TB, heart failure, worms. In a patient with asthma be careful**: look for and treat other illnesses at the same time** as the acute attack.

3. Treatment of **ACUTE asthma** has three parts (all are important):

- Supportive: **Oxygen**
- Short term: **Salbutamol**
- Treatment of inflammation: Steroids (**prednisolone or hydrocortisone**)

Antibiotics for Asthma Acute Attack:
Most acute attacks of asthma should NOT be given antibiotics. Only give antibiotics if there is evidence of infection e.g., fever, productive cough etc.
Note: this is different to COPD where most cases should be given antibiotics

Decide the severity and treat acute asthma
All symptoms and signs may not be present. The presence of **ANY ONE** feature makes the higher severity likely e.g., if the patient is alert but they have a silent chest on auscultation then treat as a life-threatening attack.
Review the patient's conditions every 15-20 minutes to adjust the treatment.

FULL RESPONSE = PEF >80% of personal best, RR and HR; speak and breathe normally; no agitation or confusion; chest auscultation with minimal wheeze or is clear; no more chest indrawing.

Considerations:
- If >2yrs old an inhaler with a spacer works as good as nebulizer (but not for life threatening asthma).
- If need to use second line therapy, then discuss with doctor.
- Always deworm patients if you give steroids.

Give hydrocortisone IV if the patient cannot take oral prednisolone.

DRUGS' SIDE-EFFECTS

- Salbutamol tablets may only be used when inhalers and nebulizers are not available because they have greater side effects and are slower to act.
- Salbutamol often causes tachycardia. Observe HR carefully especially if the patient has risk for heart disease.
- Potassium levels are decreased by **salbutamol and steroids.** This may lead to levels that can be life threatening. If possible, check potassium levels or give high potassium foods (banana, potato, beans).
- For pregnant women and persons with cardiovascular disease (coronary artery disease, congenital heart disease, high BP, high cholesterol) avoid aminophylline.

Long term steroids can make many infections worse. Remember worms (**including Strongyloides), amoeba**, TB, and other bacterial infections can get worse when using steroids. Take a good history for TB, amoeba, other infections. Give **albendazole** to prevent spread of worms.

Table: for DR ABCDE for acute asthma attack

	ASSESS FOR	TREATMENTS LIKELY TO BE NEEDED FOR **ASTHMA ATTACK**	
DRS	Danger Response Send for help	Gloves Safe place Call for help	
A	Airway obstruction, Speaking, stridor, swelling, secretions	**Give 10-15L oxygen** if saturations low **– aim SpO2 >94%.** **Note:** if not able to measure saturations then just give oxygen	
B	Assess severity of breathing problems. Are they breathless at rest? What is the RR? What are the oxygen saturations? Able to speak – words? Full sentences? Listen to the chest – any wheeze? Silent chest? Any chest indrawing?	Salbutamol nebulizer Adult/>5yr: 5mg STAT; Child <5 yrs: 2.5mg STAT. OR **Salbutamol inhaler** 10 puffs STAT (depends on severity – see below) **Sit upright, observe HR for tachycardia.**	
C	HR, BP, Cap refill Urine output, Temp Listen to HS	Put in **IV cannula** – take bloods e.g., Hct, CBC, dextrose etc. If signs of shock give fluid bolus **NSS** 500ml	
D	Check dextrose Any drugs needed e.g., antibiotics, paracetamol	**Steroid**:	**Prednisolone** PO (continue for 7 days) Adult: 40mg; Child: 1mg/kg (max 30mg) OR **Hydrocortisone** (if cannot to take PO) Adult: IV 100mg; Child: 4mg/kg
		Antibiotic:	**Ampicillin** IV OR **Amoxicillin** PO ONLY IF SIGNS OF INFECTION e.g., fever, productive cough
		If severe and not improving, discuss with doctor and consider, IV **magnesium** or IM **adrenaline**. Give dextrose if low.	
E	AVPU/GCS Expose and examine all over body	Review notes and charts History, further investigations, treatment plan	
DISCUSS WITH DOCTOR			
ASSESS RESPONSE – continue cycle with CABDE/S assessment			

Table: Doses of drugs used to treat asthma

1. SALBUTAMOL		**4. ADRENALINE** IM (1:1000 = 1mg/ml):		
Inhaler:	One puff is 100 microgram salbutamol (you can use up to to 10 puffs every 10 - 30 minutes)	Adult:		0.5 – 1ml
Nebuliser:	Adult/>5yr: 5mg; Child <5yr: 2.5mg Repeat every 20-30 min for 3 times then every 4 hours	Child:	>12yrs 6 –12yrs 6mths – 6 yrs < 6mths	0.5ml 0.25ml 0.12ml 0.05ml
Oral:	(only use if inhaled/nebuliser is not available)	**Use the 0.5ml insulin syringe to give adrenaline in children**		
Adult: Child <12yrs	2-4mg TID or QID 1-2mg TID			
Note: Stop beta blockers, risk of miscarriage in first 6m of pregnancy, observe HR for tachycardia				
2. PREDNISOLONE PO		**5. MAGNESIUM** IV (**Note**: evidence is limited)		
Oral:		Adult: Child:	1.2 - 2g IV over 20 minutes 40mg/kg (max 2g) over 20 minutes	
Adult: Child:	40mg OD in the morning x 3-5 days 1mg/kg OD in the morning (max 30mg) x 3-5 days			
3. HYDROCORTISONE IV		6. OXYGEN		
Adult: Child:	100mg QID (up to 250mg if severe) 4mg/kg (max 100mg) QID			
Change to PO prednisolone as soon as possible (can also use IV dexamethasone)				

Table: Assessment for the severity of the asthma attack

	MODERATE ATTACK	SEVERE ATTACK	LIFE THREATENING ATTACK
Difficulty breathing	When walking	On lying down	Always
Speaking	Normal or saying a few words	Single words (child cannot feed)	Cannot speak (child cannot feed)
Consciousness	Alert but may be anxious	Agitated or very silent and not moving	Sleepy or confused
Wheezing	At the end of breathing out	Loud	Not heard, silent chest
Accessory muscles (in drawing)	No or minimal	Usually	Unusual movement
Respiratory rate / minute (*see p.16*)	Increased	Increased	Increased or decreased
Pulse rate / Minute (*see p.16*)	Increased	Increased	Increased or decreased
Peak flow (PEF) after treatment	Value is **50% - 80%** of personal best	Value is **<50%** of personal best	Patient is very sick and PEF is not useful. Use clinical assessment until stable enough to do PEF
Oxygen Saturations (if available)	>94%	>94%	<94%
Central cyanosis	No	No	Yes
MODERATE ATTACK:	**SEVERE ATTACK:**	**LIFE THREATENING ATTACK:**
Depending on improvement likely no IPD admission needed	**Admit to IPD**	**Admit to IPD**
No oxygen needed	**Oxygen:** 5L, decrease according to saturations aim SpO_2 >94%	**Oxygen:** 10-15L decrease according to saturations, aim SpO_2 >94%
Salbutamol inhaler with spacer: 5-10 puffs each inhaled separately. Repeat every 10–20 minutes in the first hour (if necessary) then every 4-6 hours as needed until full response*	**Salbutamol inhaler with spacer**: 10-15 puffs each inhaled separately. Repeat every 10–20 minute in the first hour then every 4 hours OR **Salbutamol nebuliser** Adult/>5yr: 5mg; Child <5yr 2.5mg 3 times per hour then every 4 hours as needed until full response*	**Salbutamol nebuliser** Adult/>5yr: 5mg; Child <5yr: 2.5mg 3 times per hour then every 4 hours as needed until full response* **Note**: Give salbutamol inhaler with spacer 10-15 puffs only if do not have nebuliser, observe HR
Consider **Prednisolone PO** Adult: 40mg OD x 3 days Child: 1mg/kg (max 30mg) x 3 days Use if have other signs of moderate attack: moderate wheeze, difficulty breathing, etc	**Prednisolone PO** Adult: 40mg OD x 3-5 days Child: 1mg/kg (max 30mg) x 3-5 days If vomiting/cannot take PO consider IV **hydrocortisone**	**Hydrocortisone IV** Adult: 200-250mg QID Child: 4mg/kg (max 100mg) QID Switch to PO prednisolone when can take PO If no improvement, consider: **Adrenaline** IM OR **Magnesium** IV *(see below for doses)*

TREATMENT AFTER DISCHARGE

Moderate Attack:

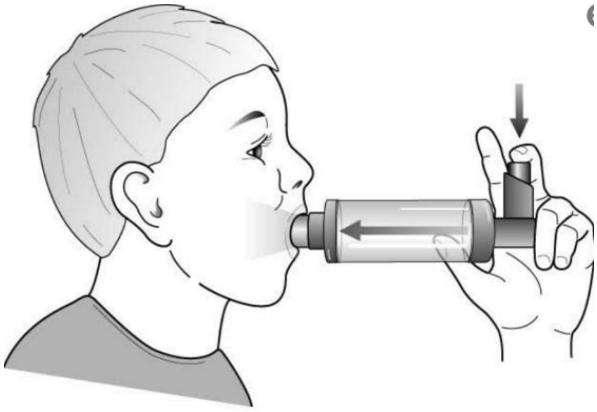
- Complete course of **prednisolone** PO for total 3 days.
- If possible, should discharge with **salbutamol inhaler** with spacer (2-10 puffs every 4-6 hours) for 3 days, then PRN.
- Consider preventative medication e.g., **budesonide, oral aminophylline** (discuss with doctor).
- Return to clinic if not better/worse or no more inhaler.
- Follow up 4 weeks or before if inhaler finished.

Severe Attack:

- Complete course of **prednisolone** PO (total 3-5 days).
- If possible, should discharge with **salbutamol inhaler** with spacer (2-10 puffs every 4-6 hours) for 3-7 days, then PRN.
- Consider preventative medication e.g., **budesonide**, oral **aminophylline** (discuss with doctor).
- Return to clinic if not better/worse or no more inhaler.
- Follow up 2-4 weeks or before if inhaler finished.

Life-threatening attack:

- Complete course of **prednisolone** PO for total 5-10 days.
- If possible, should discharge with **salbutamol inhaler** with spacer (2-10 puffs every 4-6 hours) for 3-7 days, then PRN.
- Consider preventative medication e.g., **budesonide**, oral **aminophylline** (discuss with doctor).
- Follow up after 1 week or before if inhaler finished.



CHRONIC ASTHMA

PREVENTION / LONG-TERM TREATMENT

When discharging a patient make sure you give them: general advice, long term medical treatment, what to do if has asthma attack at home, and follow up instructions.

General Advice:

1. Health education – if possible, avoid precipitants e.g., stay away from animals, smoke from wood or farm fires.
2. Do not smoke/ stop smoking, advise people should smoke away from patient e.g., smoke outside house.
3. Always carry a salbutamol inhaler in case of attack.
4. Seek medical attention early in case of symptoms not being relieved by inhaler >10 puff every 4 hours or **PEF 20%,** even if the patient has no difficulty breathing.

LONG TERM MEDICAL TREATMENT

(Discuss with doctor about which preventative medication to use)

INHALERS

Types of inhalers:

Note: Salbutamol ALONE does not prevent asthma symptoms or attacks

1. Preventer inhalers STEROID INHALER e.g., budesonide these inhalers should be taken regularly to prevent the symptoms/attacks from happening. Rinse mouth out with water (spit water out, do not swallow) after use to prevent oral candida.

2. Reliever inhalers SALBUTAMOL INHALER e.g., Ventolin these inhalers should only be used when the patient has symptoms (although sometimes taken regularly for a short time after an acute attack).

- If you do not have steroid inhalers, you can use a low dose of oral steroids for patients who have symptoms very often (discuss with doctor).
- It is important to educate the patients.
  1. How to use inhalers +/- spacer.
  2. How many puffs to take how many times a day.
  3. When to take each inhaler e.g., budesonide every day vs salbutamol PRN.
- The dose will depend on the response. Need to aim for the lowest dose of steroid inhaler that controls the symptoms.
  - **OPD patient (mild attack) with persistent symptoms**: Low dose steroid inhaler **budesonide** (e.g., 1 puff BID).
  - **Patient discharged from IPD after moderate attack:** Medium dose steroid inhaler **budesonide** (e.g., 2 puffs BID).
  - **Patient discharged from IPD after severe/life threatening attack:** High dose steroid inhaler **budesonide** (e.g., 4 puffs BID).
  - **CONTROLLED SYMPTOMS** is PEF is ≥ 80% of personal best, needing salbutamol ≤ 2 times per week, or waking up with symptoms ≤ 2 nights per month. If more symptoms than this, increase the preventer inhaler dose.

THEOPHYLLINE/AMINOPHYLLINE

- Note: oral theophylline is safer than aminophylline.
- Discuss with doctor about starting oral aminophylline/theophylline.
- Dose depends on the brand of tablet (see specific manufacturer instructions).

Advice in case of asthma attack at home:

1. Do not lie down.
2. If acute dyspnoea give salbutamol inhaler 10 puffs.

- If no improvement in 10 minutes: give a second salbutamol inhaler 10 puffs.

- If again no improvement to come to clinic.

3. If patient needs the salbutamol inhaler more than 10 puffs every 4 hours, they must come to the clinic.

FOLLOW UP

1. Follow up in OPD (check peak flow value and compare to patient's personal best value). Decrease the inhaler/tablet step by step to the minimum dose that fully controls symptoms. If symptoms come back or PEF 20%), increase the dose of steroid inhaler again. If the PEF is normal, continue or decrease the treatment.
2. Review the patient every month or when the steroid inhaler is nearly empty.
3. Review inhaler with spacer technique at each follow up appointment.
4. Keep the patient at this dose all the time to help control the symptoms.
5. If asthma attacks reduce to < 1 per month try to stop steroid inhaler/theophylline/aminophylline and give inhaled salbutamol when symptomatic.

Remember: drugs such as beta-blockers or NSAIDs e.g., ibuprofen can cause an asthma attack/make asthma worse so do not prescribe these drugs.

TUBERCULOSIS

DEFINITION

Tuberculosis is a contagious disease caused by *Mycobacterium tuberculosis* (and occasionally by *Mycobacterium bovis* and *Mycobacterium africanum*), which are also known as TB bacilli.

TB commonly attacks the lungs **(pulmonary TB)** but can cause disease in any part of the body such as the lymph nodes, pleural cavity, bones and spine, brain, abdomen, eyes, Genito-urinary tract and the skin **(extra-pulmonary TB**).

TB TRANSMISSION:

TB infection is transmitted by air. A major source of infection is a patient with pulmonary TB who is coughing and whose sputum smear is positive (i.e., TB bacilli can be seen in sputum microscopy). If an infectious person coughs or sneezes, tiny infectious particles of respiratory secretion, which contain TB bacilli, are produced. These infectious particles can remain in the air for up to six hours. Therefore, people in close contact with an infectious person breathe in air containing infectious particles of TB bacilli.

TB DISEASE:

A person infected with TB does not necessarily feel unwell and such cases are known as silent or 'latent' infections. When the lung disease becomes 'active' and symptoms develop, such cases are diagnosed with '**TB Disease'**.

- In HIV uninfected populations, only 1 person out of 10 TB-infected people develop TB disease.
- In HIV infected populations, the proportion of developing TB disease is much higher. A HIV infected person has a 21-34 times higher risk of developing TB disease than a HIV uninfected individual.

CLASSIFICATION

1. **Pulmonary TB (lungs) -** most common site
2. **Extrapulmonary TB (outside lungs)**

Common	**Less common**
• Pleural • Lymph nodes (commonly in neck) • Brain • Abdomen • Pericardium (heart) • Spine, other bones and joints.	• Genital tract • Kidney • Adrenal gland • Skin

SIGNS AND SYMPTOMS

1. Pulmonary TB

- **The** most **common symptoms of Pulmonary TB are:**
  - Cough of <u>any duration</u> (with or without sputum production).
  - Fever of unknown cause > 2 weeks.
  - Weight loss in the past three months.
  - Drenching night sweat.

- **Other symptoms:**
  - Respiratory: coughing up blood, chest pain, breathlessness.
  - General symptoms: tiredness, loss of appetite and secondary *amenorrhoea.*

If the patient has one or more of the above signs and symptoms, the case should be suspicious of TB and investigation for TB diagnosis is to be carried out.

- **Physical Signs**
  - Non-specific and similar to other lung diseases.
  - General signs: fever, tachycardia, finger clubbing.
  - Respiratory signs: often no abnormal signs in the chest, may be crepitations, wheeze or bronchial breath sounds.

2. Extrapulmonary TB

- TB outside the lungs may present with the following:
  - **TB pleural effusion:** chest pain, dullness on percussion, reduced or no air entry on the affected side.
  - **TB lymphadenopathy:** enlargement of lymph nodes, usually in the neck and bilaterally.

- **TB spine or bone:** deformity, chronic bone infection.
- **TB brain**: signs and symptoms of meningitis (headache, neurological deficit, loss of consciousness).
- **TB abdomen:** ascites, abdominal mass.

DIAGNOSIS

If you suspect a patient has TB, you should:

1. Assess for danger signs

- RR > 30/min
- PR > 120/min
- Temp > 39°C
- Unable to walk

2. Follow the algorithms below depending on if the patient has danger signs or not:

TESTS USED IN THE DIAGNOSIS OF TB

For Pulmonary TB:

1. **Sputum** for microscopic examination of **Acid-Fast Bacilli (AFB):**

- Called AFB as the bacilli are resistance to losing their colour by acid.
- Need to collect sputum 2 days in a row.
- It is a simple, rapid and reliable test for sputum smear positive cases.

2. **Molecular technique** (MTB/Rif Assay called GeneXpert test):

- Rapid result within a few hours if machine is where sample is collected.
- Can be used to see if the Mycobacteria is resistant to rifampicin – if it is resistant it is a sign that it could be a multi-drug resistant TB (MDR TB).

3. **Culture** (growing bacilli in special media) (if available):

- More specific test but results take longer (4-6wks), needs good technology, skills and is expensive.
- Used if:
  - Clinically suspect cases of smear positive and GeneXpert negative.
  - Confirmation of treatment failure.
  - Diagnosis of drug resistant TB (including MDR TB) together with drug susceptibility testing.

4. **Chest X-Ray:** useful for smear negative pulmonary TB like pleural effusion, miliary TB, and TB in children.

5. **Tuberculin skin test:** if positive is a sign of exposure to TB, it does not mean the patient has TB disease.

A 10mm induration may also be considered positive in children under the age of 4 or people who use injected drugs. An induration of 15 mm or more is considered positive in anyone.

See Table Diagnosis For Extra-pulmonary TB:

Table Diagnosis For Extra-pulmonary TB:

FNAC (fine needle aspiration cytology) for lymphadenopathy.	Thoracocentesis (pleural tap) and examination of pleural fluid: TB pleural effusion.
Chest X-Ray: TB Pleural effusion, TB Pericarditis.	Lumbar puncture and examination of CSF: TB meningitis.
Spine and Bone X-Ray: bone and spine TB.	Abdominal paracentesis and examination of peritoneal fluid: TB abdomen.

Note: Multi-drug resistant TB (MDR TB) is already a problem in the border area. Diagnosis and treatment of MDR TB should be integrated within a TB program.

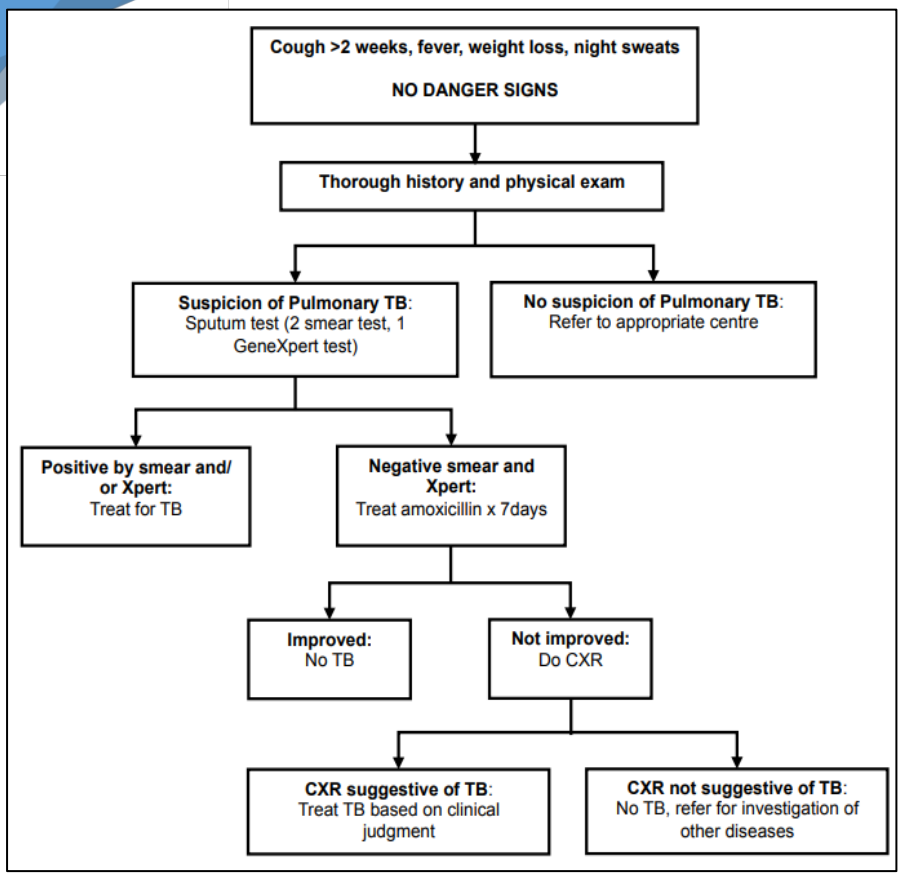


Figure: Managing a TB suspect WITHOUT Danger signs

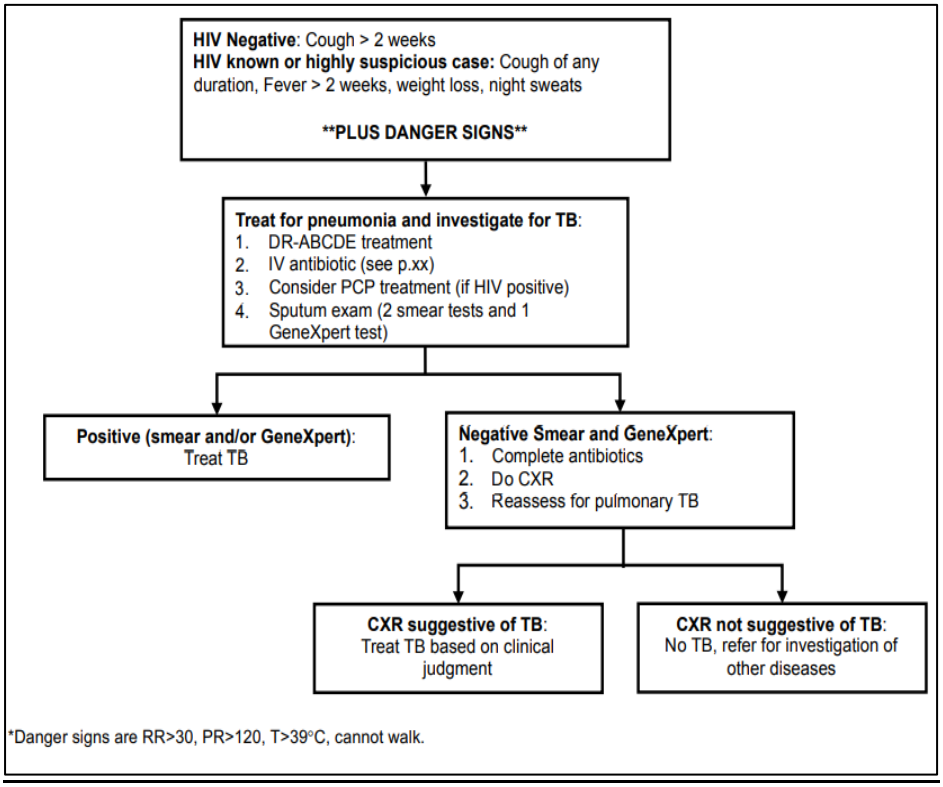


Figure: Managing a TB suspect WITH DANGER SIGNS

TREATMENT

TB can be cured by using effective treatment regimens:

1. Daily ingestion of anti-TB drugs without interruption.
2. Multi drug therapy (4-5 drugs).
3. At least 6-8 months duration of drug therapy.
4. Use of quality drugs.

FIRST LINE ANTI-TB DRUGS AND RECOMMENDED DOSAGES

Anti TB drugs	**Daily treatment (mg/kg)**	
	Children (<30 kg)	**Adult**
Isoniazid **(H)**	10 (10-15)	5 (4-10)
Rifampicin **(R)**	15 (10-20)	10 (8-20)
Pyrazinamide (**Z)**	35 (30-40)	25 (20-30)
Streptomycin **(S)**	15	15
Ethambutol **(E)**	20 (15-25)	15

Note: Consider age, body weight, existing liver or renal diseases, pregnancy and previous history of TB treatment before choosing a treatment regimen and the dosage.

Early screening and taking effective treatment can break the chain of transmission.
It is strongly advised that those patients who are coughing for more than 2 weeks or have other signs and symptoms suspected of TB should undertake TB screening as early as possible.

TREATMENT REGIMENS WITH TB DRUGS

The preferred standard short course regimen according to WHO guidelines:

New Treatment Case – Category I

	Initial Phase	**Continuation Phase**
Sputum positive. **Sputum negative with** **Extra pulmonary.**	HRZE x 2 months	HR x 4 months
TB Bone/joint	HRZE x 2 months	HR x 7 months
TB Meningitis	HRZE x 2 months	HR x 10 months

H = isoniazid, R = rifampicin, Z = pyrazinamide, E = ethambutol

Note: May need to extend Initial phase 1 extra month with HRZE if sputum smear examination after 2months of treatment is still positive. Pyridoxine (vitamin B6) 5-10 mg daily needs to be added if isoniazid is prescribed.

Re-treatment Case – Category II

Sputum positive, Sputum negative, or Extra pulmonary		
	Initial Phase (3 months)	**Continuation Phase (5 months)**
If **less than 5 months** in the previous treatment	SHRZE x 2 months Then HRZE x 1 month	HRE x 5 months
If **more than 5 months** in the previous treatment	SHRZE x 2 months Then HRZE x 1 month	5 HRZE x 5 months

S = streptomycin, H = isoniazid, R = rifampicin, Z = pyrazinamide, E = ethambutol

Note: May need to extend Initial phase 1 extra month with HRZE if sputum smear examination after 3 months of treatment is still positive.

IMPORTANT
Drug adherence and completion of treatment is essential in order to prevent treatment failure and developing Drug Resistant TB (DRTB).

Special considerations in treatment:

Pregnancy

- Patients should avoid getting pregnant during treatment.
- Rifampicin makes oral contraceptive pills less effective. Use other form of contraceptives e.g., injection Depo-Provera.
- If pregnant: streptomycin is contra-indicated as it can cause deafness to the baby. Use ethambutol instead.

EXAMPLES OF NUMBER OF TABLETS OF ANTI-TB DRUGS ACCORDING TO WEIGHT
Sample regimens (Category I) with separate anti-tuberculosis drugs in adults.

Weight in Kg				
	30-39	**40-54**	**55-70**	**>70**
Initial Phase – Daily				
H 100mg	1.5	2.5	3	3.5
R 150mg	2	3	4	5
Z 400mg	2	3	4	5
E 400mg	1.5	2	3	3.5
S 1g (in TB meningitis)	0.5	0.75	1	1
Continuation Phase – Daily				
H 100mg	1.5	2.5	3	3.5
R 150mg	2	3	4	5

Sample regimens with fixed-dose combination of anti-TB drugs in Adults 2HRZE+4HR or 2HRZE+10 HR

Intensive phase									
Regimen	Drugs	Weight							
		21 – 29	30 – 34	35 – 39	40 – 49	50 – 54	55 – 64	65 – 70	> 70
2RHZE	RHZE 150 - 75 - 400 - 275	2	2	2 ½	3	3	4	4	5
Continuation phase									
4RH (10 HR for TB meningitis)	RH 300 – 150 RH 150-100	1	1	1 1	1 1	1 1	2	2	2 1

Dosage of anti-TB drugs (number of tablets) in children according to weight bands

Body weight bands (kg)	**Isoniazid (100mg tablet)**	**Rifampicin (300mg tablet)**	**Pyrazinamide (500mg tablet)**	**Ethambutol (400mg tablet)**
<5	0.5	0.33	0.33	0.33
5 to 10	1	0.33	0.5	0.33
11 to 15	1.5	0.66	1	0.5
16 to 20	2	1	1.33	1
21 to 25	2.5	1.33	1.5	1
26 to 30	3	1.5	2	1.5

PREVENTION & VACCINE

BCG Vaccination for children

- Routine vaccination to all infants in an area with high TB prevalence is recommended:
- It protects against severe forms of TB such as meningitis, miliary TB in infants.
- Vaccination lasts for 15 years in well-nourished children.
- It is safe to give in HIV infected children **but** is contraindicated in active AIDS.

Maintaining Good Hygienic Practices

- Always cover mouth and nose with a tissue or handkerchief when coughing or sneezing.
- Keep doors and windows open during the day to provide ventilation and sunlight exposure.
- Spit only into a container.
- Proper disposal of excreta (sputum, saliva) from TB patients (burning, dumping in a pit).
- Keep good personal hygiene – regularly wash hands, take showers, wash hair, wear clean clothing, cut nails.

Improve Fitness

- Enough sleep, healthy diet, physical exercise. Do not smoke.

DRUG SIDE EFFECTS

Approach to drug side effects:

1. Identify responsible drugs.
2. Rule out other possible cause e.g., scabies for itchiness, viral hepatitis for jaundice.
3. Evaluate risk of side effects versus the consequences of treatment interruption.
4. Minor: encourage the patient to continue anti-TB and symptomatic treatment e.g., chlorpheniramine for itchiness, paracetamol for joint pain, advise the patient to take their medication at bed-time.
5. Most minor side effects are resolved within 2-3 weeks.

Table for Side effects of TB drugs

SIDE EFFECTS	RESPONSIBLE AGENT	INTERVENTION
Orange-red urine	Rifampicin	Explanation and encouragement, no harm, normal staining from drug.
Peripheral neuropathy (early symptoms: paraesthesia, then prickling and burning in feet, later in hands)	Isoniazid	Prevention by taking **vitamin B6 (pyridoxine)** 10mg OD prophylaxis. Treatment – 100-200mg of vitamin B6 daily (high dose may reduce the effectiveness of isoniazid).
Hepatitis (Jaundice)	In descending order: .Pyrazinamide .Rifampicin .Isoniazid	Stop treatment. Start re-introductory schedule when signs and symptoms of hepatitis are resolved. In case of recurrent hepatitis or severe hepatitis – use alternative treatment regimen SHE x 2 months + HE x 10 months.
Impaired vision (Eye) (Early signs: blurred vision, decreased visual acuity, red-green blindness)	Ethambutol	These symptoms are reversible a few weeks after stopping. A dosage of 15mg/kg is generally safe to use. However, if optic neuropathy is established, it is not reversible.
Vestibulo-ototoxicity (Ear) (At early stage: dizziness, vertigo, ear ringing) and **renal toxicity**	Streptomycin	- Reduce dose according to weight of the patient. If it does not work, may use alternate day injection of 3 times per week. If persistent or side effects getting worse– may stop streptomycin. - In elderly patients and patients less than 35kg – 500mg dosage is safe and effective. If deafness is established, it is not reversible.
Skin manifestation or generalized hypersensitivity	All agents in descending order: Streptomycin Ethambutol Pyrazinamide Rifampicin Isoniazid	**Minor** (itchiness and rash): symptomatic treatment with **chlorpheniramine** and Calamine lotion Severe. **Steven Johnson Syndrome** (fever rash, mucocutaneous eruptions): stop treatment. Start re-introductory schedule when the symptoms are resolved.
Joint pain	Pyrazinamide	Symptomatic treatment with **paracetamol** (or **ibuprofen** if not better with paracetamol alone), usually resolves after 2 weeks.
Gastrointestinal upset (nausea, vomiting and abdominal pain)	Rifampicin	Give after small meal. Symptomatic treatment: **omeprazole** or **metoclopramide**. Administer 2 hours before or 3 hours after TB medication.
Shock, purpura, acute renal failure	Rifampicin	Stop rifampicin. Never reintroduce rifampicin again.

ACUTE ABDOMINAL PAIN

Definition: Sudden onset of severe abdominal pain that may or may not need referral for surgical intervention.

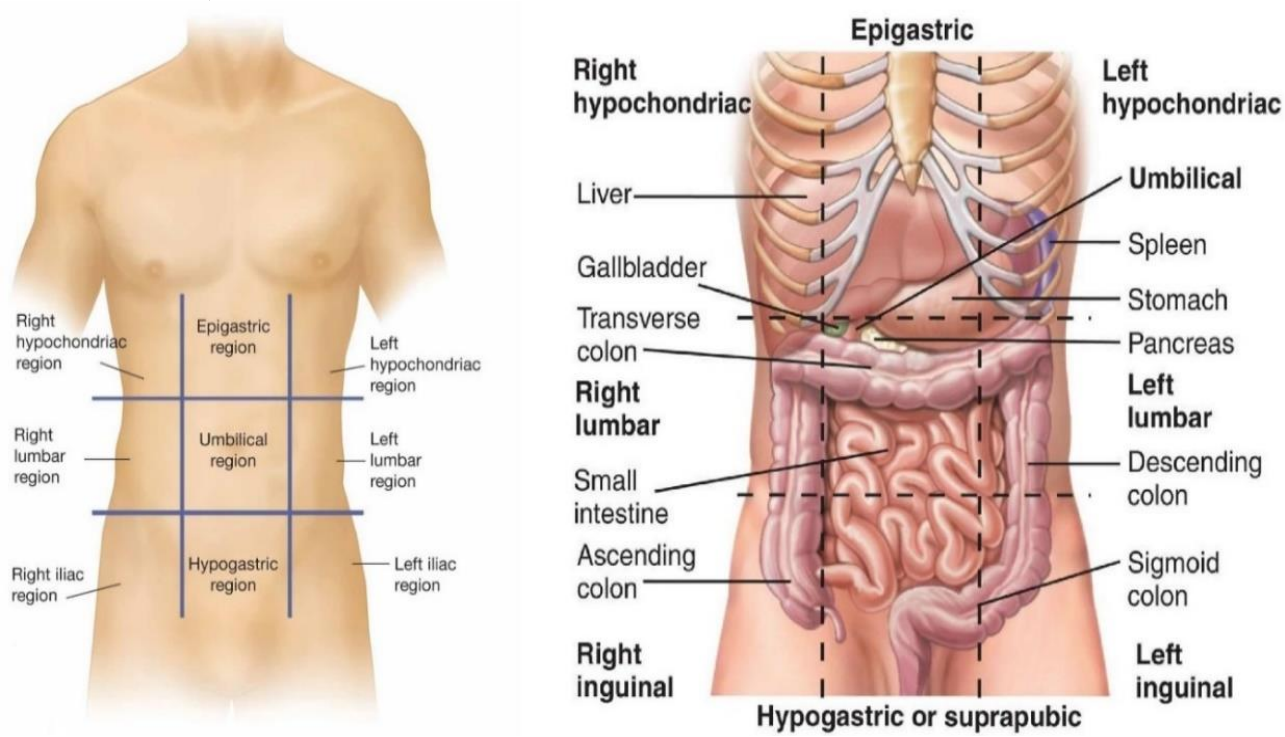


Figure: for Acute abdominal pain and 9 regions

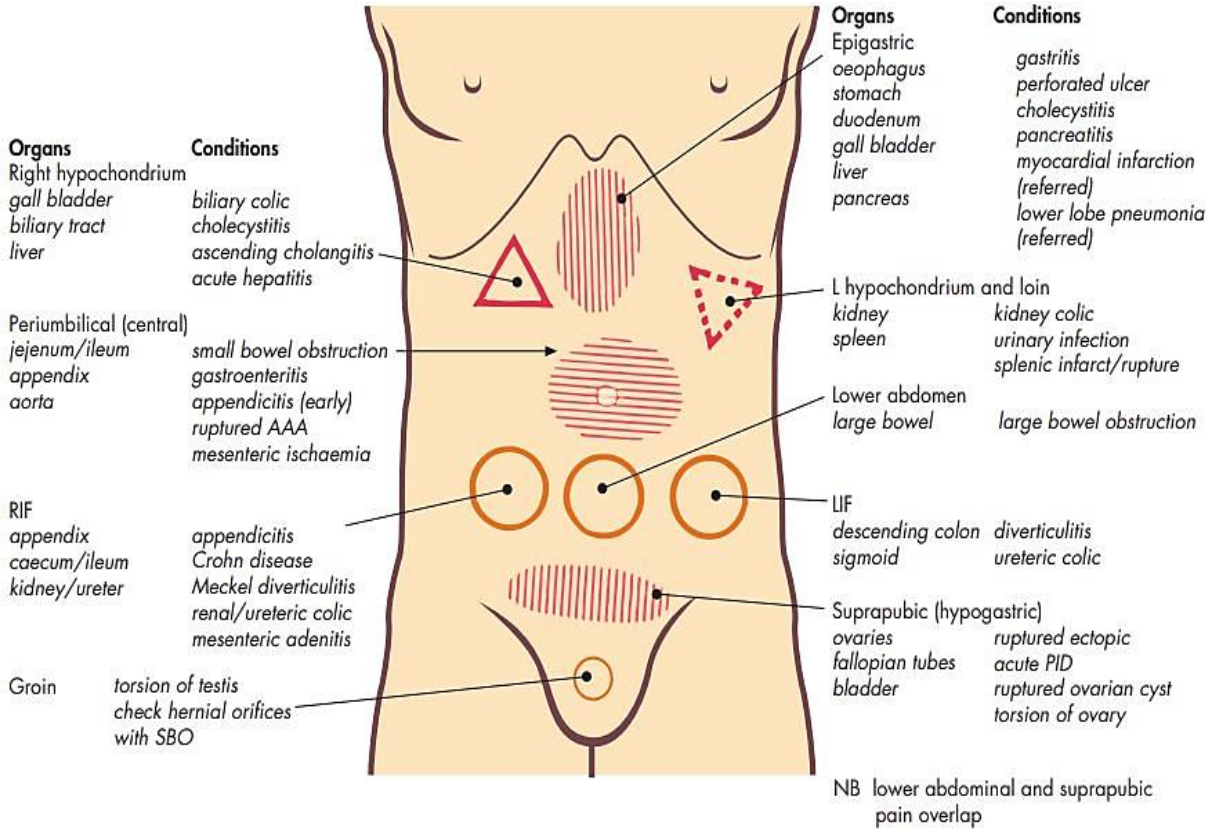


Figure: for Anatomy 9 regions and common diseases (Murtagh,2015)

GASTROINTESTINAL BLEEDING

Bleeding from the GI tract. Symptoms depend on where in the GI tract the blood is coming from. Sometimes the bleeding can be chronic e.g., from a cancer or can be acute e.g., variceal bleed.

If bleeding is acute this is an emergency: patients can become very unwell very quickly.

CAUSES

Upper GI tract (UGI) e.g., stomach, esophagus:

1. Peptic ulcer disease
2. Varices (from portal hypertension from liver disease e.g., alcoholism)
3. Cancer.

Lower GI tract e.g., intestine

1. Diverticulitis (pouches in wall of intestine)
2. Cancer
3. Inflammatory bowel disease
4. Dysentery.

SIGNS/SYMPTOMS

- Bleeding **from the upper GI tract e.g., stomach, esophagus**:
  - Will vomit brown liquid (like coffee) or fresh blood and/or
  - Will have melaena (black sticky smelly stools). (Remember that patients on iron tablets will have black stools).
- **Bleeding from the lower GI tract e.g., intestine**:
  - Fresh blood from rectum.
- May have signs of shock – tachycardia, low BP, high **CRT** (Capillary Refilling Time), fast RR, cold peripheries.

EMERGENCY TREATMENT

In case of active bleeding

See Table Emergency Treatment of GI Bleeding

GASTRO-OESOPHAGEAL REFLUX DISEASE

Gastro-esophageal reflux disease **(GERD)** is caused by a weak sphincter (muscle) between the esophagus and the stomach which means that the contents from the stomach reflux into the esophagus causing a burning pain.

RISK FACTORS

1. **High alcohol intake**
2. **Obesity**
3. **Eating spicy food**
4. **High caffeine intake**
5. **Heavy smoking**
6. Pregnancy
7. Drugs e.g., NSAIDs, steroids, aspirin and doxycycline

SIGNS AND SYMPTOMS

Burning pain in the epigastric area moving to the mouth with acid taste, especially when lie down.

DIAGNOSIS

Clinical diagnosis.

Lifestyle advice:

- Try to reduce or stop alcohol, smoking, spicy food, hot drinks, tea and coffee.
- Avoid eating for 3 hours before bedtime, eat more but smaller meals, and do not lie down after meals.
- Advice overweight patients to lose weight, reduce fatty foods.
- If possible, avoid medications that can cause GORD.

TREATMENT

(1) Antacids-Such as Aluminum hydroxide, Magnesium hydroxide, Gaviscon. OR
(2) Histamine (H2) blocker – Cimetidine or Ranitidine orally OR
(3) Proton Pump Inhibitors- Pantoprazole / Omeprazole orally OR
(4) Prokinetic drugs- Metoclopramide/Domperidone orally

GASTRITIS

DEFINITION

Gastritis is an inflammation of the stomach mucosa (the inner surface of the stomach).

CAUSES

- Helicobacter pylori (H. pylori) bacteria in the stomach
- High alcohol intake
- Drugs: NSAIDs, steroids high dose, ferrous sulphate. Especially prolonged use is a risk factor
- Heavy smoking
- Eating spicy food
- Autoimmune gastritis (*can cause Pernicious anaemia*)

SIGNS AND SYMPTOMS

- Pain in the epigastric area (burning pain, dull pain).
- Nausea, vomiting, bloating, belching, feeling of fullness, weight loss.
- Anemia in autoimmune gastritis (decreased HCT, increased MCV and MCH).

DIAGNOSIS

Clinical diagnosis, and Gastroscopy. If vomiting with blood, treat as gastrointestinal emergencies.

Table Emergency Treatment of GI Bleeding

	ASSESS	TREATMENTS	
DR	Danger Response	Gloves Safe place, call for help	
A	Airway obstruction Speaking, stridor, swelling, secretions	**Suction** (if available) Oxygen	
B	RR, SpO2, cyanosis Chest indrawing/ tracheal tug Listen to chest		
C	HR, BP, Cap refill Urine output, Temp Listen to HS	**2 IV cannulas** (biggest size possible 16G or 18G) Take bloods e.g., **Hct, blood group**, **BUN*,** CBC, MS, dextrose etc. **Fluid bolus 1L STAT** **Transfuse** if signs of shock	
D	Check dextrose Seizures Pain	If UGI bleeding and suspect **PEPTIC ULCER DISEASE** e.g., history of abdominal pain, no risk factors for liver disease: **Omeprazole** 40mg IV (or PO) OR **Ranitidine** 50mg IV	If suspect **PORTAL HYPERTENSION** e.g., high alcohol intake, chronic hep B or C or signs of cirrhosis) **Ceftriaxone IV** 1g OD for 5-7 days (varices are often associated with bacterial infection) +/- **Vitamin K** IM 2.5-10mg STAT dose
E	AVPU/GCS Expose and examine	History, further investigations, treatment plan	

ASSESS RESPONSE – Re-start ABCDE
If no response, refer hospital

TREATMENT

Lifestyle advice:

- Stop (or at least reduce): alcohol, smoking, spicy food, hot drinks, tea and coffee.
- Advise overweight patients to lose weight, reduce fatty foods.
- If possible, avoid medications that can cause gastritis.

PREVENTION

Avoid coffee, alcohol, eating spicy foods, smoking. Avoid prolonged use of medications that cause gastritis e.g., steroids or NSAIDs (non-steroidal anti-inflammatory drug) like ibuprofen. If long term medication is absolutely necessary (e.g., steroids for nephrotic syndrome) consider **omeprazole** 20mg OD prophylaxis to prevent gastritis.

PEPTIC ULCER DISEASE

DEFINITION

In peptic ulcer disease, epigastric pain can be very severe. Ulcers can be in the stomach (gastric ulcer) or in the duodenum (duodenal ulcer). Often peptic ulcers are caused by infection with bacteria called *H. pylori*. Medicines that decrease stomach acid like aluminum hydroxide may make you feel better, but the ulcer may come back.

SIGNS AND SYMPTOMS

- Burning pain in the epigastric area:
  - **Gastric ulcer:** pain worse with food.
  - **Duodenal ulcer:** worse before meals and in the morning (empty stomach). Pain may improve with eating but comes back 1-2 hours after a meal.
- Nausea, vomiting, bloating, loss of appetite.
- Weakness and fatigue due to chronic blood loss.

COMPLICATIONS

- **Acute bleeding:** In some cases, acute **bleeding** can happen. The patient will vomit brown liquid (like coffee ground) or fresh (bright red) blood and may have melaena (black sticky smelly stools). See above for emergency treatment.
- **Chronic bleeding:** if small amount of bleeding occurs over a long time, the patient will become anaemic.
- **Perforation:** hole in the stomach wall or the duodenum which can lead to peritonitis (hard, very tender abdomen), sepsis and death.
  - **DRS AB-CABDE/S**
  - Give nothing to eat or drink (NPO)
  - IV **ampicillin+ IV gentamicin + IV metronidazole**
  - IV fluids – NSS

REFER THE PATIENT TO HOSPITAL IMMEDIATELY if suspect perforation

DIAGNOSIS

It is a clinical diagnosis. Examine abdomen to check for any pain/masses. Look for signs of anaemia. If possible, test for *H. pylori*. However, testing is expensive and may not be available.

TREATMENT

When giving treatment it is important to do ALL the steps, not just give medication:

- Lifestyle advice.
- Stop any medications that make symptoms worse.
- Consider de-worming, check stool test.
- Try step by step treatment.

PREVENTION

Avoid coffee, alcohol, eating spicy foods, smoking. Avoid prolonged use of medications that may cause peptic ulcer disease (e.g., NSAIDs). If long term medication absolutely necessary e.g., steroids for nephrotic syndrome, consider **omeprazole** 20mg OD prophylaxis.

See Table: Helicobacter pylori description and treatment

HEMORRHOIDS (PILES)

OVERVIEW

- Hemorrhoids also called piles are swollen veins in your anus and lower rectum, similar to varicose veins. Hemorrhoids can develop inside the rectum (internal hemorrhoids) or under the skin around the anus (external hemorrhoids).
- Nearly three out of four adults will have hemorrhoids from time to time. Hemorrhoids have a number of causes, but often the cause is unknown.
- Fortunately, effective options are available to treat hemorrhoids. Many people get relief with home treatments and lifestyle changes.

SYMPTOMS

Depend on the type of hemorrhoid.

External hemorrhoid	**Thrombosed hemorrhoids**
These are under the skin around your anus. Signs and symptoms might include: • Itching or irritation in your anal region • Pain or discomfort • Swelling around your anus • Bleeding	If blood pools in an external hemorrhoid and forms a clot (thrombus), it can result in: • Severe pain • Swelling • Inflammation • A hard lump near your anus

CAUSES

The veins around your anus tend to stretch under pressure and may bulge or swell. Hemorrhoids can develop from increased pressure in the lower rectum due to:

- Straining during bowel movements
- Sitting for long periods of time on the toilet
- Having chronic diarrhea or constipation
- Being obese
- Being pregnant
- Having anal intercourse
- Eating a low-fiber diet
- Regular heavy lifting

RISK FACTORS

As you age, your risk of hemorrhoids increases. That's because the tissues that support the veins in your rectum and anus can weaken and stretch. This can also happen when you're pregnant because the baby's weight puts pressure on the anal region.

COMPLICATIONS

Complications of hemorrhoids are rare but include:

- **Anemia.** Rarely, chronic blood loss from hemorrhoids may cause anemia, in which you don't have enough healthy red blood cells to carry oxygen to your cells.
- **Strangulated hemorrhoid.** If the blood supply to an internal hemorrhoid is cut off, the hemorrhoid may be "strangulated," which can cause extreme pain.
- **Blood clot.** Occasionally, a clot can form in a hemorrhoid (thrombosed hemorrhoid). Although not dangerous, it can be extremely painful and sometimes needs to be lanced and drained.

PREVENTIONS

- **Eat high-fiber foods.** Eating more fruits, vegetables, and whole grains can soften the stool and increase its bulk, which will help you avoid the straining. Add fiber to your diet slowly to avoid problems with gas.
- **Drink plenty of fluids.** Drink six to eight glasses of water and other liquids each day.
- **Consider fiber supplements.** Most people don't get enough of the recommended amount of fiber — 20 to 30 grams a day — in their diet. Over-the-counter fiber supplements, such as psyllium (Metamucil) or methylcellulose (Citrucel), improve overall symptoms and bleeding from hemorrhoids. Be sure to drink at least eight glasses of water or other fluids every day.

Table: Helicobacter pylori description and treatment

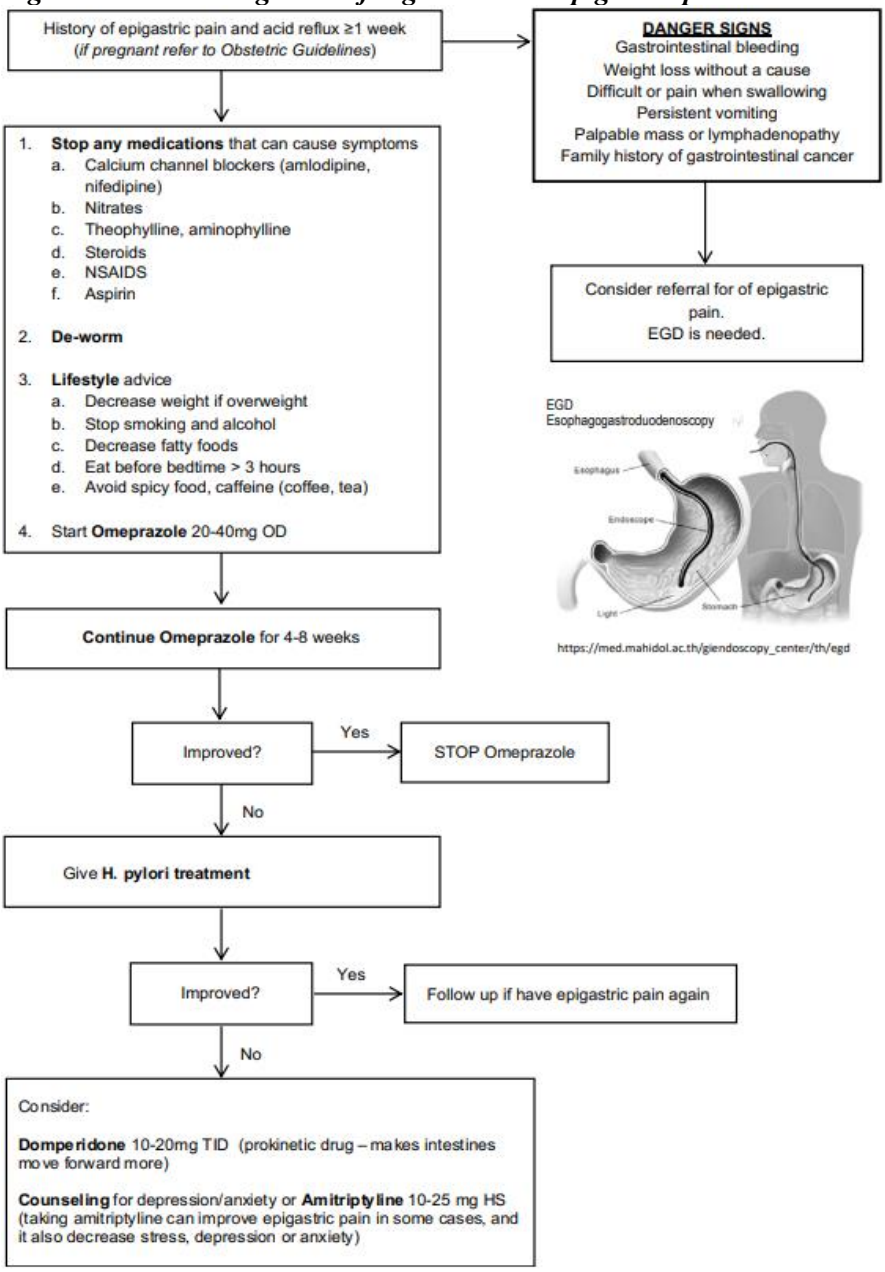
Helicobacter pylori (H. pylori): *H. pylori* is a bacterium that is found in many people's stomachs. This bacterium is able to survive the highly acidic environment in the stomach. Most people do not know they have the infection, and it often it does not cause any problems. Sometimes it causes gastritis or ulcers. It is not known why and when people become infected. It has also been linked to stomach cancer. Testing for *H pylori* can be done by serology, a breathing or a stool test.

If symptoms do not improve with medical management, try to treat for H. pylori.

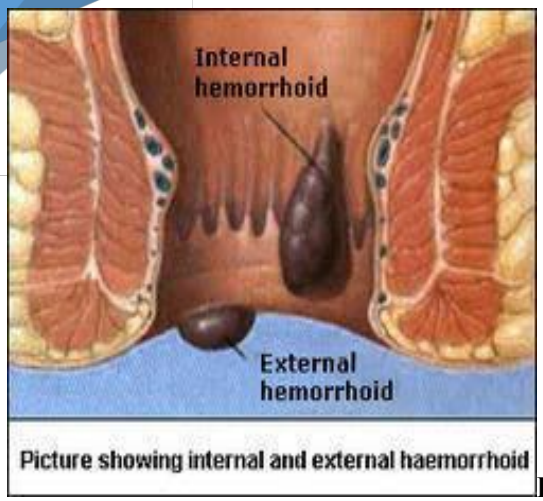
Omeprazole 20mg BID for 14 days AND
Metronidazole 500mg TID for 14 days AND
Amoxicillin 500mg TID for 14 days
Then continue **Omeprazole** 20mg OD for 2 weeks

Note: H pylori may be resistant to antibiotics, so even if these medications are given the bacteria may not be cleared and the patient may not improve. Longer treatment duration (e.g., 14 days) might improve outcome.

Figure: Treatment algorithm for gastritis and epigastric pain



If the pain does not improve when this algorithm, comes back again and again, or getting worse, discuss with doctor. There could be another problem like cancer or *H. pylori* resistance to antibiotics.



Picture showing internal and external haemorrhoid

Don't strain. Straining and holding your breath creates greater pressure in the veins in the lower rectum.

- **Go as soon as you feel the urge**.
- **Exercise.** Stay active to help prevent constipation and to reduce pressure on veins,

Avoid long periods of sitting. Sitting too long, particularly on the toilet, can increase the pressure on the veins in the anus.

DIAGNOSIS

Diagnosing internal hemorrhoids might include examination of your anal canal and rectum.

- **Digital examination.** Your doctor inserts a gloved, lubricated finger into your rectum. He or she feels for anything unusual, such as growths.
- **Visual inspection.** Because internal hemorrhoids are often too soft to be felt during a rectal exam, your doctor might examine the lower portion of your colon and rectum with an anoscope, proctoscope or sigmoidoscope.

- **colonoscopy if:**
  - Your signs and symptoms suggest you might have another digestive system disease
  - You have risk factors for colorectal cancer
  - You are middle-aged and haven't had a recent colonoscopy.

TREATMENT

Home remedies - You can often relieve the mild pain, swelling and inflammation of hemorrhoids with home treatments.

- **Eat high-fiber foods.**
- **Use topical treatments.** Apply an over-the-counter hemorrhoid cream or suppository containing hydrocortisone or use pads containing witch hazel or a numbing agent.
- **Soak regularly in a warm bath or sitz bath.** Soak your anal area in plain warm water for 10 to 15 minutes two to three times a day. A sitz bath fits over the toilet.
- **Take oral pain relievers.** Acetaminophen, aspirin or ibuprofen

See your doctor in a week if you don't get relief, or sooner if you have severe pain or bleeding.

Medications

- Over-the-counter creams, ointments, suppositories, or pads containing hazel, or hydrocortisone and lidocaine.
- Don't use an over-the-counter steroid cream for more than a week because it can thin your skin.

External hemorrhoids thrombectomy

- Done if a painful blood clot (thrombosis) has formed within an external hemorrhoid
- Done under local anesthesia, is most effective within 72 hours of developing a clot.

Minimally invasive procedures

- For persistent bleeding or painful hemorrhoids
- Done in outpatient setting and don't usually require anesthesia.

Rubber band ligation.

- Put one or two tiny rubber bands around the base of an internal hemorrhoid to cut off its circulation. The hemorrhoid withers and falls off within a week.
- Bleeding might begin two to four days after the procedure but is rarely severe.
- Occasionally, more-serious complications can occur.

Injection (sclerotherapy).

- Injects a chemical solution into the hemorrhoid tissue to shrink it.
- less effective than rubber band ligation.

Coagulation (infrared, laser or bipolar)

- Use laser or infrared light or heat causing small, bleeding internal hemorrhoids to harden and shrivel.

Surgical procedures

Only a small percentage of people with hemorrhoids require surgery. However, if other procedures haven't been successful or you have large hemorrhoids, your doctor might recommend one of the following:

Hemorrhoid removal (hemorrhoidectomy)	Hemorrhoid stapling
- removes excessive tissue. It is the most effective and complete way to treat severe or recurring hemorrhoids. Complications - temporary difficulty emptying your bladder and it occurs mainly after spinal anesthesia. - pain which medications can relieve. Soaking in a warm bath also might help.	- stapled hemorrhoidopexy. - Used only for internal hemorrhoids. - less pain than hemorrhoidectomy - for earlier return to regular activities - a greater risk of recurrence and rectal prolapse Complications bleeding, urinary retention, and pain, as well as, rarely, a life-threatening blood infection (sepsis).

DIARRHOEA

Diarrhoea is a symptom and not a disease.

Acute diarrhoea = An increase in the number (>3/day) AND loose or watery stools passed over a period of less than 14 days. Acute diarrhoea can have many different causes (gastrointestinal infection, food poisoning, surgical problems, or other diseases).

Chronic diarrhoea = A diarrhoeal episode that lasts more than 2 weeks (**Note:** causes and treatments for chronic diarrhoea are different from acute diarrhoea).

The following 2 types of acute diarrhoea are described: (mixed syndromes can occur)

DIARRHOEA WITHOUT BLOOD

Stools are very liquid (watery diarrhoea), many stools, and clear colour (brown, yellowish). Fever and abdominal pain can exist but there is no blood or mucus in stools. The clinical signs are mostly caused by dehydration. The cause can be viral, bacterial (e.g., Cholera, *E. coli*) or parasitic (e.g., *Giardia)*. **Note:** acute diarrhoea without blood can also be seen in malaria.

DYSENTERIC DIARRHOEA - DIARRHOEA WITH BLOOD

Stools are soft rather than liquid and are with blood. There is abdominal pain and fever can be high. Most common causes are *Shigella* and *Campylobacter*. Parasites like amoeba can also cause dysentery (usually without high fever).

SIGNS AND SYMPTOMS

- How many days has the patient had diarrhoea?
- How many times per day?
- Is it watery or with blood?
- Is there abdominal pain, rectal pain, feeling that haven't completely emptied bowels (tenesmus), fever or vomiting?

ACUTE DIARRHOEA

Table: Acute diarrhoea

	DIARRHOEA WITHOUT BLOOD	DYSENTERIC DIARRHOEA
Signs	Sometimes fever Slight abdominal pain Vomiting	High fever Moderate to severe abdominal pain Vomiting
Stools	Watery	Blood
Life-threatening	Dehydration	Sepsis

DIAGNOSIS

It is most important to evaluate and treat dehydration. Diagnosis is made on clinical grounds: diarrhoea without blood or dysentery. To specify between viral, bacterial or amoebic disease you need to carry out a **stool-test**. Consider the next points:

- For all types: First evaluate the **signs of dehydration** .
- If there is **fever** you must also think of associated diseases such as malaria, otitis media , pneumonia , meningitis or UTI.
- Look for signs of purging watery diarrhoea or repeated vomiting. Think of **Cholera**.
- If the patient has **abdominal signs:** a tender abdomen or abdominal distension, think of surgical causes (obstruction or perforation).
- With **chronic diarrhoea** (>2 weeks) think of malnutrition and chronic diseases e.g., HIV

TREATMENT OF DIARRHOEA

Follow these steps to safely diagnose and treat diarrhoea:

1. **Assess acute or chronic**
2. **Evaluate hydration using the WHO criteria.**
3. **Choose a treatment according to the WHO criteria.**
4. **Recognize the syndrome: diarrhoea without blood or with blood (dysentery).**
5. **Consider cause of diarrhoea and if any antibiotics are needed.**
6. **Evaluate hydration using the WHO criteria**

Diarrhoea (mainly diarrhoea without blood) can lead to severe dehydration. First assess your patient for signs of dehydration:

Table: Clinical signs for evaluating dehydration plan (WHO) Dehydration assessment

	PLAN A **No Dehydration**	**PLAN B** **Mild Dehydration**	**PLAN C** **Severe Dehydration**
General condition	Normal	Agitated	Very tired or unconscious
Eyes	Normal	Slightly sunken	Deeply sunken
Tears	Present	Absent	Absent
Mouth and Tongue	Moist	Dry	Very Dry
Thirsty	None	Yes	Unable to drink
Skin pinch	Goes back quickly (Normally)	Goes back slowly	Goes back very slowly

Choose a treatment according to the WHO criteria:
The decision on whether to admit and how to treat the patient is dependent on the WHO classification A, B or C. Once evaluating the level of dehydration then follow the treatment:

WHO PLAN A
To treat diarrhoea at home and prevent dehydration. The patient has no signs of dehydration. No need to admit to IPD.
Rules of home treatment
GIVE EXTRA FLUID
How much?
After each loose stool give:
Child < 2 yrs: 50-100ml (quarter of a large cup).
Child 2-10 yrs: 100-200ml (half of a large cup).
Older child and adults: give patient enough ORS for at least 2 liters.
What fluid to give?
Oral Rehydration Solution (ORS)
You can also give salted rice water, salted yoghurt drink or vegetable/ chicken soup with salt. Be careful, too much salt can make dehydration worse ("osmotic dehydration").
Do not give fluids e.g., carbonated (fizzy) drinks, commercial fruit juices, sweetened tea, tea or coffee.
How to give?
Give frequent, small sips from a cup.
If there is vomiting, wait 10 minutes then continue more slowly.
Continue to give extra fluids until the diarrhoea stops.
ZINC
Zinc sulphate Child<6m: 10mgOD; Child 6m-5yrs 20mg OD for 10-14 days. (1 tablet = 15mg)
Note: no benefit to give if child >5yrs so DO NOT GIVE.
Infants: dissolve tablet in a small amount of expressed breast milk, ORS or clean water; in a spoon.
Older children: chew tablets or dissolve in a small amount of clean water in a cup or spoon. Remind the mother to give the zinc supplements for **10-14 days***.
CONTINUE FEEDING
- Continue to feed normal diet, and increase breast feeding:
Infants who are not breastfeeding: continue usual milk formula at least every 3 hours (if possible, by cup).
Infants who are less than 6 months who are being breastfed and given extra food should try to increase breastfeeding (more times and for longer each feed) and decrease the food (ideally to **exclusive breastfeeding**).
Children older than 6 months that are not taking soft food should be given cereals (or bread, rice) and vegetables in addition to milk. Educate the parents about giving solid foods.
- Recommend food rich in potassium as this can be lost in the diarrhoea/vomiting e.g., banana, green coconut water, fresh fruit juice, tomatoes.
ADVISE WHEN TO COME BACK
You should tell the family/patient that they should return if:

Pass many watery stools.	Vomits a lot.	Has a fever
Is very thirsty.	Not better after 3 days.	Does not eat or drink normally.
Blood in stool		

WHO PLAN B

To treat dehydration.

The patient has **signs of dehydration**. Needs to be admitted to IPD.

REHYDRATE

Give ORS in the first 4 hours according to the table below.

Vomiting is very common especially in the first 1-2 hours: **if the child vomits wait 5-10 minutes and try again more slowly (small but frequent amounts of fluid) – do not go straight to IV fluids because of vomiting:**

Table 3: WHO Guidelines approximate amount of ORS to give in first 4 hours
**** Use age if you cannot get weight****

Weight	**< 5kg**	**5-7.9kg**	**8-10.9kg**	**11-15.9kg**	**16-29.9kg**	**30kg or more**
Age	<4 months	4-11 months	12-23 months	2-4 years	5-14 years	15 years +
ORS	200-400ml	400-600ml	600-800ml	800-1200ml	1200-2200ml	2200-4000ml

Note: If patient wants more ORS, then give them more

REASSESS

Assess for signs of dehydration **every 1 hour**. If signs of dehydration get worse and the child develops signs of severe dehydration e.g., very tired or unconscious, deeply sunken eyes, not able to drink treat for severe dehydration (Plan C).

After **4 hours** reassess fully according to Table 2 then decide what treatment plan to continue:

No signs of dehydration à plan A.

Some dehydration à plan B **AND offer food, milk and other fluids (as above).**

Worsening dehydration à plan C

ZINC

Zinc sulphate Child<6m: 10mg OD; Child 6m-5yrs: 20mg OD for 10-14 days.

Note: no benefit to give if child >5yrs so DO NOT GIVE.

Infants: dissolve tablet in a small amount of expressed breast milk, ORS or clean water; in a spoon.

Older children: chew tablets or dissolve in a small amount of clean water in a cup or spoon. Remind the mother to give the zinc supplements for the **full 10-14 days.**

FEEDING

Solid food should not be given in the first four hours (except breastfeeding).

After 4 hours if plan B or plan A is continued, give food every 3-4 hours (as per plan A feeding).

If change to treatment plan A children >6m should have some food before they are discharged.

WHO PLAN C
EMERGENCY to treat severe dehydration:

Table 4: WHO Recommendations how much IV Ringers Lactate fluid to give

	Whilst waiting for IV access	First give 30ml/kg in:	Then give 70ml/kg in: (or use SMRU IVF chart[b])	When to re-assess
Infants under 12 months	Give ORS	1 hour	5 hours	6 hours
Older than 12 months	Give ORS	30 minutes	2 ½ hours	3 hours
How to calculate drop rate	$Drops/_{Minute} = \frac{ml}{hour} \times \frac{drops\ per\ 1\ ml^*}{60}$		Giving sets: No set*: 1 ml = 20 drops Metroset* (burette): 1 ml = 60 drops Blood set*: 1 ml = 15 drops	

Example I
You want to give 500 ml in 5 hours with Metroset:

$$Drops/_{Min} = \frac{500}{5} \times \frac{60^*}{60} = 100\ drops/\ min$$

Example II
You want to give 500 ml in 5 hours without set:

$$Drops/_{Min} = \frac{500}{5} \times \frac{20^*}{60} = 33\ drops/\ min$$

Also give ORS (approx. 5ml/kg/hour) as soon as the patient can drink (usually after 3-4hrs (infants) or 1-2 hrs (children).

REASSESS

Do vital signs every 15 minutes initially.
After 1-2 hours: if IV hydration is not improving then increase the rate of the fluid.
After 3 hours (children/adults) and **6 hours (infants)** re-assess for signs of dehydration.

No signs of dehydration à plan A (observe the child for at least 6 hours).
Some dehydration à plan B (stop IV fluid and give ORS).
Worsening dehydration à plan C again

ZINC

Zinc sulphate Child <6m: 10mg OD; Child 6m-5yrs: 20mg OD for 10-14 days.
Note: no benefit to give if child >5yrs so DO NOT GIVE.

Infants: dissolve tablet in a small amount of expressed breast milk, ORS or clean water; in a spoon.
Older children: chew tablets or dissolve in a small amount of clean water in a cup or spoon.
Remind the mother to give the zinc supplements for the **full 10-14 days.**

FEEDING

Should not be given until at least the first re-assessment (except for breastfeeding).
If continuing on plan B or plan A give food every 3-4 hours as described above.
If change to treatment plan A, children >6m should have some food before they are discharged.

DIARRHOEA WITHOUT BLOOD

Patients with watery diarrhoea do NOT need antibiotics.
They only need REHYDRATION

Most cases of acute diarrhoea without blood do not need antibiotic treatment. However, there are (at least) two special cases of watery diarrhoea that do need antibiotics.

Giardia: caused by a parasite (giardia *intestinalis*). In most of the cases, there are only few clinical Signs: nausea, abdominal pain, weight loss, (watery) diarrhoea. There is no fever. If the diarrhoea becomes chronic (More than 14 days): treat with metronidazole for 3 days: Adults: 2 g OD; Child: 10mg/kg TID.

DYSENTERY– DIARRHOEA WITH BLOOD

Where possible, a stool sample should be seen by a medic.

There are two types of dysentery:

Bacterial: Several types of bacteria cause dysentery; the most severe form is ***Shigella.***
Associated symptoms: fever, abdominal pain, feeling that haven't completely emptied bowels (tenesmus), unwell patient.

Amoebic: Often not acute illness, less than 30% of sufferers have fever. Sometimes the amoebae

migrate via the blood to form peripheral (e.g., liver) abscesses.

It is often not possible to differentiate between amoebic and bacterial diarrhoea without laboratory stool investigation.
Choose the therapy according to patient's symptoms (especially presence of fever and if patient is at risk):

ADULT PATIENTS AT RISK
1. Patient over 65 years old with no support at home to help them.
2. Malnourished.
3. High fever >39ºC.
4. Signs of severe dehydration.
5. Signs of confusion, seizures or coma.

1. NO FEVER
Admit to IPD if the patient is **at risk**. If possible, treat in diarrhoea ward/area to prevent spreading.
Prescribe **metronidazole PO** x **5 days** (5-10 days if liver amoebiasis:
Adult: 750mg TID
Child: 15mg/kg TID
Note: Metronidazole doses for amoeba are higher than usual. Follow the recommended dose given here.

2. FEVER
Admit to IPD if patient is **at risk**. If possible, treat in diarrhoea ward/area to prevent spreading.
Treat the fever with paracetamol.
Give **ciprofloxacin** PO x **3 days:**
Adults: 500mg BID
Child >1m: 15mg/kg BID
Note: if pregnant (ciprofloxacin contraindicated) give **ceftriaxone** IM 1g OD for **3-5 days**.
If not better give **metronidazole** (dose as above).
Ensure sufficient food intake of normal diet.

Watch for complications: abdominal distension, perforation, sepsis

Note: For all diarrhoea do a stool-test to try to differentiate between amoebic and bacterial diarrhoea. If stool test is negative, it does not mean there is no infection, sometimes it is difficult to find with a microscope. When there are an increased number of cases of diarrhoea, take stool samples for laboratory analysis (culture and sensitivity), inform the doctor and prepare for an outbreak of dysentery.

PREVENTION
Give the following education to all patients to prevent diarrhoea:

- Wash hands with soap and water before eating, preparing food and after visiting the toilet.
- Breastfeed babies (exclusive breast feeding if <6m).
- Boil drinking water if not chlorinated.
- Cook food well and keep it covered.
- Use toilets. Clean carefully after passing stools.
- Do not use chronic antacid (like aluminum); gastric acidity helps to fight bacteria.

COMPLICATIONS
Septicemia, acute abdomen, amoebic liver abscess and haemolytic uremic syndrome (HUS) (anaemia, low platelets and acute renal failure).

VACCINE
For cholera, only a short-acting vaccine (useful in outbreaks) is available.

CHOLERA
Cholera is very infectious – if suspect a case then use safety precautions
And discuss with the doctor about referral to hospital

DEFINITION
Cholera is an intestinal infection caused by the bacterium ***Vibrio cholerae***. This bacterium produces Cholera Toxin (CT), an enterotoxin which causes a massive outpouring of fluid and salts (electrolytes) into the bowel. Cholera infection is transmitted through contaminated water or food.

Cholera should be suspected when a child older than 5 years, or an adult, develops severe dehydration from acute watery diarrhoea (usually with vomiting), or if any patient older than 2 years has acute watery diarrhoea when cholera is known to be present in the area.

SIGNS AND SYMPTOMS
- Infections range from asymptomatic to acute fulminant watery diarrhoea, often described as 'rice-water stools.
- In severe cases, purging watery diarrhoea can rapidly cause the loss of 10% or more of the body's weight, with hypovolemic shock, metabolic acidosis and potassium loss causing death.
- Vomiting starts after the onset of (always painless) diarrhoea.
- 75% or more of initial infections with ***V. cholerae*** may be asymptomatic, depending on the infecting dose.
- People with blood type O are more likely to develop severe cholera than those with other blood types.

DIAGNOSIS
- Clinical

- In outbreaks, in non-epidemic situations stool-sample test for *V. cholera* can be done, although if suspect a case a referral should be done.

TREATMENT

Note: if suspect **cholera** – put in IV line, give Ringers Lactate 1L stat and refer to hospital immediately

If unable to refer (only if rural clinic) then follow these steps:

- Rapid replacement of lost fluid and electrolytes through immediate oral or IV rehydration. A patient needs 10-15 liters of fluid the first day. In severely dehydrated patients 50-100ml/kg/hr.
- Rehydrate with Ringers Lactate with careful replacement of potassium after 24h of fluid replacement. Check potassium if possible. If hypokalaemia, add potassium chloride (20-40mmol KCl) in one-liter Ringers Lactate.
- Antimicrobial therapy is indicated for severely dehydrated patients 2 years or older.
- Several antibiotics are recommended by WHO (doxycycline, tetracycline, trimethoprim-sulfamethoxazole, erythromycin, chloramphenicol or ciprofloxacin) but different resistance levels are found in different parts of the world. Previous recommendation for the Thai-Myanmar border is **ciprofloxacin** 1-gram STAT dose. It is recommended to check for resistance in your clinic before starting treatment.

Note: if unable to refer it is VERY important to take precautions to avoid the spread of cholera: Isolate patients in a separate area/room

Make a hole in the bed so the stool falls into a chlorinated bucket
Make sure you wear protective equipment

PREVENTION

Use clean water for hand-washing and for cooking.
Avoid uncooked seafood.
Avoid eating leftovers of rice as this is an excellent growth medium.

VACCINE

There are vaccines for short-term protection (6 months). These vaccines should be given in case of an outbreak situation.

LIVER DISEASES

HEPATITIS

DEFINITION

Hepatitis is an inflammation of the liver. It has many causes, but the commonest on the Thai-Myanmar border is viral hepatitis.

Hepatitis can be:
Acute e.g. hepatitis A or drug reactions (most will improve if the drug is stopped).
Acute or chronic e.g. hepatitis B: may be acute if the body's immune system manages to fight the virus (then become immune and cannot get infected again) or may become chronic and lead to liver cirrhosis.
Chronic e.g. autoimmune hepatitis: will get worse over time.

CAUSES

1. **Viral Infection**

Table: for Viral hepatitis (A, B, C)

	Transmission	Length of infection	Treatment	Complication
Hepatitis A	Faeco-oral e.g. poor hygiene	Acute, usually self-limiting	Supportive	Severe illness if pregnant
Hepatitis B	Contact with infected blood or body fluids, mother to child, sexual intercourse	5% of adults infected will become chronic 95% neonates infected will become chronic	Antiviral drugs (may not be available). ***See OB guidelines*** for peri-natal prevention	Liver cirrhosis Liver cancer Associated with Hepatitis D infection
Hepatitis C	Contact with infected blood, congenital	Often chronic	Antiviral drugs (may not be available)	Liver cirrhosis Liver cancer
Hepatitis E	Faeco-oral	Acute, usually self-limiting	Supportive	Severe illness in pregnancy possible

2. **Parasitic** (e.g. Liver flukes, *E. histolytica*, malaria)
3. **Metabolic syndrome** (non-alcoholic liver disease)
4. **Drugs:** e.g. anti-TB drugs, HIV drugs, leprosy drugs, paracetamol (dose-dependent)
5. **Alcoholic hepatitis**
6. **Autoimmune hepatitis**

SIGNS AND SYMPTOMS

- Jaundice
- Malaise (fatigue, tiredness)
- Mild fever
- Loss of appetite
- Nausea and vomiting
- Right upper quadrant pain
- Smooth, tender and slightly enlarged liver
- Dark urine, stools not pale

Viral hepatitis infection can cause different symptoms in each patient. Some patients will have moderate symptoms (e.g. fatigue) and other patients may have severe liver disease

DIAGNOSIS

- Liver function test (AST/ALT raised >1000U/L)
- Hepatitis B testing
- Liver ultrasound

Interpretation of Hepatitis B results:

For definitions e.g., antibody/antigen.

Note: In some settings it is not usually needed to check all of these tests (often only HBsAg +/- **HBeAg** are tested). Sometimes only the rapid test for HBsAg is available.

HBsAg (Hepatitis B surface antigen)	• Protein on the surface of the hepatitis B virus which is present during acute or chronic infection. • Means that the person is infectious e.g. can pass the infection on to someone else.
Anti-HBs (antibody against hepatitis B surface antigen)	• Antibody that is formed when the immune system fights the hepatitis B virus. • It means that the person has developed immunity either from an infection of hepatitis B or from the vaccine.
HBcAg (Hepatitis B core antigen)	• Protein inside the hepatitis B virus. Means that the virus is replicating e.g. making copies of the virus and that the patient is infectious.
IgM anti-HBc (IgM antibody against hepatitis B core antigen)	• Antibodies against hepatitis B core antigen when the symptoms begin in acute hepatitis B. • Means recent or new infection, or exacerbation of chronic infection.
Anti-HBc (IgG antibody against hepatitis B core antigen)	• Antibodies that stay positive for life. • Means that the patient has an acute ongoing infection or had a previous infection.
HBeAg (Hepatitis B e antigen)	• Similar to hepatitis core antigen. • Means that the patient is very infectious.

Figure: for Hepatitis B serology interpretation

HBsAg	Anti-HBc-Ab	Anti-HBs-Ab	IgM anti-HBc-Ab	Interpretation
-	-	-		No acute or chronic infection. Hep B infection in incubation period; repeat Hep B diagnostic after 2-6 month if suspected. Not immunized and could become infected if exposed.
-	+	+		No acute or chronic infection. Patient has previous infection. Depending on the antibody level, the patient is now immune.
-	-	+		No acute or chronic infection. Patient had hepatitis B vaccination. Immunity depends on antibody level
+	+	-	+	Acute infection
+	+	-	-	Chronic infection (can check HBeAg to see if patient is very infectious)
-	+	-		Unclear-could be: Resolved infection (most common) False positive anti-HBc Low level chronic infection Resolving acute infection

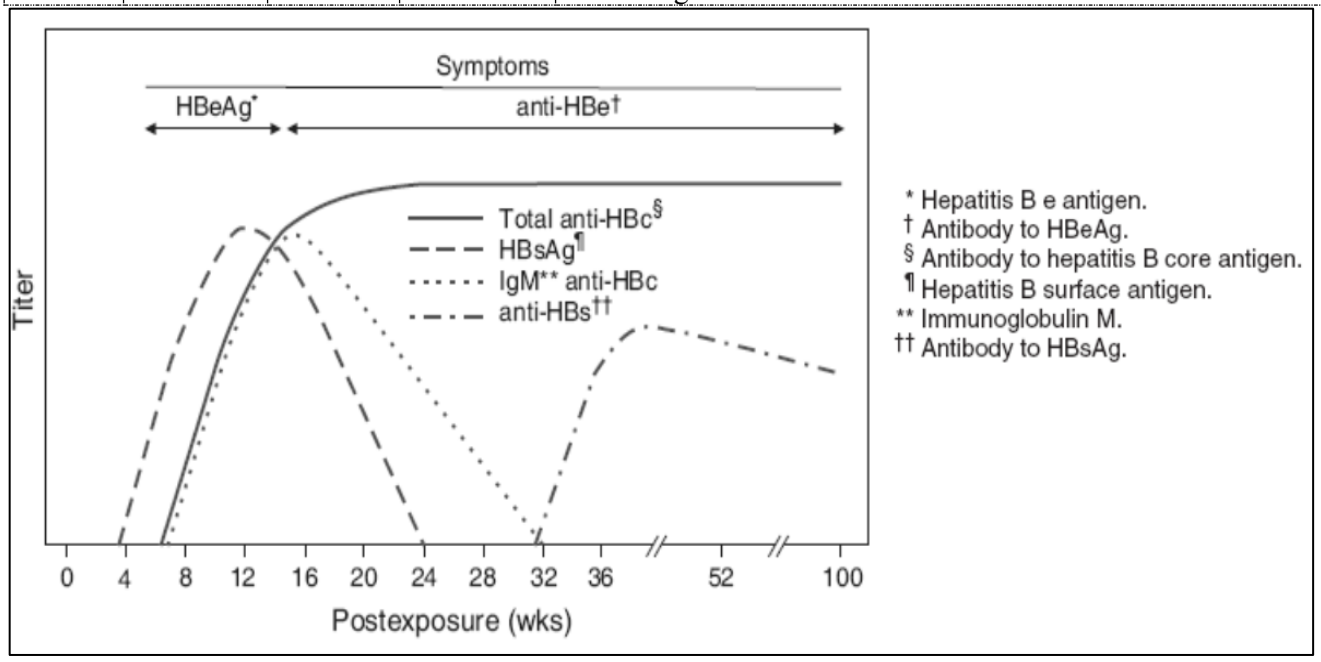


Figure: Serology of acute Hepatitis B infection and recovery

TREATMENT

Supportive treatment only: if the patient is dehydrated, or cannot eat or drink, admit to IPD. Encourage the patient to drink or give maintenance IV fluids.

No alcohol!

If the patient is taking drugs that could affect the liver (e.g. paracetamol), stop the drugs and discuss with the doctor. When giving medications be careful to check if safe in liver disease or if a different dose needs to be given.

VACCINATION

Hepatitis B vaccine

PREVENTION

Hepatitis A: improvement of sanitation.

Hepatitis B: general precautions for health workers, vaccination (and immunoglobulin) including for PEP, testing of donor blood, condom use, don't re-use needles.

Hepatitis C: general precautions for health workers, testing of donor blood (although not currently available at most clinics on the border), don't re-use needles.

Table: HCV Treatment regimens (2020)

Recommendation for treatment	Regimen type	Treatment duration (week)	
		Cirrhosis	Non-cirrhosis
Preferred regimens	**SOF/VEL** **Sofosbuvir 400mg/ Velpatasvir 100mg x once daily**	**12**	**12**
Alternative regime 1	**SOF/DCV** **Sofosbuvir 400mg/** **Daclatasvir 30mg x once daily**	**24**	**12**
Alternative regime 2	**SOF/DCV+Ribavirin** **Sofosbuvir 400mg/** **Daclatasvir 30mg + Ribavirin 200mg once daily**	**12**	**12**

Note: Ribavirin: body weight < 75 kg - 2 in the morning and 2 in the evening
Body weight ≥ 75 kg – 3 in the morning and 3 in the evening.

LIVER CIRRHOSIS

DEFINITION

Cirrhosis is a chronic disease that destroys the cells of the liver and replaces them with scar tissue.

CAUSES

Common causes:

1. **Chronic alcohol abuse**
2. **Chronic hepatitis B (or C) virus** is a common cause

Less common causes

1. **Auto-immune** e.g., primary biliary cirrhosis
2. **Genetic** e.g., Recurrent Haemolysis due to blood disorders, biliary atresia (structural abnormality of liver/bile ducts from birth)
3. **Drugs** e.g., isoniazid, steroids, paracetamol overdose.

SIGNS AND SYMPTOMS

- Jaundice
- Malaise, weakness, bodily itching
- Red palm side of hands (palmar erythema)
- Slow hand tremor
- Ascites, oedema of the legs and back
- Muscle wasting
- Spider naevi (red spider-like blood vessels on the skin).
- Hair loss, loss of libido (sex drive)
- Peripheral neuropathy
- Hepatic encephalopathy
- Men: Gynecomastia, testicular atrophy, impotence
- Women: breast atrophy, irregular menstruation, amenorrhea
- Haemorrhage: bruises, purpura, epistaxis
- Portal hypertension: splenomegaly, caput medusa (distended abdominal veins), variceal bleeding
- Clubbing, pigmentation, Dupuytren's contracture (thickening of tendon of little/ring finger in hand), white nails

COMPLICATIONS

- Hypoglycaemia
- Liver failure +/- encephalopathy
- Portal hypertension +/- esophageal varices +/- GI bleeding
- Ascites
- Infections (bacterial peritonitis)
- Poor nutrition +/- vitamin deficiencies
- Hepatocellular carcinoma (liver cancer)
- Heart and kidney failure

DIAGNOSIS

Liver function test (AST/ALT raised). **Alpha feto-protein** is a blood test for liver cancer, discuss with doctor if appropriate.
Ultrasound of liver, if available.

TREATMENT

It is not possible to cure cirrhosis, only to control the symptoms and to delay liver failure:

GENERAL TREATMENT:

- Strongly advise patients to **STOP alcohol** – give support in stopping if addicted to alcohol.
- Nutrition: high protein, low salt diet.
- Monitor BP, as HBP is a risk for bleeding.
- If possible, vaccinate against Hepatitis B, if not already infected. If Hepatitis B positive give counselling for their partner to get screening/immunization.
- Avoid drugs that can cause liver toxicity e.g., NSAIDs.
- Adjust dose of medications e.g., paracetamol 500mg TID.

- If alcohol is the cause give prophylactic thiamine (vitamin B1) to prevent Wernicke's encephalopathy.

SPECIFIC TREATMENT:

1. PORTAL HYPERTENSION

DEFINITION

A patient with liver cirrhosis will have scarring in the liver which causes increased pressure in the portal vein (the blood vessel that carries blood form the spleen and GI tract to the liver). This pressure causes the veins in the esophagus, stomach and rectum to dilate (called varices) and possibly rupture. This will cause bleeding in vomit (fresh hematemesis) or in the stool (melaena or fresh blood).

SIGNS AND SYMPTOMS

- Splenomegaly
- Caput medusa (distended abdominal veins)
- Variceal bleeding

TREATMENT

In case of an acute upper gastrointestinal haemorrhage: DR ABCDE management

- When stable start propranolol 40mg BID to decrease the risk of bleeding from the varices. Increase to 80mg BID according to HR/BP (max 160mg BID).

2. ASCITES

DEFINITION

Abdominal distension due to the build-up of fluid.

DIAGNOSIS

- Clinical – look for other signs of liver failure.
- Think about other causes of oedema e.g., heart failure, kidney failure, low albumin (consider blood tests e.g., albumin, BUN & Creatinine).
- Abdominal ultrasound – especially, to look at liver, kidneys and amount of fluid.

TREATMENT

- Decrease salt intake.
- Diuretics
- **Spironolactone** 50mg OD (increased to 200 400mg OD if needed)
- **Furosemide** 20mg OD (increase to 120mg if necessary)
- **Increase diuretics by ratio of 2:5 furosemide: spironolactone**

****Note**: Long term high doses of diuretics should have sodium, potassium, **BUN and creatinine monitoring****

- Record weight daily.
- If tense ascites which is not improving with medication consider paracentesis (removing up to 2L of fluid).

3. SPONTANEOUS BACTERIAL PERITONITIS (SBP)

DEFINITION

Patients with ascites are at risk of getting infections of the ascitic fluid. Common organisms are ***Klebsiella*, *E coli* and *pneumococcus*.**

SYMPTOMS

- Abdominal pain
- Fever (although may not have fever)
- Decreased bowel sounds
- Sometimes confusion, drowsiness.

DIAGNOSIS

CBC, blood culture, LFT, creatinine & BUN

If unsure of diagnosis can send sample of peritoneal fluid for culture and cell count (Likely SBP if neutrophils >250cell/mm3).

****Note**: DO NOT WAIT FOR RESULTS BEFORE GIVING ANTIBIOTICS**

TREATMENT

- Start **ceftriaxone** IV 1g OD and **metronidazole** PO 500mg TID.

4. HEPATIC ENCEPHALOPATHY

DEFINITION

Liver cirrhosis causes a build-up of toxins (often containing ammonia) in the blood that a normal liver can normally get rid of. The toxins cause changes to brain function. Attacks are often caused by an infection or constipation.

SYMPTOMS

Sleep problems (sleeping too much/too little/ or sleeping during the day), Slurred speech, Mood or personality changes, Coma, Trouble concentrating or thinking clearly, Drowsy

DIAGNOSIS

Clinical, look for an infection, rule out any other causes of confusion e.g., stroke etc.

TREATMENT

- If available give **lactulose** 30ml OD or BID (this decreases ammonia production).
- Stop diuretics/correct electrolyte abnormalities.
- Treat any infection/dehydration/GI bleeding.
- Remove any sedatives (medications, drugs or alcohol).

5. HEPATOCELLULAR CARCINOMA

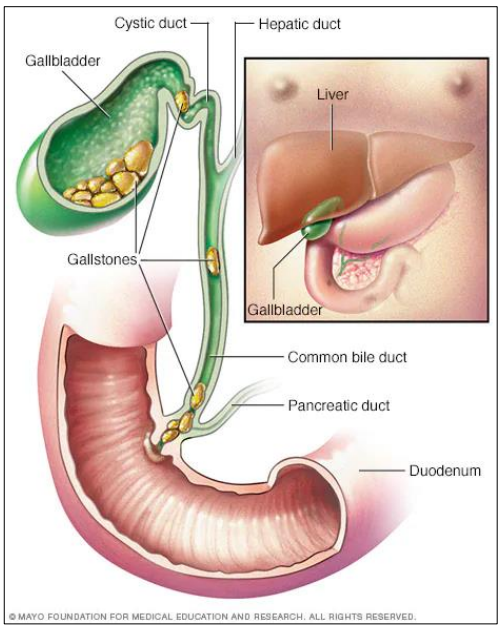
DEFINITION
Cancer of the liver

RISK FACTORS
- Alcohol excess
- Hepatitis B and C
- Aflatoxin (toxin produced by fungus)
- Liver cirrhosis
- Haemochromatosis (disease with high iron levels)
- Wilson's disease (disease with high copper levels)

DIAGNOSIS
Ultrasound scan +/- alpha feto-protein

TREATMENT
- No treatment is available at clinics on the border, consider referral to hospital.

BILIARY COLIC



Biliary colic is severe abdominal pain caused by the passage of a stone through the bile duct. When there is an obstruction of the bile duct, jaundice will occur. The blockage may be caused by gallstones or worms (especially ascaris). During pregnancy, gallstones are more common.
Note: If there is also evidence of infection e.g., fever, high WBC then treat as acute cholecystitis.

RISK FACTORS
Four Fs – Female, Fertile, Fat, Forty

SIGNS AND SYMPTOMS
- Pain comes in waves (colicky) and can radiate to back and right shoulder.
- Guarding in right upper quadrant (RUQ)
- Central abdominal pain moving to RUQ.
- Vomiting.
- No fever, no jaundice.

DIAGNOSIS
Clinical
Ultrasound of gallbladder to reveal stones (if available).

TREATMENT
- **Buscopan** IM or IV 20mg QDS (max 100mg/d)
- Strong Analgesia e.g., **tramadol** PO 50-100mg, not more often than 4 hours (max 400mg/d)
- If the pain persists after two injections of Buscopan and tramadol: consult a doctor.
- Worm treatment
- Ursodiol (Actigall) is used to dissolve gallstones in people who do not want surgery.

PREVENTION
Regular deworming (e.g., of pregnant women)
Intake of a healthy, low fat diet.
Weight loss

ACUTE CHOLECYSTITIS

DEFINITION
Acute cholecystitis is a bacterial infection of the gall bladder mostly due to obstruction of the bile ducts. It may follow an attack of biliary colic. Cholecystitis can also be due to malnutrition or typhoid fever.

SIGNS AND SYMPTOMS
- Pain, tenderness and guarding in right upper quadrant (RUQ)
- Vomiting
- Fever, rigors
- Jaundice (if bile duct obstruction.

DIAGNOSIS
Clinical; specific sign is pain when the patient breathes in deeply when the RUQ is palpated, and no pain if this procedure is performed on the LUQ (Murphy's Sign).
Ultrasound of the gallbladder to reveal stones, if available.

COMPLICATIONS
Empyema (gallbladder fills with pus), Peritonitis.

TREATMENT
- Bed rest
- IV fluids, no food or drink
- **Buscopan** IM or IV 20mg QDS (max 100mg/d)
- Strong Analgesia e.g., **tramadol** PO 50-100mg, not more often than 4 hours (max 400mg/d)
- **Ceftriaxone** IV 1g OD and **metronidazole** PO 500mg TID

- When fever settles switch to oral **ciprofloxacin** 500mg BID and **metronidazole** 500mg TID (total 10 days of antibiotics)
- Once the acute infection is over considered referral for surgical removal of gallbladder. Without surgery, recurrence is 25%.

PREVENTION
- Surgical removal of the gallbladder will prevent further attacks of cholecystitis.
- Intake of a healthy, low fat diet.
- Weight loss

ACUTE PANCREATITIS
DEFINITION
Acute pancreatitis is inflammation of the pancreas which can become chronic. Patients can become very unwell, very quickly.

CAUSES
1. **Alcohol**
2. **Gallstones**
3. Also, less commonly
   - o Medications e.g., steroids, HIV drugs, metformin
   - o Trauma
   - o Infections e.g., Mumps
   - o Diabetes

SIGNS AND SYMPTOMS
- Severe epigastric pain radiating to back
- Vomiting
- Jaundice
- If chronic pancreatitis: weight loss, fatty stool, diarrhoea

****Note**: Jaundice without abdominal pain is often a sign of pancreatic/gallbladder cancer, examine for a mass**

DIAGNOSIS
Clinical: typical history and epigastric tenderness on examination. No signs of peritonitis/bowel obstruction.
If possible, consider checking amylase (if pancreatitis will be 3 or more times the normal range).
Ultrasound may show inflamed pancreas (very difficult to see), but may also show cause e.g., gallstones, alcoholic fatty liver disease.

COMPLICATIONS
Chronic pancreatitis, abscess/necrosis of pancreas, pseudocysts, pleural effusion.

TREATMENT
- Bed rest
- No food or drink until the inflammation has resolved.
- Intravenous fluids – NSS, D5W, careful monitoring of fluid input/output is very important.
- **Buscopan** IM or IV 20mg QDS (max 100mg/d)
- Strong Analgesia e.g., **tramadol** PO 50-100mg, not more often than 4 hours (max 400mg/d).
- No surgery is needed.

PREVENTION
Gallbladder removal after cholecystitis, decrease alcohol intake.

LIVER ABSCESS
DEFINITION
One or more collections of pus within the liver. There are two types of liver abscess:
1. **Amoebic** Three times more common than bacterial.

The patient may report a recent episode of dysentery.
Treat with metronidazole +/- drainage.

2. **Bacterial**

Mostly from bacteria ascending the bile ducts.
The patient is often more unwell/septic.
Treat with broad spectrum antibiotics +/- drainage.

SIGNS AND SYMPTOMS
- Fever, chills, no appetite, nausea.
- Painful and enlarged liver (hepatomegaly) on palpation or percussion (in 50% of cases).
- Sometimes chest pain with a right-sided pleural effusion.
- Usually no jaundice, no splenomegaly, no ascites (if present think of other diagnoses).

DIAGNOSIS
- Clinical
- Ultrasound is very helpful to diagnose liver abscess.
- Stool test to establish the cause.

TREATMENT
If the patient is stable (not too unwell/ not septic)
Start **metronidazole** PO x 5-10 days:

- Adults: 750mg TID
- Child 15mg/kg TID
- If patient not improving after 3-5 days, follow unwell/septic protocol
  Note: Metronidazole doses for amoeba are higher than usual. Follow the recommended dose given here**
- **If the patient is unwell/septic:**
- Start **IV ampicillin, gentamicin and PO metronidazole (dose as for stable patient)**
- Continue for 10-14 days.

****Depending on their size (>6 cm), and response to antibiotic treatment**
Liver abscesses need to be drained surgically**

PREVENTION

Adequate and early treatment of (amoebic) dysentery could prevent liver abscess.

LIVER FLUKES

Opisthorchis viverrini and ***Clonorchis sinensis***, which are known as **small liver flukes (SLF),** and Fasciola hepatica (known as common liver fluke). These parasites are flatworms that reside in the bile ducts. Infection occurs by ingestion of undercooked freshwater fish (Opisthorchis and Clonorchis) and vegetable (e.g., water cress) in Fasciola.

SIGNS AND SYMPTOMS

- Mostly asymptomatic.
- Abdominal discomfort/pain.
- Nausea/vomiting, loss of appetite.

COMPLICATIONS

Opisthorchis and ***Clonorchis*** significantly increase the risk of cancer (cholangiocarcinoma). The longer the patient is infected, the higher the risk is. Repeated treatment, as a sign of repeated infection is also increasing the risk. Other complications are hepatic fibrosis, cholangitis, cholecystitis, obstructive jaundice and liver abscess.

DIAGNOSIS

- Stool microscopy.
- **CBC** can show eosinophilia.
- Ultrasound to check for complications.

TREATMENT

Organism	Treatment	Children (avoid in children < 6 months old)
Opisthorchis viverrini, Clonorchis sinensis	**Praziquantal 325mg/kg/dose TID x 3 days**	**Only use if >2 years old. Give adult dose.**

PREVENTION

Advise people to:

- Avoid eating raw or undercooked fish (small liver flukes).
- Advise to clean or cook vegetable before consumption **(Fasciola).**

INTESTINAL WORMS

Intestinal worms are very common (*ascaris / hookworm/ Trichuris / taenia*). The patient is infected by eating with dirty hands, walking without shoes or eating uncooked meat or vegetables.

Worms should be treated to

1. Prevent anaemia and malnutrition.
2. Prevent the following complications:

- Intestinal obstruction/obstructive jaundice
- Cysticercosis (*Taenia solium*) – lesions in brain and skin

When a patient needs steroid treatment (e.g., prednisolone) for another disease, **ALWAYS deworm** as the steroids decrease the immune system so the worm infections get worse.

Table: Treatment options for worms

Organism	Treatment	
	Oral treatment for adults and children >1 year (avoid in 1st trimester of pregnancy)	Children (avoid in children < 6 mo old)
Roundworms (Nematodes): infection by contact with soil/water/food infected with human faeces		
Hookworm	1. Albendazole[1] 400mg STAT 2. Mebendazole 100mg BD x 3 days	Mebendazole[2] (6mo - 1 year OR < 10kg) Give 50mg STAT or BD x 3d Albendazole[1,2] (1 - 2 years old) Give 200mg STAT or OD x 3d
Ascaris Lumbricoides		
Trichostrongyliasis		
Trichuris Trichiura	1. Mebendazole 100mg BD x 3 days 2. Albendazole[1] 400mg OD x 3 days	
Enterobius Vermicularis	1. Albendazole[1] 400mg STAT, repeat day 14 2. Mebendazole 100mg STAT, repeat day 14	
Strongyloides larva	1. Albendazole[1] 400mg OD x 3 days	
Capillaria	1. Albendazole[1] 400mg OD, for 10 days 2. Mebendazole 200mg BD, for 20 days	Consider treatment up to 30 days. Relapse is common if treatment is not completed.
Tapeworm (Cestode): infection from ingesting raw or undercooked infected meat		
Taenia species	Praziquantal[3] 10mg/kg STAT	Only use if >2 years old. Give adult dose
Hymenolepis nana or diminuta	Praziquantal[3] 25mg/kg STAT, repeat day 14	
Flatworms (Trematodes): ingestion of raw, undercooked, alted, pickled, or smoked freshwater fish, crab, or crayfish		
Opisthorchis viverrini, Clonorchis sinensis	Praziquantal[3] 25mg/kg/dose TID x 3 days	Only use if >2 years old. Give adult dose
Paragonimus		
Fasciola hepatica	Refer: discuss with doctor	
Protozoa: infection from contaminated water or food		
Giarda Lamblia	Tinidazole 2g STAT	Only use if > 3 years old. Give 50mg/kg STAT or OD x 3d[2]
Entomoeba histolytica	Tinidazole 2g OD x 3 days	
Balantidium Coli		
Blastocystics Hominis, Entomoeba Coli	No treatment, not pathogenic; if symptoms repeat stool test	
Cryptosporidium	Refer: discuss with doctor	Consider treatment if symptomatic or immunocompromised

RENAL MEDICINE

URINARY TRACT INFECTIONS

DEFINITION

Urinary Tract Infection (UTI): symptoms and bacteria in the urine from an infection somewhere between the kidneys and the bladder.

- **Lower UTI (cystitis):** infection in the **bladder.**
- **Upper UTI (pyelonephritis)** infection in the **kidney.**
- **Prostatitis:** infection of the **prostate.**

All children < 5 years old with more than one UTI should be referred for further investigation at a hospital if possible. Unexplained recurrent UTIs in adults may be caused by urinary tract stones, tumours or STIs.
Consider referral.

Diabetes Mellitus is a risk factor for UTI. **UTIs in men are not common**, so think about other diagnosis e.g., prostatitis, STIs, renal stones or enlarged prostate (if older age). Urinary tract infections in children require treatment as soon as possible in order to prevent kidney damage. Recurrent UTIs can lead to urinary tract stones, urinary tract obstruction from scarring or chronic renal failure.

In clinics there is an increasing resistance of bacteria to some antibiotics like amoxicillin and cotrimoxazole. Treatment of UTI should be according to local resistance/sensitivity patterns at each hospital (or organization).

CAUSES

- Ordinary bacteria, usually E. coli, can cause acute or chronic UTI.
- Tuberculosis bacteria causes chronic UTI.
- Sexually transmitted infections (STI).
- Urethral catheter.
- Obstruction of urinary tract with stones or mass or congenital abnormality.
- Sexual Intercourse.
- Pregnancy.
- No special cause in some females.

If you suspect a UTI you must think of lower UTI/cystitis (infection of the bladder) or upper UTI/pyelonephritis (infection of the kidney.) **Note:** Cystitis NEVER has fever in adults.

SIGNS AND SYMPTOMS

See Table Signs and symptoms of UTI
Remember to also ask about:

- Vaginal itchiness: consider **candida.**
- Vaginal or penile discharge: **consider STI**.
- If suprapubic pain: is it similar to menstrual pain? Consider **menstrual cramps.**
- Recent antibiotic use: may affect the culture being positive.

DIAGNOSIS

Urine dipstick, urine sediment, and urine culture (**Ucx**) Urine dipstick and sediment are not very accurate for diagnosis, but you can get results immediately. Urine culture is the best test but takes a few days for results.
See Table: Interpretation of urine dipstick and urine sediment results in patients with lower UTI symptoms
Extra-information you can get from the tests:
Urine Dipstick:

- **Specific gravity:** a sign of dehydration, normal hydration = <1.010, mild = 1.010-1.020, moderate = 1.021-1.030, severe >1.030.
- **Ketones:** sign of anorexia, if ketones high check dextrose – if dextrose high may be a sign of diabetic ketoacidosis.
- **Glucose:** If positive, this is a sign of diabetes.
- **Protein:** if very high may be a sign of renal failure – consider checking BUN/Creatinine.
- **Blood (erythrocytes):** especially if WBC/nitrite negative may be a sign of renal stones or trauma.
- **Haemoglobin:** may be a sign of haemolysis.
- **Urobilinogen:** a sign of haemolysis or liver disease.

Urine Sediment:

- **RBC casts, granular casts or waxy casts:** consider renal failure, discuss with doctor –check BUN/ Creatinine.
- **WBC casts:** suggest infection or inflammation.
- **Crystals e.g., phosphate, calcium:** consider renal stones.

Urine culture (UCx): do a mid-stream urine collection (MSU) in sterile container. Store in fridge. Transport in cool box.

TREATMENT FOR UTI

For routine treatment of UTI, see on the next page.
If the patient has recent UTI treatment, there could be a resistant bacterial infection. Ask the patient to follow up in the clinic for the urine culture result.
Multi-drug resistant bacteria are increasing. Try to always send urine culture to confirm diagnosis and sensitivity. Change treatment based on culture results.
Alternative treatments if bacteria are resistant:

- Cotri BID for 3 days (if the bacteria are sensitive on urine culture).
- Fosfomycin (Monurol) 3 gm po x 1 (stat) dose or 1 gm IV x 1 (stat) dose.
- Meropenem 1gm IV TID, discuss with doctor for how long to treat.

In cases of recurrent cystitis, think about bladder stone, kidney stone, STIs, or resistant bacteria. Men do not usually get cystitis. Think about STIs or prostatitis in a man with UTI symptoms.
Recurrent UTIs in children should be investigated with ultrasound.

Table Signs and symptoms of UTI

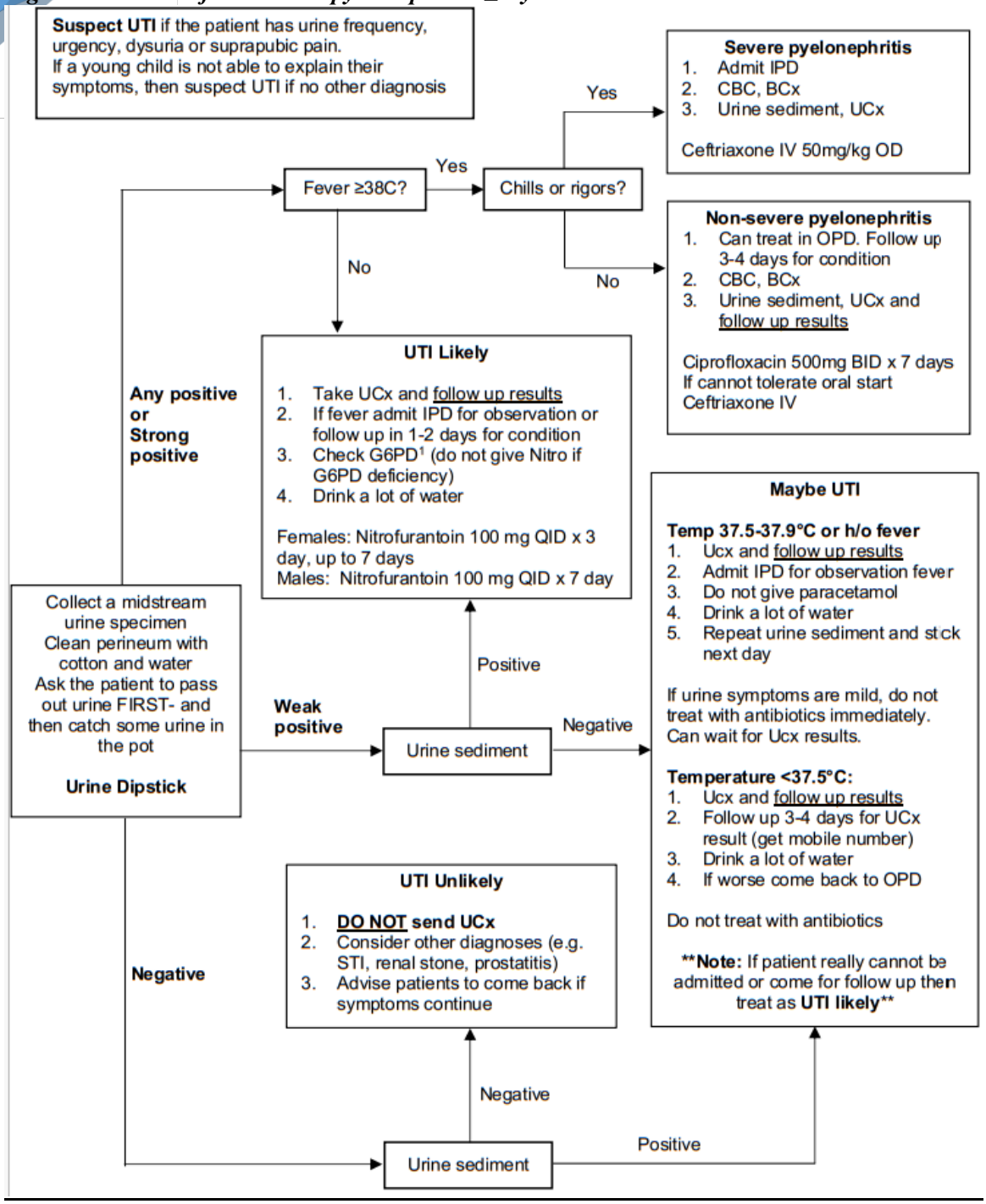
Lower UTI Cystitis	• Dysuria (pain or burning when pass urine NOT HOT URINE WITH FEVER). • Cloudy urine. • Blood in urine (haematuria). • Frequent urination. • Pain and tenderness lower abdomen.	****NO FEVER****
Upper UTI Pyelonephritis	**Symptoms of lower UTI <u>AND/OR</u>** • Flank pain (kidney area). • Chills and rigors. • Sepsis or shock	****AND FEVER****

Table: Interpretation of urine dipstick and urine sediment results in patients with lower UTI symptoms

Urine Dipstick	**Urine Sediment**	**Action**
Any Positive or Strong Positive	NA	Treat as UTI
Weak Positive	Negative	Maybe UTI
Negative	Positive	Maybe UTI
Negative	Negative	UTI unlikely
Urine dipstick: Any positive = WBC* ≥ 1 **<u>OR</u>** nitrite positive. Weak positive = WBC 1 **<u>OR</u>** WBC 2 only (nitrite negative). Strong positive = WBC 3 **<u>AND/OR</u>** nitrite positive. Negative = WBC 0 **<u>AND</u>** nitrite negative.		**Urine sediment microscopy** Positive = WBC ≥ 10 **<u>AND</u>** Epithelial cells < 5 Negative = WBC <10 Contaminated = Epithelial cells ≥5 (need to repeat)

*** WBC = leucocytes**

Figure: Flowchart for UTI and pyelonephritis ≥ 3 years old



Note: Nitrofurantoin and ciprofloxacin can cause haemolysis in **G6PD** deficiency. If G6PD deficient **do not use nitrofurantoin**. You can still use ciprofloxacin, but the patient should stop the drug and to return to IPD if symptoms of **jaundice** or **dark urine** occur.

TREATMENT FOR PYELONEPHRITIS

DRS AB-CABDE/S if unwell:

1. Admit to IPD.
2. Send urine culture.
3. Antibiotics.

- Patient not vomiting/septic: PO **ciprofloxacin** 500mg BID for **7 days** (10 days if pregnant).
- Patient vomiting/septic: IV **ceftriaxone** 1g OD: treat with IV for 24 hours after afebrile then change to PO **ciprofloxacin** or a sensitive antibiotic (depending on urine culture results) to complete 7 days.
- If the patient has received antibiotics for UTI or pyelonephritis recently, the patient may be at risk for multi drug resistant bacteria. Discuss with doctor.

1. Treat pain and fever.
2. Monitor urine output.
3. Advise to drink plenty of water (3-4 liters/day for adults).
4. IV fluids if not able to drink water/ signs of shock.
5. Ultrasound scan of kidneys (if available) to look for any abnormal anatomy (in children) or signs of obstruction and hydronephrosis (stone).

It is important to check the urine culture result and change antibiotics if the bacteria are resistant.

PREVENTION OF UTI AND PYELONEPHRITIS

- Drink at least 2 liters of water per day.
- Urinate at least 3-4 times per day so urine does not stay in bladder for a long-time.
  - In females, it is important to urinate immediately after intercourse.
- Encourage good hygiene.
- Avoid constipation, so urine does not stay in the bladder (bladder cannot empty well because of stool).

PROSTATITIS

DEFINITION

Inflammation of the prostate. Can be associated with STI.

SIGNS AND SYMPTOMS

- Fever
- Pain and tenderness in the rectum or when pass stool.
- Often very painful rectal examination.
- Cloudy urine.
- Haematuria (blood in urine).
- Dysuria (pain or burning when passing urine.
- Frequent urination.

DIAGNOSIS

- Rectal examination.
- Examine urine: cloudy or bloody urine.
- Urine dipstick and urine sediment positive.

TREATMENT

DRS AB-CABDE/S if unwell

1. Treat in IPD until the patient's temperature returns to normal.
2. Prevent dehydration: drink plenty of water (3-4 liters/day for adults).
3. If the patient cannot drink, give IV fluids and monitor urine output.
4. Treat pain and fever.
5. Avoid constipation – advise high fiber diet.
6. **Antibiotics**
   - **Ciprofloxacin** 500 mg BID oral for **4 weeks.**
   - If the patient cannot take oral medication: **Ceftriaxone** 1-gram OD IV/IM until the patient can tolerate oral.

BENIGN PROSTATIC HYPERTROPHY (BPH)

BPH is a noncancerous increase in size of the prostate gland. 10-30% of the men in their **early 70s have symptomatic BPH.**

SIGNS AND SYMPTOMS

Urinary frequency, waking at night to urinate, urgency, involuntary urination at night, urge incontinence (urine leak following a strong sudden need to urinate). Urinary hesitancy (a delay between trying to urinate and the flow actually beginning), intermittency (not continuous), weak urinary stream, straining to void, feeling of incomplete emptying, and terminal dribbling, **dysuria, UTI.**

Causes: The cause is unclear.

- **Hormone:** most experts consider androgens to play a permissive role in the development of **BPH**. Androgens must be present for **BPH** to occur, but do not necessarily directly cause the condition.
- **Diet:** studies indicate that greater protein intake may be a factor in development of **BPH**.

Epidemiology evidence:

There is epidemiological evidence linking **BPH** with metabolic syndrome **(Obesity, Diabetes, high triglycerides, high LDC) and Hypertension**.

Degeneration:

BPH is an age-related disease. BPH is a consequence of fibrosis and weakening of the muscular tissue in the prostate. Myofibers are broken and replaced by collagen fibers.

Normal PSA levels by age	
Age range (years)	Baseline age-adjusted PSA levels ng/ml
40 – 49	0 – 2.5
50 – 59	0 – 3.5
60 – 69	0 – 4.5
70+	0 – 6.5

DIAGNOSIS:

1. Rectal examination
2. **Trans rectal USG.**
3. Blood Test for **PSA (Prostate Specific Antigen).**

COMPLICATIONS

- Recurrent **UTI.**
- Bladder **Stones**.
- Haematuria.
- Acute retention of urine.
- Chronic retention of urine.
- Obstructive **nephropathy**.

TREATMENT

- Reduce evening **fluid intake**.
- Reduce **caffeine intake**
- Prevention of **constipation.**
- Voiding in the **sitting position**
- **Alpha blocker: Prazosin (Minipress) 0.5 mg/ Terazosin 2 mg ON.**
- **5 alpha-Reductase inhibitor** (dihydrotestosterone inhibitor): Finasteride 1 mg OD, Dutasteride 0.5 mg OD
- **Tamsulosin**: Relaxing the muscle in the bladder and prostate 0.4 mg at night.

PROSTATE CANCER

Prostate cancer is cancer of the prostate. The prostate is a gland in the male Reproductive system that surrounds the urethra just below the bladder. Most prostate cancer are slow growing. Cancers cells may spread to other areas of the body, particularly the bones and Lymphnodes.

CLASSIFICATION

Non-metastasis prostate cancer

1. Clinically localized disease-confined to the prostate gland (**Stage T_1-T_2**)
2. Locally advanced disease-spread outside the capsule of the prostate gland but has not yet spread to other organs. (Stage T_3)

Metastasis prostate cancer

Cancer that has spread outside the prostate gland to local, regional, or systemic Lymphnodes, seminal vesicles, or other body organs (e.g., Bone, liver, Brain) (**stage T_4**).

RISK FACTORS

1. **Age:** uncommon < 50years, 85% are diagnosed aged > 65 years.
2. **Genetics:** First degree relative (father or brother) affected increase incidence.
3. **Diet:** Red meat, low blood level of vitamin D, low intake of fruit (Particularly Tomatoes), **high intake of fat**, **Ca^{++}.**
4. **Infections:** Prostatitis
5. **Racial:** Lowest in **Chinese men.**

SIGNS AND SYMPTOMS

- **Early cancer**: symptom less
- **Local disease**: Prostatism, urinary retention, Haematuria, lower extremities oedema, on rectal examination – prostate is hard and, non-tender.
- **Metastatic disease:** malaise, weight loss, bone pain, Pathological fractures, spinal cord compression, ureteric obstruction may cause renal failure, signs depend on site of **metastases.**

DIAGNOSIS

1. **Prostate – Specific Antigen (PSA).**
2. Digital rectal examination.
3. Transrectal **USG**
4. **Biopsy**.
5. **MRI**

PREVENTION

1. Rate of prostate cancer is linked to **western diet.**
2. Some evidence supports lower rate of **CA prostate** with a vegetarian diet.
3. Regular exercise.
4. High supplemental **calcium intake** has been linked to advanced **prostate cancer.**
5. **5 – Alpha – reductase inhibitors (Finasteride, and dutasteride) reduce the risk of CA prostate**.

MANAGEMENT

1. **Palliative** (treat symptoms only).
2. Radical prostatectomy.
3. Radiation
4. Cryosurgery
5. High – intensity focused **USG**
6. **Chemotherapy.**
7. **Hormonal therapy** (To stop or slow the growth) – **Androgen suppression Therapy.**

PROGNOSIS

- Men with low grade disease – unlikely to die within 15 years of diagnosis.

- Older men (**age 70-75**) with low grade disease – 20% overall survival at 15 years.
- Men with high grade disease – high mortality with 15 years of diagnosis.

ACUTE GLOMERULONEPHRITIS

DEFINITION

Acute Glomerulonephritis (AGN) is an inflammation of the filter of the kidneys. One of the common causes that can be treated is Post-Streptococcal Glomerulonephritis. This disease usually follows 6 weeks after a skin infection (***e.g., impetigo)*** or 1 to 2 weeks after throat infection (***e.g., tonsillitis)***. It is more common in children over the age of 3 years.

SIGNS AND SYMPTOMS

50% of AGN are very mild and the patients do not seek medical care.

In other cases, the patient can have:

- Smoking, rusty coloured urine.
- Fluid retention (oedema) especially of the face, but it can be generalized (lung or cerebral oedema) in severe cases.
- Low urine output with concentrated urine (oliguria).
- Hypertension usually mild, but it can be severe in 5-10% cases.
- If oedema is generalized there may be signs of circulatory congestion and pulmonary oedema: difficulty breathing, crackles at lung base.

CAUSES

There are many causes of acute glomerulonephritis. It can sometimes follow other infections like pneumonia, typhoid, leptospirosis, malaria, **hepatitis C**, or measles. The kidney develops inflammation in the tissue and cells which allows blood and protein to leak into the urine.

DIAGNOSIS

Urine dipstick: protein (proteinuria), blood (haematuria).

Urine sediment: Red and white blood cells, hyaline, granular and red blood cell casts. If available, check **ASO (anti-streptolysin O) titre**. If increased, the diagnosis is more likely Post Streptococcal Glomerulonephritis.

Ask for history of previous skin or throat infections. Look at the skin to find signs of old impetigo

TREATMENT OF AGN

- Admit to IPD, rest.
- Restrict salt intake.
- Restrict fluid intake to 500ml to 1L per day in adults, 50ml/kg/day in children (max 1L).
- **IM Benzathine penicillin stat**, **Erythromycin** if allergic to penicillin.
- Antibiotics e.g., **amoxicillin or cloxacillin** (see tonsillitis and impetigo) are recommended if the infection is still present.
- In case of severe oedema (ascites or pulmonary oedema):

PO Furosemide	Child 1m - 12yrs:	0.5-2mg/kg 2-3 times daily (max 80mg/d)
	>12yrs/Adult:	20-40mg OD (max 600mg/d)

- Treat complications: hypertension, acute pulmonary oedema.
- Acute phase usually lasts 6-8 weeks, haematuria and proteinuria usually disappear in 1 year, need regular follow up.

PREVENTION

Effective treatment (finish 10 days of medicine) of tonsillitis or impetigo. Treatment within 10 days of onset can prevent AGN. Prevent other infections that can cause glomerulonephritis.

If there is no response to furosemide even before the maximum dose, consider urgent referral for dialysis (renal replacement therapy).

KIDNEY STONES

DEFINITION

The formation of stones in the urinary system (in bladder or in kidney), can cause partial or complete obstruction. Stones formed in the kidney can travel down and block the ureters or urethra. Stones in the kidney cause kidney pain. Stones in the ureter cause ureteric colic.

In patients with repeated urinary infections look for stones

SIGNS AND SYMPTOMS

- Severe acute lumbar or pelvic pain; intermittent (**renal colic: patient cannot lie still and has pain that spreads from flank to pubic area**) or constant.
- Blood in the urine (**haematuria**).
- The patient passes **stones in the urine.**
- If also has infection may have fever, chills, dysuria etc.

DIAGNOSIS

Urine dipstick: Often positive for blood. If positive for WBC/nitrite, there could also be an infection.

Urine sediment: Often positive for RBC. If positive for WBC/bacteria, there could also be an infection.

Ultrasound kidney or bladder to look for stones and any abnormal anatomy which would make stones more likely. Bladder stones are more common in

children and if very big or cannot pass, should refer for surgical removal.

TREATMENT

- Admit to IPD.
- Drink 3-4 liters/day for adults. If unable to drink, give IV fluids.
- If fever and chills (secondary infection) treat as for pyelonephritis.
- Treat the pain according to the severity:
- **Paracetamol**
- **Ibuprofen**, **diclofenac, aspirin** PO or IM are alternatives.
- **Buscopan** (hyoscine butyl bromide) IM/IV depending on severity.

Child 6-12 yrs: 5-10mg TID (max 30mg/d)
Child >12 yrs or Adult: 20mg QDS (max 100mg/d)
Repeat the same dose after 30 minutes if still pain.
Do not use Buscopan for pregnant women.

- **Tramadol** PO 50-100mg, not more often than 4 hours (max 400mg/d).
- **Surgical treatment is recommended for stones 0.5 centimeters in size and larger.**
- Allopurinol and potassium citrate may dissolve the uric acid stones.

Consider referral:
If pain is not relieved with maximal analgesia.
If there are signs of urethral obstruction (e.g., suprapubic pain and no urine output)
If there is chronic obstruction to prevent kidney damage.

PREVENTION

Drink plenty of fluids, as dehydration is a risk factor. Avoid food that could cause stones (peppers, cashew nuts, cocoa, grapefruit/orange juice, black tea, Cola, chocolate).

ACUTE KIDNEY INJURY

DEFINITION

Acute kidney injury (AKI) is a sudden loss of kidney function. It is very important to treat AKI quickly as patients can become very unwell and it can lead to complications including death. It may also lead to chronic kidney disease.

Normal urine output should be at least 0.5ml/kg/hr in adults and 1ml/kg/hr in children

SIGNS AND SYMPTOMS

Most often will have symptoms of the cause (e.g., diarrhoea causing dehydration, flank pain from renal stone). May also complain of:

- Fatigue
- Headache
- Nausea/Vomiting
- Loss of appetite
- Low urine output (oliguria)
- **No urine output (anuria) **DANGER SIGN****
- Oedema

1. **Pre-renal** (problem before the kidney)
   - **Dehydration e.g., from diarrhoea, not drinking enough when unwell (most common cause)**.
   - Problem with blood vessel supply to kidney.

2. **Renal** (problem in the kidney).
   - Drugs causing damage to the kidneys e.g., NSAIDs.
   - Acute kidney diseases.

3. **Post-renal** (problem after the kidney causing a blockage to the flow of urine).
   - Kidney stones e.g., blocking the ureter.
   - Tumours e.g., bladder/urethra.
   - Large prostate

DIAGNOSIS

- **Urine output**.
- **Ultrasound** to rule out any cause of obstruction (e.g., renal stone) or complications e.g., hydronephrosis (swelling of the kidney).
- **BUN and creatinine**

BUN and creatinine are blood tests that show kidney function.
Note: BUN can also increase if there is an upper GI bleeding.

- **Creatinine Clearance**

do not use gentamicin if Creatinine Clearance < 20ml/minute or decrease the dose of ampicillin or cloxacillin if creatinine clearance <10 ml/minute. Normal values are Male: 97 to 137 ml/min, Female: 88 to 128 ml/min.

TREATMENT

- If likely due to dehydration, then give NSS fluid bolus and assess for response by monitoring the urine output.
- Carefully monitor fluid input and output. Consider inserting a catheter.
- Treat the underlying condition.
- Stop any drugs that may have caused the kidney failure e.g., NSAIDs.
- Do not give any drugs that are contraindicated in renal failure.
- Change doses of drugs according to the creatinine clearance.

No urine output (anuria) after fluid replacement is a DANGER sign. This means the patient may need dialysis (artificial kidney treatment). If have catheter, make sure it is not blocked and causing no urine to come out. If no urine output discusses with doctor about referral.

NEPHROTIC SYNDROME

DEFINITION

In nephrotic syndrome, large amounts of protein are found in the urine (proteinuria) and blood levels of protein decrease (hypoalbuminemia). Low protein in the blood cause generalized oedema.

SIGNS AND SYMPTOMS

- Generalized painless oedema, location depends on position and activity (e.g., sacral and periorbital oedema in the morning which improves during day when standing up).
- In severe cases there is pulmonary oedema.
- High BP.
- Normal urine function in the beginning but may develop reduced urine output (oliguria).
- Protein in the urine (massive proteinuria).

CAUSES

Nephrotic syndrome may be due to kidney disease (primary glomerular disease) or can be a complication of other diseases like diabetes mellitus or infection (secondary glomerular disease). The exact cause can only be found by doing a renal biopsy.

- It is most common in children 2-12 years old.
- In children **< 5 years** old, the most common cause of nephrotic syndrome is Minimal Change Disease and is usually responsive to steroids.

DIAGNOSIS

The diagnosis is clinical. For children, the most common cause is Minimal Change Disease and over 90% will respond to steroids. Minimal change disease is a disorder where there is damage to the glomeruli. If the child is at least 1 year old and less than 12 years old, has normal BP, no visible hematuria (tea colour urine), and no kidney failure (very high creatinine), you can try a course of steroids. For adults, it is better to refer.

These tests may help with diagnosis if available:

- Urine dipstick protein ≥3+, blood maybe slight positive (if blood 1+, think of other diagnosis).
- 24-hour urine collection – proteinuria >3g/d (adult) or >50mg/kg/d (child).
- Low Albumin (Hypoalbuminemia).
- High Cholesterol and triglyceride.

TREATMENT

Find and treat the underlying cause (e.g., diabetes mellitus, infection). All patients should be first treated in IPD. Drug therapy of nephrotic syndrome consists mainly of steroids (such as prednisolone) and diuretics.

- **Stopping steroids suddenly is dangerous** and can lead to **death** from hypotension. All patients should be supervised regularly until the treatment is completed. Tell the patient that they must not stop suddenly, and they must be very careful not to run out of tablets.
- **Each case must be considered carefully, if treatment cannot be supervised and the patient cannot follow up, do not begin steroid treatment.**
- Always take prednisolone with meals because it can cause gastric ulcers. Consider prescribing 20mg OD **omeprazole** to protect the stomach.
- Be aware of the side effects of prednisolone (high BP, gastric ulcers, osteoporosis (weak bones), weight gain, acne, glaucoma etc.).

> When patients have been on steroids for more than 2 weeks it is important to decrease the dose slowly. When decreasing prednisolone if you do not have 1mg tablets or unable to cut tablets use the recommendation as a guide and discuss with a doctor to create a decreasing regime.

Diuretics

Note: Diuretics relieve oedema but do not treat the disorder and should only be used if there is pulmonary oedema or moderate to severe ascites.

Use a combination therapy of:

Furosemide

Adult: 40mg OD
Child: 1mg/kg OD

AND/OR spironolactone (check renal function before giving) : Reduce according to clinical response. **Note:** be alert to signs of hypovolemia or electrolyte imbalance when using diuretics.

Treatment of other diseases

Remember that there is a high risk of infection because of the loss of immune proteins and treatment with steroids. Therefore, treat any other infection. For example:

- Give **albendazole** (3-day course for **Strongyloides**) to prevent the spreading of worms **BEFORE** starting steroids.
- Be sure that your patient has no active TB or amoebic disease (steroids make them worse).

- Treat for high BP with **enalapril**.
- We do not have the drugs for elevated cholesterol, so cannot give this treatment.

PROPHYLAXIS OF OTHER DISEASES

During the oedema the patient has a high risk of infection: consider **penicillin V** (500 mg PO BID) prophylaxis and **pneumococcal vaccine**.

Other important management

Avoid immobilization (because of high risk of thrombosis especially if albumin <20g/1L)- encourage gentle exercise e.g., walking around the clinic.

Careful fluid restriction e.g., intake < 1L per day.

Give a high calorie/high protein diet.

Weigh patient every day. Aim to lose up to 1kg/day.

Keep in IPD until the patient's condition is improving, then discharge with a **weekly follow-up** (check weight and dipstick).

> Patients who recover on prednisolone can relapse (have more episodes of nephrotic syndrome).
> **Ask the patient to return to OPD as soon as he/she slight oedema.** Discuss with doctor and consider giving the treatment again.

FOLLOW UP

Nephrotic syndrome can last a few years and sometimes can cause renal failure It is important to follow patients regularly for first 6 months and then case by case for at least 2 years, if possible, Advise the family that if in between follow up the patient gets the symptoms again to come back to clinic.

Note: when decreasing steroids check urine dipstick every 1-2 weeks to make sure that the nephrotic syndrome is not worsening: **if has proteinuria again discuss with doctor and consider referral.**

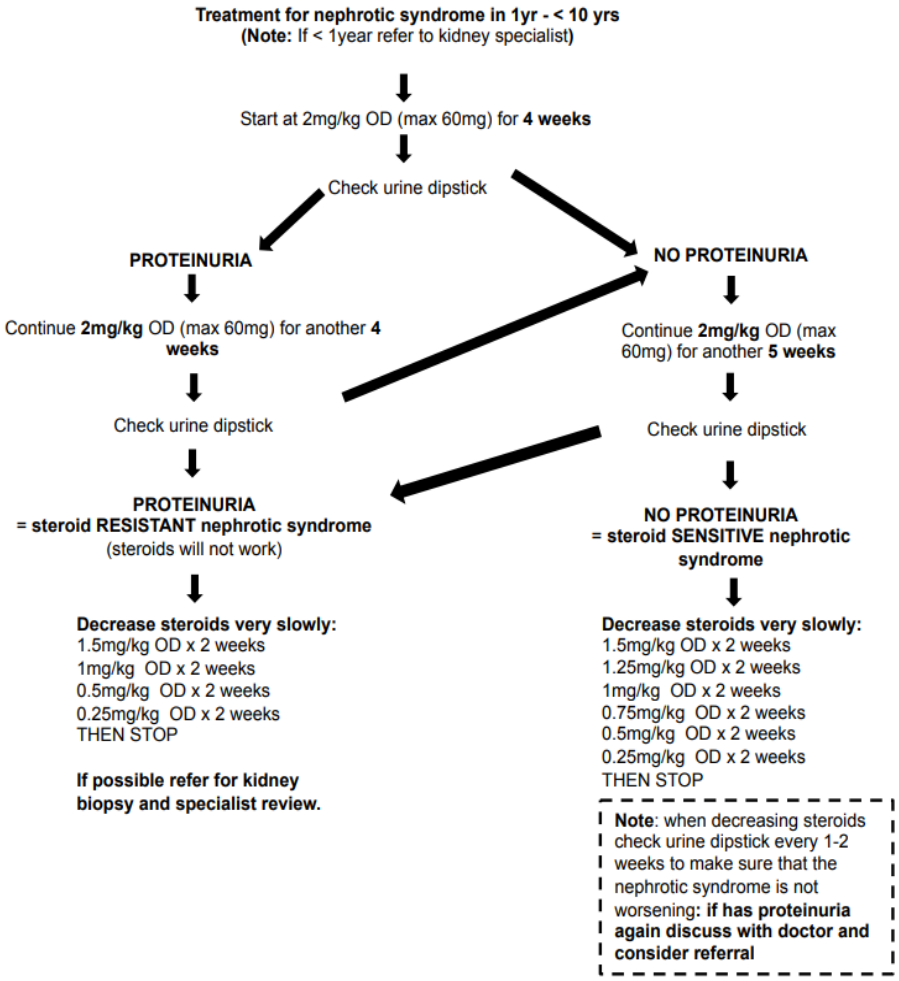


Figure: How to use prednisolone for nephrotic syndrome 1yr to <10 years

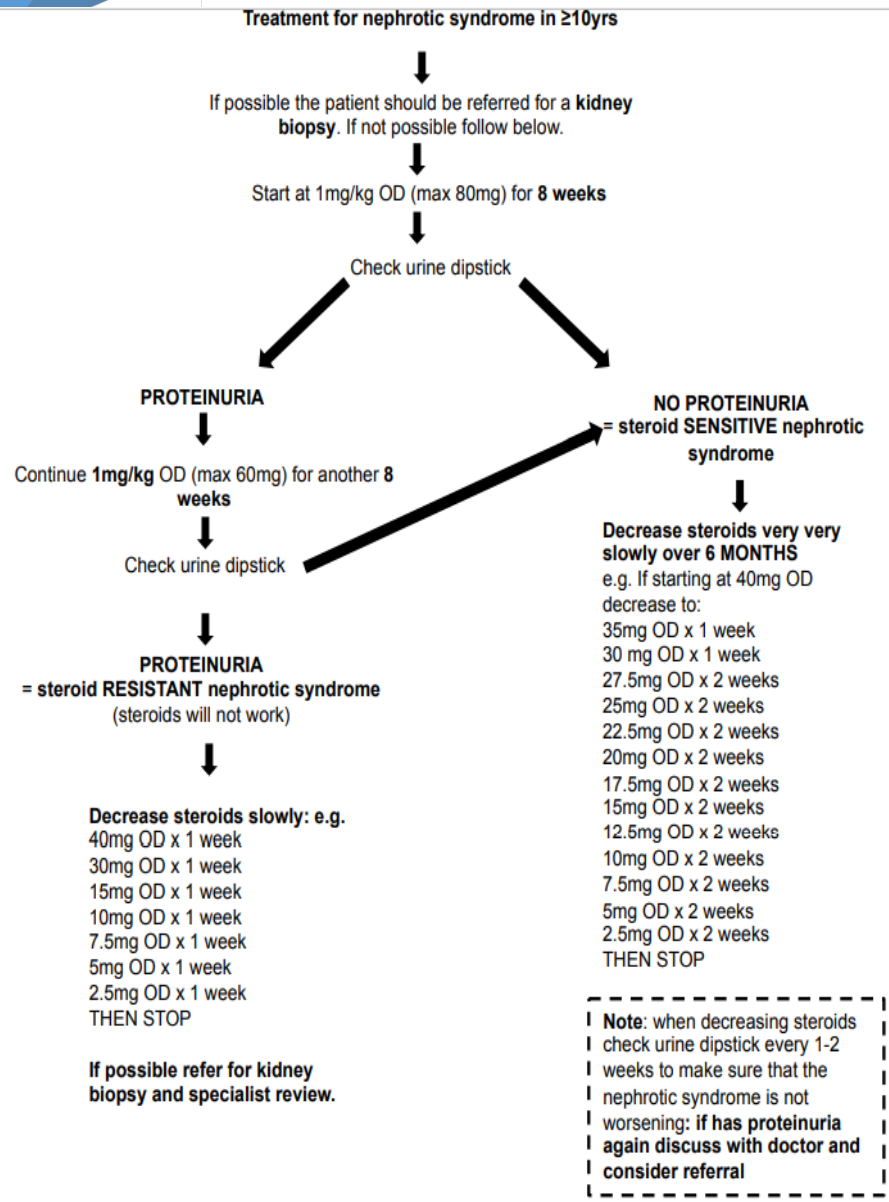


Figure: How to use prednisolone for nephrotic syndrome ≥ 10 year

ENDOCRINE DISEASES

DIABETES MELLITUS

Diabetes mellitus (DM) is a disease characterized by high blood sugar due to reduced insulin secretion by the pancreas and insulin resistance. Long term complications such as heart disease and kidney failure remain the leading cause of mortality in diabetes mellitus.

Complications can be delayed or prevented with good blood sugar control

Acute symptoms

- Acute symptoms are related to hyperglycaemia and include:
- Increased thirst, dry mouth, polydipsia, polyuria, nocturia
- Change in weight (usually weight loss), polyphagia
- Blurred vision, tiredness, dizziness
- Genital candidiasis (candida balanitis in men)
- Skin infections (easy to get infections and not easy to heal)
- Mood change, irritability, difficulty in concentration, apathy
- **The disease can be poorly symptomatic and may be diagnosed several years after onset once complications have already developed.**

Acute Complications

Hyperglycaemia **with signs of:**

- **<u>Diabetic Ketoacidosis (DKA)</u>**: hyperglycaemia **(>250 mg/dL or >14 mmol/L**), hyperketonaemia (in blood and urine), and metabolic acidosis.
  - Symptoms: nausea, vomiting, ketones smell from breath (fruity smell), dyspnoea, abdominal pain, confusion, dehydration, coma, death
  - Admit in IPD: give NSS as fast as possible: 1 litre in 1 h, and then 1 litre every 2-4 h (depending on clinical condition and urine output) – consider catheterizing the patient to monitor urine output
  - **<u>All true DKA cases need insulin to survive</u>** consider referral to hospital (case by case, taking in consideration age and chronic complications) and do counselling to family
  - If not possible to send the patient to hospital, discuss case with senior medic or doctor.
  - Treat any underlying infections as a precipitating factor.

- **Hyperosmolar Hyperglycaemia State (HHS)**: hyperglycaemia (>600 mg/dL or >33 mmol/L), no ketones, no acidosis.
  - **<u>Symptoms:</u>** extreme dehydration, and altered consciousness (e.g., lethargy and confusion)
  - The treatment of diabetic ketoacidosis and hyperosmolar hyperglycaemia state are similar, including the administration of Insulin and the correction of fluid and electrolytes abnormalities.

DEFINITION

Hypoglycaemia: blood dextrose < 70mg/dl (< 3.8mmol/L).

Severe hypoglycaemia: blood dextrose <45mg/dl (2.5mmol/L).

CAUSES OF HYPOGLYCEMIA

1. Diabetic medication dose is too high especially Glibenclamide and insulin because both increase insulin in blood.
2. A diabetic person took his/her medication but then did not eat.
3. Malaria (especially in pregnant women and/or undergoing quinine treatment).
4. Other infections.
5. Non-diabetic medications e.g., beta blockers, aspirin poisoning, quinine.
6. Liver failure.
7. Adrenal gland failure (Addison's disease – patients have hypotension, hypotension and electrolyte imbalance – common in advanced HIV and /or TB patients).
8. Tumour in pancreatic cells (Islet cell tumours cause increased insulin in the blood).
9. Alcohol consumption.
10. Quinolone medication.

SYMPTOMS

- Sweating.
- Hungry.
- Tremor.
- Dizziness.
- Drowsiness.
- Aggressive or irritable behaviour.
- Confusion, convulsions/seizures and coma.

TREATMENT

- **If dextrose 45-70mg/dL:**

Give oral sugar solution (water mixed with sugar) or sweet drink to prevent severe hypoglycaemia.

- **If dextrose <45mg/dL:**

If able to drink give oral sugar solution (water mixed with sugar) or sweet drink

If unable to drink e.g., in coma: insert IV cannula and give

- **Adult IV 50% Dextrose 20-50 ml**
- **Child and Neonate IV 10% Dextrose 2-3 ml/kg**
- **Adult IM/SC Glucagon 1 mg**
- **Neonate Glucagon 20 micrograms/kg.**
- **IV Hydrocortisone 2.5-5 mg/kg BID if adrenal insufficiency is suspected.**
- After giving oral/IV dextrose re-check blood dextrose after 15 minutes to make sure it is >70mg/dL.

PREVENTION

Warn every patient who is on medication about the symptoms of hypoglycaemia and how to treat at home (eat a tablespoon of sugar) and outside (to have something to eat or drink with them).

CHRONIC COMPLICATIONS

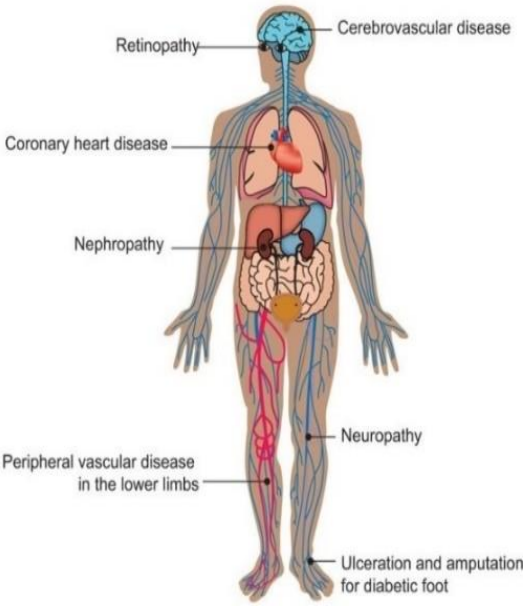
Complication process and Symptoms

Microvascular disease:
Retinopathy (eye damage)
Nephropathy (kidney damage)
Neuropathy (nerve damage)

- Sensory loss: tingling and numbness.
- Motor weakness: difficulty while sitting and standing.
- Gastroparesis: constipation, or chronic diarrhea.
- Impaired skin healing - foot ulcer especially.

Macrovascular disease:

- Angina pectoris and myocardial infarction.
- Transient ischemic attacks and strokes.
- Peripheral arterial disease claudication (painful leg when walking).



Late-stage complication

- Blindness
- Kidney failure
- Stroke
- Heart ischemia
- Heart failure
- Foot ulcer
- Skin ulcer
- Gangrene
- Amputation
- Sepsis
- Impotence

Diagnose to confirm diabetes mellitus

As soon as symptomatic, or when screening (pregnant women, asymptomatic with CVS risk factor or > 45 years), diagnosis is by measuring blood glucose:

1 mmol/L = 18 mg/dl 1 mg/dl = 0.055 mmol/l	**Diabetes mellitus**	**Impaired Glucose Regulation**	**Normal**
Fasting Blood Glucose (FBG) **At least 8 hr fasting**	≥ 7 mmol/l (≥ 126 mg/dl) Need to confirm twice	May become diabetes Give recommendation to change lifestyle	< 5.6 mmol/l (< 100 mg/dl)
Random blood Glucose (RBG) At any time of the day	≥ 11.1 mmol/l (≥ 200 mg/dl)		< 7.7 mmol/l (< 140 mg/dl)

Two categories

There are 2 types of diabetes mellitus: **type 1 and type 2**. They can be distinguished by a combination of features:

	Type 1	**Type 2**
Age of onset	Most common < 30 year	Most commonly > 30 year
Associated obesity	Uncommon	Very common
Requiring insulin treatment	Yes (**always**)	No (unless advanced disease)
Plasma level of endogenous insulin	Extremely low to undetectable	Variable (depends on degree of insulin resistance and insulin secretory defect)
Hyperglycaemia response to oral antihyperglycemic drugs	No	Yes, initially in many patients

TREATMENT

Lifestyle

Diet and Exercise: this can improve insulin sensitivity and blood glucose control, reducing complications.

Oral antihyperglycemic drug diabetes types 2

Metformin: **1st** line (not expensive)

- **Effect:** Reduces glucose production and increases peripheral utilization (by improving insulin sensitivity).
- No risk of hypoglycaemia
- Is associated with initial gastrointestinal side effects (diarrhoea, bloating) that can be reduced if introduced at low dosage and taken with food. Symptoms should resolve after few weeks; then you may consider increasing gradually if needed
- **Contraindications:** renal or hepatic impairment, iodine x-ray contrast media, general anaesthesia.

Glibenclamide: **2nd** line

- Effect: Increase Insulin secretion by pancreas has a few contraindications but kidney and liver impairment increase risk of hypoglycaemia.
- Has risk of hypoglycaemia (especially in elderly) and can also induce weight gain. Always take immediately before a meal.

Insulin

- Compulsory for the treatment of type 1 diabetes
- **Diabetes type 2**: if oral treatment is not enough to control the blood level, use insulin.

Treatment of other cardiovascular risk

Stop smoking and alcohol.

Reduce BW with exercise and diet.

Control hypertension: target is < 130/80 mmHg, **1st line** is ACE inhibitors (enalapril)

Give Aspirin 75 mg OD to all adult diabetes patients who have risk factors for cardiovascular disease, e.g.:

- Smoking
- Kidney disease
- Poorly controlled diabetes
- Angina or other cardiac disease
- Family history of heart disease

If possible, all patient > 40 years with diabetes should monitor **cholesterol level** and take **statin** treatment (**Statins** are very effective at reducing cholesterol and reducing risk of cardiovascular disease)

If possible, all patients should get **Flu immunization** when available.

Algorithm for medical treatment of diabetes mellitus

FBG > 7 mmol/l or RBG > 11.1 mmol/l
Repeat the next day with a second FBG Start treatment immediately if patient is clearly symptomatic (e.g., polyuria or polydipsia) 🡻
1st line: Metformin (If no contraindication) **+ Lifestyle** 500mg BD for 2 weeks then increase to 1g BD. If side effects, delay to increase dose 🡻
Follow-up 1 month **If FBG > 7mmol/l or RBG > 11.1 mmol/l**
Add Glibenclamide (2.5 mg OD 2 weeks, then 2.5 mg BD or TID 2 weeks) 🡻
Follow-up 1 month **If FBG > 7mmol/l or RBG > 11.1 mmol/l**
Increase Glibenclamide up to 15 mg/day (5mg BD or TID – maximum 5mg per dose) 🡻
Follow-up 1 month **If FBG > 7mmol/l or RBG > 11.1 mmol/L**
Give counselling to patient about need for insulin (If possible, continuing metformin and stopping **Glibenclamide** when using insulin)

NB: Glibenclamide should be taken before meal. Give BD if 2 meals per day and give TID if 3 meals per day. Do not take if skip one meal.

If the blood glucose is not improving, always remember to check and explain importance of compliance.

If RBG > 18 mmol/l and patient symptomatic for diabetes, consider starting directly with a combination of two oral drugs, after checking for diabetic ketoacidosis or hyperosmolar hyperglycaemic state i.e., metformin 500mg BD and Glibenclamide 5mg OD in a new case. If you do this, you can stop the **Glibenclamide** once the blood glucose levels come under control at 2 weekly review or follow-up.

Every month (if stable consider doing follow-up every 2-3 months)

Check vital signs, BW (BMI), cardiovascular examination

Check if any complications especially feet lesions screening

Check if any infection (especially UTI), especially if diabetes is poorly controlled.

Monitor blood glucose level with:

FBG or RBG: 1 time/month

- **Goal of treatment:** FBG **4-6.7 mmol/l** or RBG **< 7.7-10 mmol/l**

Recommend HbA1c: 1 time/6-12 months, for unclear situations

- **HbA1c** measurements reflect glucose levels over the previous 3 months.
- Diagnosis of diabetes mellitus when **HbA1c ≥ 6.5 % on 2 occasions**.
- **Goal of treatment: HbA1c levels** < 7 % (8.5 % can be acceptable in certain situations, e.g., elderly).

Others

	New patient	**Every year**	**Every 2 years**
Urine dipstick for ketone/glycosuria/protein	Yes	if symptoms	Yes
Creatinine	Yes	if proteinuria/hypertension	Yes
Comprehensive foot examination	Yes	Yes	Yes
Eye clinic	Yes	if symptoms	Yes
Dental clinic	Yes	if symptoms	Yes

If renal impairment
Give stronger health education
The National Institute for Health and Clinical Excellence specifies that **Metformin** be stopped if **serum creatinine** exceeds **1.7mg/dl (150mmol/L)** or e**GFR** is below 30ml/min due to the risk of the life-threatening complication, lactic acidosis. If serum creatinine **>1.3mg/L (130mmol/L), Metformin** should be reduced or change to **Glibenclamide or Gliclazide.**

Management of Type 2 Diabetes Mellitus (4th Edition) Quick Reference for Health Care Providers

RECOMMENDATIONS FOR PHARMACOLOGICAL THERAPY

ORAL AGENT MONOTHERAPY

1. If glycaemic targets are not achieved (**HbA1c** <6.5%, FPG < 6mmol/L) with lifestyle modification within 3 months, **OAD** agents should be initiated.
2. In the presence of marked hyperglycaemia in newly diagnosed **T2DM** (**HbA1c** 6.5-8%, FPG 6-10 mmol/L), OAD agents should be considered at the outset with lifestyle modification.

COMBINATION OF ORAL AGENTS

Combination of oral agents is indicated in:

- Newly diagnosed patients with **HbA1c** 8-10%, FPG10-13 mmol/L.
- Patients who are not reaching targets (**HbA1c** < 6.5%) after 3-6 months on monotherapy.

COMBINATION OF ORAL AGENTS AND INSULIN

Combination of oral agents and insulin is indicated in:

- Newly diagnosed patients with **HbA1c >** 10%, FPG > 13mmol/L.
- Patients who are not reaching targets (**HbA1c** < 6.5%) after 3-6 months on optimal doses oral therapy.

ORAL ANTI-DIABETIC AGENTS (OAD)

Formulation	Minimum Dose	Maximum Dose	Remarks
α- glucosidase (AGI)			
Acarbose 50/100mg	Initial dose 50 mg OD Usual dose 50-100 mg TDS	100 mg TDS	• Should be taken with main meals. • Causes bloating, abdominal discomfort, diarrhoea and flatulence.
Biguanides (Metformin)			
Metformin 500 mg	Initial dose 500 mg OD Usual dose 500 mg TDS	1,000 mg BD	May cause nausea, anorexia and diarrhoea. Should **not** be used in patients with impaired renal function (serum creatinine >150 μmol/L, creatinine clearance <30ml/min), liver cirrhosis, CCF, recent MI or any condition that can cause lactic acid accumulation.
Metformin retard 850 mg	Initial dose 850 mg OD Usual dose 850 mg BD	1,700 mg OM/ 850 mg ON	
Metformin extended release	Initial dose 500 mg OD	2,000 mg OD	
Insulin Secretagogues: Sulphonylureas (SUs)			
Glibenclamide	2.5 mg OM	10 mg BD	Major adverse side effect is hypoglycaemia. Higher risk in renal impairment, liver cirrhosis and the elderly. Combining 2 different SUs / insulin secretagogues is **not** recommended.
Glibenclamide and Metformin fixed-dose combination	Initial dose one 2.5 mg/ 250 mg OD or BD	Two 5 mg/ 500 mg tablets BD	
Gliclazide	40 mg OM	160 mg BD	
Gliclazide MR	30 mg OM	120 mg OM	
Glipizide	2.5 mg OM	10 mg BD	
Insulin Secretagogues: Non-SUs or Meglitinides			
Repaglinide	0.5 mg	4 mg (not exceeding 16 mg OD)	Take with meals.

Nateglinide	60 mg	120 mg (not exceeding 360 mg OD)	Higher risk of prolong hypoglycaemia when repaglinide is combined with gemfibrozil. This combination is **contraindicated.**
Thiazolidinediones (TZDs)			
Rosiglitazone	4 mg OD	4 mg OD	Side effects include weight gain, fluid retention, and haemodilution. **Contraindicated** in patient with **CCF** and **liver failure**. Use with insulin is **not** recommended.
Rosiglitazone and Metformin fixed dose combination	2 mg / 500 mg BD	4 mg / 500 mg BD	
Pioglitazone	15 mg OD	45 mg	
DPP-4 Inhibitor			
Sitagliptin 100/50/25 mg	100 mg OD	100 mg OD	Minimal risk of hypoglycaemia and weight neutral. Excreted unchanged by the kidneys and a reduction of dose is recommended with renal impairment (25 to 50 mg)
Sitagliptin and metformin fixed dose combination 50 mg/ 500 mg 50 mg/ 850 mg 50 mg/ 1000 mg	50 mg / 500 mg BD	50 mg / 1000 mg BD	

DIABETES IN PREGNANCY (Gestational diabetes, GDM)

Gestational diabetes is high blood sugar (glucose) that develops during pregnancy and usually disappears after giving birth. It can happen at any stage of pregnancy but is more common in the second or third trimester.

Pregnant diabetic women have higher rates of stillbirth, pre-eclampsia, premature labour and very large babies (or less commonly, very small babies)

MANAGEMENT OF DKA (DIABETIC KETOACIDOSIS)

1. **If the patient is in shock:**

Give fluid bolus 0.9% saline 10-20ml/Kg over 1-2 hour.

2. Monitor vital signs, blood glucose, potassium and acid-base balance (if available) every 1-2 hour.
3. **Rehydrate the patient evenly 48 hours.**
   - **Moderate DKA:** use 5-7% dehydration.
   - **Severe DKA:** use 7-10% dehydration.
   - **Formula:** Fluid rehydration (Fluid deficit) minus Bolus + maintenance.
   - **Fluid rehydration:** percentage dehydration x body weight in grams
   - **Maintenance fluid: 1st** 10 kg = 100ml/kg
     - 10 – 20 kg = 1000ml/day + 50ml/kg for each kg above 10 kg.
     - Over 20 kg = 1500 ml/day + 20 ml/kg for each kg above 20 kg.
   - **Example:** A 25 kg child is clinically shocked and 10% dehydrate as a result of DKA.

     Bolus = 20ml/kg = 20x25 = 500 ml **NS 0.9%**
   - Fluid Rehydration = 10 x 25 x 1000 gms/100 = 2500 ml – Bolus 500 ml = 2000 ml.
   - Maintenance = 1500 + (20 x 5) = 1600 ml
   - Fluid rehydration 2000 ml + Maintenance 1600 ml for 24 hours = 3600ml/24 hour = 150 ml/hr.

4. **Start insulin infusion 0.1 unit/kg/hr** with IV infusion (Dilute 50-unit regular insulin (Short acting, Actrapid) in 50 ml normal saline, 1 unit = 1 ml). 1-2 hours after starting fluid replacement therapy.
5. Add **KCL** 40 mmol per liter fluid.
6. Change to **0.45% NS + 5% Dextrose** if blood glucose **< 17 mmol/l.**
7. When oral fluid is tolerated, IV fluid should be reduced.
   - If continuous IV insulin infusion is not possible, SC or IM administration of a short or rapid- acting insulin analog (Insulin lispro, Insulin Aspart, Regular Insulin, Actrapid) is safe and effect.
   - **Initial Dose:** SC/IM 0.3 unit/kg followed by 1 hour later SC/IM 0.1 unit/kg every hour or 0.15 – 0.2 unit/kg every 2 hours. If DKA has resolved (PH >7.3, HCO3 >15mmol/L) and blood glues is < 14 mmol, reduce SC/IM insulin to 0.05 unit/kg/hour and keep blood glucose normal 11mmol/L.

OR

   - Change to SC regular insulin **0.25 unit/kg** before meals (prebreakfast, pre-lunch, pre-dinner), SC intermediate insulin (Glargine) **0.25 unit/kg** before bed time.

- After discharging from your clinic, change twice daily injections.
- Total insulin dose is about **1 unit/kg/day, and** some prefer twice daily injections (30% as soluble insulin and 70% as isophane insulin, Mixtard 30). Calculate Prebreakfast 2/3 and Predinner 1/3 of total daily dose.

Comprehensive foot examination

- Inspection feet (i.e., callus, ulcers, sores), remember to check between toes also.
- Palpation of dorsalis pedis and posterior tibial pulses.
- Check patellar and Achilles reflexes.
- Determination of proprioception vibrations and monofilament sensations.
- Give counselling to patients how to take care of their feet.

Diabetes education

Diabetes is a chronic disease with no cure. Patient will have this disease for life (except for diabetes during pregnancy) and need to learn to live with it. Good lifestyle changes can help control the disease.

Every follow-up is a good opportunity to do health education to your patient on diabetes related topics. Because there is so much to discuss, you should rotate the main topics throughout the year. Here are 6 topics you should go through one after one and record it on the patient's chart.

1/ **Diet education – Extremely important, educate at every appointment**
2/ Information about complication
3/ Treatment: dosage, side-effect (management of hypoglycemia), adherence
4/ Foot ulcer & skin ulcer prevention
5/ Cardiovascular risk factor management
6/ Exercise

Anytime, do not hesitate to ask the patient what he or she understands.

Dietary instructions

- The goal of the diet is to **reduce sugar** and to be careful of **BW**, and other cardiovascular risk factor such as hypertension and cholesterol.
- **Eat regularly:** normally 2-3 main meals /day. Don't skip meal and keep good hydration.
- **Carbohydrates** (will be metabolized into sugar by the body), add to every meal (should make up 33% of the meal) to avoid hypoglycaemia if on **Glibenclamide** or **insulin**:
- Prefer starchy foods such as rice, potatoes, bread, cereals, and pasta.
- Eat plenty of vegetable such as cabbage, pumpkins, cauliflower, mushroom, watercress, and also kidney beans, butter beans, chickpeas or red and green lentils
- Eat fruit in reasonable quantity; in favour of green-mango, starfruit, grapefruit, pineapple, banana
- Reduce (no need to exclude but should be limited)
- **Fat:** Prefer **steam cooking** than fried cooking
- Fish is good fat
- **Meat:** prefer chicken and remove fatty part and skin. Reduce/avoid beef and pork
- Avoid chips, French fries, sausages, pies
- Reduce coconut milk/fats, dairy product
- **Salt:** Limit salt when cooking. Be careful with dry salty fish, fish-paste
- **Sugar**
- Reduce and better to stop all sweet drinks (coca cola, sprite etc…)
- Reduce and better to stop M150, La peh ye (sweet tea), coffee and tea 3 in 1 (birdy), Ovaltine/Milo.
- Reduce and better to stop alcohol (beer, spy, whisky)
- Reduce and better to stop biscuit, sweets & candies
- **Water and La peh chaut (green tea) are good also.**

THYROID DISEASE

The thyroid is a small hormone-producing gland located just below the Adam's Apple in the neck. It produces two thyroid hormones (thyroxine/T4 and triiodothyronine/T3), which circulate in the bloodstream and control the metabolism. Thyroid hormones influence almost every other organ system in the body. They tell the organs how fast or slow they should work and tell the body systems when to use energy (e.g., consume oxygen and produce heat). The amount of hormones the thyroid produces is controlled by the Thyroid-Stimulating Hormone (TSH) which is produced by the pituitary gland.

You can detect the two **main thyroid disorders** by measuring TSH and F-T4 (free T4) in the blood of a patient.

TSH	FT4	Conclusion
Normal	Normal	No thyroid disease
↑	↓	Hypothyroid
↑	Normal	Sub clinical hypothyroid/Treated Hypothyroid
↓	↑	Hyperthyroid
↓	Normal	Sub clinical hyperthyroid

HYPOTHYROIDISM

Underactivity of the thyroid gland. The chief cause is iodine deficiency. Some (Primary atrophic hypothyroidism and Hashimoto's thyroiditis) are autoimmune diseases.

SIGNS AND SYMPTOMS

SIGNS: BRADYCARDIC; Reflexes relax slowly, Ataxia (cerebellar), Dry thin hair/skin, Yawning/drowsy/coma, Cold hands, Ascites+/- non-pitting oedema (lids, hands, feet) +/- pericardial or pleural effusion, round puffy face/double chin/obese, Defeated demeanour, Immobile+/- ileus, CCF. Also, neuropathy, myopathy, goitre.

SYMPTOMS: Tiredness, Sleepy, Lethargic, <mood, Cold-disliking, Increased weight, Constipation, Menorrhagia, Light menstruation, Hoarse voice, Reduced memory/cognition, Dementia, Myalgia, Cramps, Weakness.

Pregnancy problems: Eclampsia, Anaemia, Prematurity, Stillbirth, PPH.

DIAGNOSIS

- Clinical: Feel the thyroid gland (goitre, nodules), pulse, look for dry skin, oedema
- Laboratory test: **TSH, FT4** for diagnosis, TSH only for follow up of treatment.

MANAGEMENT OF HYPOTHYROIDISM

If **TSH** is high **and FT4** is low, start treatment. Medication used is thyroxine, levothyroxine sodium **(T4)**. Goals of treatment: improve symptoms and **TSH** back to normal level.

Hypothyroidism			
Start thyroxine (take 30 minutes before food)			
< 50 years	Starting Dose – 50 µg OD (usually 1.6µg/kg/day) Increase the dose after 4 weeks to 100 – 150 µg OD by clinical judgment (reduction in weight, puffiness of face, increase in HR) Then recheck TSH after 4 weeks and adapt the thyroxine dose NB: hoarseness of voice, anemia, skin & hair changes take months to resolve		
≥ 50 years or history of ischemic heart disease (Treat only if TSH >7.5mIU/L or very symptomatic disease)	Starting Dose – 25 µg OD Increase Dose – by 25 µg after 4 weeks Then recheck TSH after 4 weeks and adapt the thyroxine dose NB: thyroxine may precipitate angina or myocardial infarction.		
Follow-up Take blood test for TSH only after 4-6 weeks, and BEFORE taking thyroxine			
TSH result	What to do	Example	Follow-up
TSH High (≥ 4.67 mIU/l)	Increase the dose by 25 µg daily dose. Always discuss compliance with the patient	Current dose 100 µg OD New dose 125 µg OD	Re-check TSH in 4 weeks
TSH Normal (0.49-4.67 mIU/l)	Continue thyroxine at the same dose	Current dose 100 µg OD Continue 100 µg OD	Re-check TSH in 6 months or in **12** months if this the 2nd time TSH is normal) or check before if symptoms reappear
TSH Low (< 0.49 mIU/l)	Decrease the dose by 25 µg daily dose. 25 µg alternate days is the lowest dose	Current dose 100 µg OD New dose 75 µg OD (If already 25 µg OD, try alternate day – 1 tablet every 2 days)	Re-check TSH in 4 weeks

Note: Most patients with hypothyroidism will require lifelong thyroid hormone therapy.

SUBCLINICAL HYPOTHYROIDISM

When TSH is increased with normal FT3 or FT4, confirm increase in TSH is persistent. Recheck TSH in 3-6 months. Treat if: **TSH ≥ 10 mIU/l**

- Or history of treated **Graves' disease (Overactive Autoimmune disease).**
- Or other associated autoimmune – **Type 1 diabetes mellitus**, **pernicious anaemia, Vitiligo**

If TSH 4 – 10 mIU/l and vague symptoms – Treat for 6 months, only continue till symptoms improve or the patient is trying to get pregnant (aim is TSH < 2.5uIU/ml).

If not in above groups, Check TSH yearly

Health education

Importance of regular treatment and follow-up

Patients should understand that there are many different causes of thyroid disorders:

- Some causes require lifelong treatment
- Other patients may never need treatment
- Some patients' thyroid function may return to normal after months-years and can stop treatment.

Explain side effects of PTU and Carbimazole if used.

Teach the patients the signs of hyper/hypothyroidism.

Advise to come for follow-up if symptoms appear.

Propose family planning if needed

If a woman wants to get pregnant, explain that it is important to control the thyroid before.

HYPERTHYROIDISM

Over activity of the thyroid gland.

SIGNS AND SYMPTOMS

- Diarrhoea
- Sweating
- Increased sensitivity to heat
- Nervousness
- Exophthalmia (protruding eyes)
- Increased appetite
- Weight loss
- Tachycardia, palpitations

DIAGNOSIS

- Clinical: check pulse rate, feel thyroid gland (goitre, nodules).
- Laboratory test: TSH and FT4 (after 1 month then every 3 months).
- Hydatidiform molar pregnancy can cause symptoms that look like.

TREATMENT

(1) **Radioactive Iodine ablation:** Radioactive Iodine is taken by mouth and is absorbed by the thyroid gland where it causes the gland to shrink.

(2) **Antithyroid medications:** (A) Carbimazole (B) PTU (C) Propranolol(to help relieve some symptoms)

(3) Thyroidectomy

(A). **Carbimazole:** It prevents production of the thyroid hormones T3 and T4.

Tablet: 5mg, 10mg

- **Mild:** 15mg/day PO divided 8 hourly initially
- **Moderate:** 30-40 mg/day PO divided 8 hourly initially
- **Severe :** 60 mg/day PO divided 8 hourly initially
- **Maintenance:** 5-30 mg/day PO divided 8 hourly.

Side Effects: Bone marrow suppression causing neutropenia and agranulocytosis. Carbimazole and methimazole use in early pregnancy is thought to slightly increase the chance of certain birth defects occurring in the baby.

(B). **PTU:** It blocks the thyroid from making thyroid hormones.

- For treatment in pregnant women, refer to obstetric guidelines. Hyperthyroidism in pregnancy can cause irreversible mental retardation in the fetus/infant.
- Check liver function tests (ALT, ALP, Bilirubin) before starting **propylthiouracil**.

Propylthiouracil (PTU) 50mg tablet (this is an anti-thyroid drug which will stop the thyroid malfunction.

- Start **PTU 200-400mg** per day in divided doses e.g., 2 – 4 tablets BID.
- Check thyroid function (TSH, FT-4) and liver function tests after 1 month, then every 3 months.
- When TSH and clinical signs are becoming normal: slowly decrease dose by 50mg every 2 months to 50 -150mg daily in divided doses.
- Continue maintenance treatment for 12 to 24 months, then discontinue treatment to see if the patient is not hyperthyroid anymore. Follow clinical.
- There is a risk of hepatotoxicity. Advise patients on how to recognize symptoms of liver disease (anorexia, nausea, vomiting, fatigue, abdominal pain, jaundice, dark urine, itching)
- For rapid symptomatic treatment of tachycardia and palpitations give propranolol 40mg OD then increase to 40mg TID if required.

FOLLOW UP

- Initial phase (3 months): every month.
- After initial phase: every 2 -3 months.

Note: Hyperthyroidism in pregnant women should be monitored carefully, with frequent thyroid function tests. Delivery should not take place at home and the neonate should be observed carefully for signs of thyroid disease.

(C) Propranolol : Propranolol is the preferred for Beta blockade in hyperthyroidism and thyroid storm due to its additional effect of blocking the peripheral conversion of inactive T4 to active form T3.

- Dose: 20-40 mg tds.

PREVENTION

- Patients should take their medication regularly and come to the clinic for consultation.
- They should be able to recognize the signs or symptoms of too much or not enough thyroid hormone.
- They should be made aware that some other medications could interact with their thyroid medication.
- They should discuss all new medications with their doctor.

THYROTOXIC CRISIS (THYROID STORM)

- Thyrotoxic crisis is defined as a sudden **severe life-threatening** exacerbation of hyperthyroidism associated with multiple organ decompensation. Suspect the existence of **thyroid storm** in any known case of hyperthyroidism developing a fever.
- **Thyroid storm is fatal if untreated**, mortality rate is **20-50%.** Avoid **Aspirin based antipyretics**, they release free **T4** and free **T3** from protein bound sites.

CLINICAL PRESENTATION

1. Fever, Sweating
2. Tachycardia out of proportion to fever classically persist during sleep.
3. Weight loss, tremors
4. **Multiorgan dysfunction:**
   - **CNS dysfunction:** confusion, delirium, agitation, stupor, coma.
   - **GI dysfunction:** abdominal pain, diarrhoea, vomiting, jaundice.
   - **CVS dysfunction:** systolic hyper or hypotension, heart failure, rapid atrial fibrillation/flutter.
5. Recent history of **surgery**, iodinated **CT** contrast, sepsis.
6. Volume depletion from fever, diarrhoea, increased metabolism.
7. **Goiter** may not be evident.

MANAGEMENT

- Administer **high-flow oxygen by non-rebreather reservoir mask**.
- **Monitor vital signs, ECG, pulse oximetry**.
- **IV fluids: D/S** by slow infusion with appropriate **electrolytes and vitamins**. Correct volume depletion cautiously to avoid precipitation or worsening **heart failure**.
- Fluid loss may require replacement of **3-5** liters/day.
- **Laboratory**

FBC	CXR
Urea/Electrolytes	ECG
LFT	Urine RE, C&S
TFT	

- **Paracetamol,** tepid sponging.
- **Propranolol** 60mg 4 hourly **OR** 80mg 8 hourly.
- **PTU (Propyl thiouracil)** blocks iodination as well as the conversion of **T_4** to **T_3.**
  - **Dose: 400-600mg stat.**
  - **Followed** by 200-300mg 4 hourly.
  - **Hydrocortisone** 100mg **IV/IM** every 8 hr. (total 3 doses).OR
  - **Dexamethasone** 2mg IV every 8 hours.
- Consider IV antibiotics and **Lugol's Iodine** 5 drops 8 hrly.
- If patient is pregnant, refer for further management.

GOITRE

A goitre is an enlargement of the thyroid gland, which appears as a large swelling at the front of the neck. Endemic goitre occurs in areas where iodine in the diet is deficient. Iodine is essential for the production of thyroid hormone and deficiency impairs the making of it. To compensate, the gland increases in size. Hyper- or hypothyroidism may occur. Regular consumption of foods such as cassava, cabbage or turnips also cause goitre; it is also made worse by smoking and pregnancy.

SIGNS AND SYMPTOMS

- Swelling of the thyroid.
- Hypo or hyper thyroidism.
- Iodine deficiency in pregnancy: increased fetal and perinatal mortality.
- In children: physical and mental retardation.

Clinical (WHO classification)

Grade 0: normal thyroid, no palpable or visible goitre.
Grade 1: palpably enlarged thyroid, but not visible with the neck in a normal position.
Grade 2: thyroid clearly visible with the neck in a normal position.

INVESTIGATION

- **TSH and FT-4** if symptoms of hyper or hypothyroidism.

COMPLICATIONS

Pain or a sense of fullness in the neck is common. Frequently, there is no pain. Compression of the trachea and/or esophagus leading to dyspnoea and/or dysphagia (rare) is a reason for surgical intervention.

TREATMENT

- Encourage eating salt with iodine added to it

- If available, you can give iodized oil
- In children, goitre disappears slowly after several months. In adults, it disappears more slowly or never, despite improvement to normal thyroid function.
- A few patients will develop hyperthyroidism and require treatment for that condition.
- Surgery is only indicated if the goitre makes local compression on the neck (airway or blood vessels).

DANGER SIGNS: If the swelling is irregular, you can feel one solitary nodule, there is a change in the voice or there is also cervical lymphadenopathy then these may be signs of thyroid cancer – discuss with a doctor.

PREVENTION

The best way to prevent goitre or iodine deficiency is to encourage consumption of iodized salt (note: this is available in the market. If there is no iodized salt available, provide people living in iodine deficient areas with iodized oil.

HAEMATOLOGICAL DISEASES

ANAEMIA

Anaemia is defined as a low hemoglobin (Hb) concentration and may be due either to a low red cell mass or increased plasma volume (e.g., in pregnancy).

- **Men: Hb < 13.5 g/dL**
- **Women: Hb < 11.5 g/dL**

SIGNS AND SYMPTOMS

- fatigue, dyspnoea, faintness, palpitations, headache, tinnitus, anorexia
- Signs of hyperdynamic circulation: Tachycardia, flow murmurs, cardiac enlargement, retinal haemorrhages (rare), anaemic heart failure.

CAUSES

- Acute
  - Malaria (acute destruction of RBCs)
  - Acute bleeding (GI tract, genital tract, artery damage in accident)
  - G6PD deficiency
- Chronic
  - Nutritional deficiencies (lack of ferrous and folic acid in diet)
  - Hook worm infestation
  - Repeated pregnancies and prolonged breast-feeding
  - Peptic ulcer
  - thalassemia
  - Chronic bleeding
  - Cancers
  - Chronic infections
  - Liver and kidney diseases
  - Tropical splenomegaly
  - Aplastic anemia

INVESTIGATIONS

- **Hb levels**
- Rapid test or systematic thick and thin blood films in areas where malaria is endemic.
- Urinary dipstick: check for haemoglobinuria or haematuria.
- Emmel test if sickle cell disease is suspected.
- Blood cell count if available to guide diagnosis

See Table:TYPES OF ANAEMIA (Diagnosis with Complete Blood Count)

ANAEMIC HEART FAILURE (SYMPTOMATIC)

Symptoms

- Severe difficulty breathing at rest
- Extreme weakness
- Sometimes chest pain

Signs

- Severe pallor
- Acute Pulmonary Edema sign; crept and wheezing
- Hepatomegaly
- Engorgement of jugular veins
- Peripheral edema and sometimes, ascites

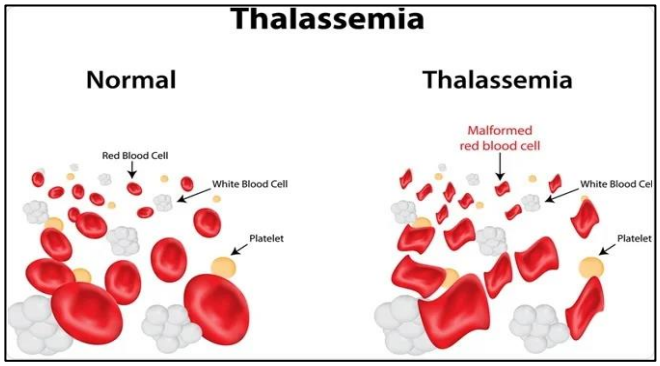
TREATMENT

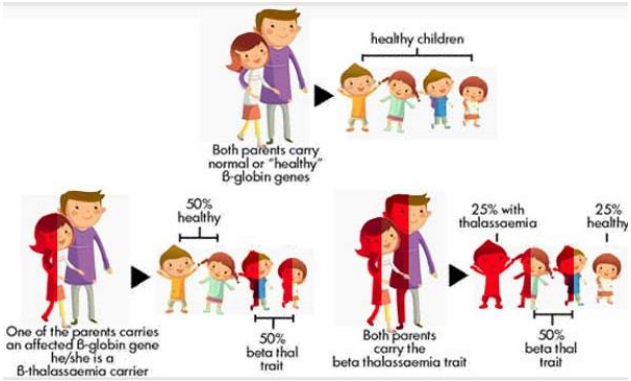
- Treatment dose of **ferrous sulphate (FS)** and **folic acid (FA)**
  - **Treatment dose**
    - FS 200 mg TID, FA 5 mg OD
  - **Prophylactic dose**
    - FS 200 mg OD, FA 5 mg/week
- A response to oral medication usually appears in <2 weeks (**Hb should raise by 1g/dl every 7-10 days**). **FS** should be continued for **3-6 months** after the Hb level has returned to normal to refill the body's iron store. Administration of vitamin C may help the body to absorb iron.
- If **Hb <6 /Hct <18,** Blood transfusion.
- Anaemic heart failure is very difficult to treat successfully and, if possible, should be prevented by providing treatment before reaching this stage. Treat the pulmonary oedema.
- All patients with **anaemia** should be **dewormed.**
- Treat the cause.

Table:TYPES OF ANAEMIA (Diagnosis with Complete Blood Count)

Low MCV (Microcytic Anaemia)	
Iron-Deficiency Anaemia (IDA) Thalassemia Sideroblastic Anaemia (very rare)	
Normal MCV (Normocytic Anaemia)	
Acute blood loss Anaemia of chronic disease Bone marrow failure Renal failure	Hypothyroidism Haemolysis Pregnancy
High MCV (Macrocytic Anaemia)	
B12 or folate deficiency Alcohol excess or liver disease Reticulocytosis (with haemolysis) Cytotoxics	Myelodysplastic syndromes Marrow infiltration Hypothyroidism Antifolate drugs (e.g., Phenytoin)
Diagnosis with Reticulocytes count	
Reduced number of **reticulocytes**	Deficiency (iron, folic acid, vitamin B12), spinal tumour, renal failure
Increased or normal number of **reticulocytes**	Haemolysis, sickle cell disease, thalassaemia
Eosinophilia	Ancylostomiasis, trichuriasis, schistosomiasis, HIV infection, malignant haemopathies

THALASSAEMIA





Thalassaemia is a **genetic** disease caused by abnormal or decreased Haemoglobin production. Haemoglobin is found in the red blood cells and is the part of the cell that carries the oxygen needed for the tissues to work. Haemoglobin is made up of two alpha (α) and two **beta (β)** chains. Thalassaemia results in decreased or absent Haemoglobin chains: In alpha-thalassemia, **α chains** are affected and in beta - thalassemia the beta-chains are affected.

There are many variations of the disease from no chains being produced by the body to minor changes in the chains. So, the disease ranges from being extremely severe to patients not even being aware they have the disease.

BETA β THALASSAEMIA

	Beta Thalassaemia Minor	Beta Thalassaemia Intermedia	Beta Thalassaemia Major
Symptoms	Mild, well-tolerated anaemia, often noticed in pregnancy	Well-tolerated anaemia that gets worse with age, splenomegaly	▪ Severe anaemia, starting in the first year of life ▪ Child does not grow and develop well ▪ Child contracts many infections ▪ Abnormal bone growth, especially in the face ▪ Enlarged liver and spleen (hepato-splenomegaly)
Diagnosis	CBC, High Serum Ferritin level, Thalassaemia test (Hb electrophoresis, DNA test)	CBC, High serum Ferritin level, Thalassaemia test(Hb electrophoresis, DNA test)	CBC, High Serum Ferritin level, film (target cells), thalassaemia test(Hb electrophoresis, DNA test)
Treatment	**Folic acid** and vitamin B, do not overload with iron.	**Folic acid** and vitamin B, do not overload with iron.	• Consider regular transfusions to **keep Hb > 8, Hct > 24.** • Transfusion is the only effective treatment, but over time this causes iron levels to increase in the body which damages some organs, causing death (consider giving desferrioxamine at each blood transfusion, which can help reduce iron overload). • **Folic acid** If splenomegaly is present, discuss the possibility of having surgery to remove the spleen (splenectomy) but the benefit of this is only temporary.

Prognosis of Beta Thalassaemia Major and blood transfusion

Without transfusion	• Death usually occurs within one year
With adequate transfusion	• Child growth and development are usually good, school attendance is improved Infections are reduced, overall health is improved, **bone deformities** improve. • Symptoms of iron overload appear after about 10 years, with liver disease and **cardiac toxicity**. • **Death** is usually due to cardiac iron overload.
With not enough transfusion	• **Anaemia** with reduced growth, slow development and **bone deformity**. Enlarged spleen (splenomegaly). • Intermittent fever. • Bleeding. • **Death** usually occurs at 20-30 years of age from cardiac iron overload.

Mentzer Test: MCV/ RBC = <13 = Thalassemia > 13 IDA

TREATMENT

- FA, Vitamin B & C
- Blood transfusion
- Splenectomy
- **Desferrioxamine 1 – 2 g at each blood transfusion.**

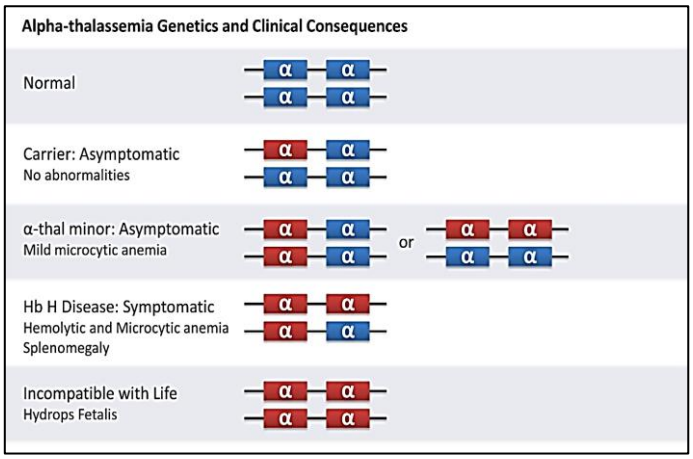
ALPHA THALASSAEMIA (deletions of chromosome 16p)

COMPLICATIONS

- Complications occur in varying degrees and include the following:
- Hepatosplenomegaly
- Leg ulcers
- Gallstones
- Aplastic or hypoplastic crises
- Skeletal, developmental, and metabolic changes due to ineffective erythropoiesis (these resemble the changes characteristic of beta thalassemia intermedia or beta thalassemia major)
- Prominent frontal bossing (due to bone marrow expansion)
- Delayed pneumatization of sinuses
- Marked overgrowth of the maxillae

- Ribs and long bones becoming boxlike and convex
- Premature closure of epiphyses resulting in shortened limbs
- Compression fracture of the spine (which may result in cord compression or other neurologic deficits)
- Osteopenia and fractures

Splenectomy or transfusion support is often necessary in the second or third decade of life.



G6PD DEFICIENCY (GLUCOSE-6-PHOSPHATE DEHYDROGENASE DEFICIENCY)

This disease is caused by a deficiency of the enzyme G6PD in the red blood cells that is important for these cells to function. It is a genetic disease which is present from birth. It is usually more severe in men, but women can also have G6PD deficiency which can be mild to severe. People with this disease usually have no symptoms, although some have chronic anaemia.

SIGNS AND SYMPTOMS

Most patients have no symptoms. Some have chronic anaemia. Acute haemolytic anaemia occurs after taking certain drugs (see below) or having an infection or acute illness:

- Jaundice, pallor, dark urine, sometimes abdominal and back pain.
- Neonatal jaundice with or without anaemia.
- Symptoms of anaemia: fatigue, difficulty breathing, tiredness, palpitations

DIAGNOSIS

- G6PD test

TREATMENT

- Stop any drug that could have caused the haemolysis
- Treat any infection
- Usually, the haemolysis is self-limiting, and treatment is not needed
- Blood transfusion can save the life of the patient in severe cases of anaemia
- Check the patient urinates enough, encourage the patient to drink plenty of fluids.

Drugs And Chemicals That Cause Severe Haemolysis In G6pd Deficient People:

- Dapsone and other sulphones
- Methylene Blue
- Niridazole
- Nitrofurantoin
- Primaquine
- Quinolones (including ciprofloxacin, norfloxacin, ofloxacin, nalidixic acid)
- Sulphonamides (including co-trimoxazole)

Note: mothballs may contain naphthalene which also causes haemolysis

Drugs With Possible Risk In G6pd Subjects

- Aspirin
- Chloroquine (acceptable in acute malaria)
- Vitamin K analogue (menadiol sodium phosphate)
- Quinine (acceptable in acute malaria)

PREVENTION FROM HAEMOLYSIS

- Avoid drugs and chemical (above list)
- Please note down “G6PD Deficiency” in patient booklet to aware of any clinician consulting patients.
  - To decide whether to transfuse, several parameters should be taken into account:
  - Clinical tolerance of anaemia
  - Underlying conditions (cardiovascular disease, infection, etc.)
  - Rate at which anaemia develops.
  - Hb levels <6

BLOOD TRANSFUSION

INDICATIONS

Table: Hb level defining anaemia and transfusion threshold

Patient	Hb level defining Anaemia	Transfusion threshold
Children 2-6 months	< 9.5 g/dl	**Hb < 4 g/dl**, even if there are no signs of decompensation **Hb ≥ 4 g/dl** and < 6 g/dl if there are signs of decompensation or sickle cell disease or severe malaria or serious bacterial infection or pre-existing heart disease
Children 6 months-5 years	< 11 g/dl	
Children 6-11 years	< 11.5 g/dl	
Children 12-14 years	< 12 g/dl	
Men	< 12 g/dl	Hb < 7 g/dl if there are signs of decompensation or sickle cell disease or severe malaria or serious bacterial infection or pre-existing heart disease
Women	< 13 g/dl	
Pregnant women	< 11 g/dl (1st and 3rd trimester) < 10.5 g/dl (2nd trimester)	**< 36 weeks** Hb ≤ 5 g/dl, even if there are no signs of decompensation Hb > 5 g/dl and < 7 g/dl if there are signs of decompensation or sickle cell disease or severe malaria or serious bacterial infection or pre-existing heart disease **≥ 36 weeks** Hb ≤ 6 g/dl, even if there are no signs of decompensation Hb > 6 g/dl and < 8 g/dl if there are signs of decompensation or sickle cell disease or severe malaria or serious bacterial infection or pre-existing heart disease

VOLUME TO BE TRANSFUSED

In the absence of **hypovolaemia or shock:**
Children < 20 kg: 15 ml/kg of red cell concentrate in 3 hours or 20 ml/kg of whole blood in 4 hours
Children ≥ 20 kg and adults: start with an adult unit of whole blood or red cell concentrate; do not exceed transfusion rate of 5 ml/kg/hour.
Repeat if necessary, depending on clinical condition.

Table: Blood group compatibility

Donor / Acceptor	can give blood to:	can receive blood from:
O	**O-A-B-AB** Group O is universal donor	O
A	A-AB	A-O
B	B-AB	B-O
AB	AB	**A-B-O-AB** Group AB is universal acceptor

MONITORING

Monitor the patient's condition and vital signs (heart rate, blood pressure, respiratory rate, temperature):

During the transfusion: 5 minutes after the start of transfusion, then every 15 minutes during the first hour, then every 30 minutes until the end of the transfusion.
After the transfusion: 4 to 6 hours after the end of the transfusion.
If signs of circulatory overload appear:

- Stop temporarily the transfusion.
- Sit the patient in an upright position.
- Administer oxygen.
- Administer **furosemide by slow IV**:
  - Children: 0.5 to 1 mg/kg
  - Adults: 20 to 40 mg
- Repeat the injection (same dose) after 2 hours if necessary.
- Once the patient has been stabilized, start the transfusion again after 30 minutes.

RATE OF TRANSFUSION

- The transfusion should usually last approximately 3 hours, with the following exceptions:
- For patients with low BP and acute bleeding (until systolic is >90mmHg): give it over 10 minutes.
- For patients at risk of cardiac failure (e.g., severely malnourished children, old people, people with heart / kidney problems, patients with chronic anaemia) give it over 4 hours and give **furosemide 20mg PO** half way.

When to check vital signs:

- Before starting
- After 5 and 15 minutes
- Then after every hour until 1-hour post transfusion.
- Never mix blood with **D5W** (this can cause haemolysis) or ringer (this can cause clotting): you can mix blood with **NSS**.
- Never add medication to the blood.
- Do not shake the blood.

MOST COMMON CAUSE OF TRANSFUSION REACTIONS

Table: Common causes of transfusion reaction

Haemolysis	Fever, chills, lumbar back pain, anxiety, fast pulse, low BP, dark urine, burning sensation at IV site	Stop transfusion If shock > Give NSS (Follow Shock guideline)
Pulmonary oedema	Old people, people with known heart / kidney problems, patients with chronic anaemia.	Put the patient in sitting position Give Oxygen Give Furosemide IV 40 mg (For adult)
Allergic reaction	Urticaria, big red itching lesions.	Give chlorpheniramine PO (adult 4mg). If no other symptoms and the skin rash goes away in ½ hour, ask the doctor if you can start the transfusion again, but observe carefully.
More Severe allergic reactions **(Anaphylaxis)**	Oedema, difficult breathing, wheezing, high BP, then Low BP Oedema, difficult breathing, wheezing, high BP, then low BP, sometimes diarrhoea and vomiting.	Give oxygen Give adrenaline 1:1000 IM Give NSS fast. Give hydrocortisone IM/IV Give chlorpheniramine IV

Table: Causes of Pancytopenia

1. Chemotherapy for malignancies. 2. Some drugs (Chloramphenicol, phenytoin, quinine, carbamazepine, phenylbutazone). 3. Aplastic Anaemia. 4. Familial hemophagocytic syndromes. 5. Metastatic carcinoma of bone. 6. Multiple myeloma (cancer of plasma cell). 7. Overwhelming infections. 8. Viral infections (HIV, EBV). 9. SLE.	10. Leukemia. 11. Leishmaniasis. 12. Myelofibrosis (bone marrow is replaced by fibrous scar). 13. Sever folate or vitamin B_{12} deficiency. 14. Lymphoma. 15. Copper deficiency. 16. Hypersplenism. 17. Low dose arsenic poisoning. 18. Chronic radiation sickness. 19. Paroxysmal nocturnal haemoglobinuria.	20. **Gaucher's disease** (It is a hereditary deficiency of the enzyme glucocerebrosidase which acts on glucocerebroside. When enzyme is defective, glucocerebroside accumulates, particularly in white blood cells and can collect in the spleen, liver, kidneys, lungs, brain and bone marrow. The disorder is characterized by bruising, fatigue, anaemia, low blood platelets count and enlargement of liver and spleen.

RISK DURING BLOOD TRANSFUSION

Observe the patient carefully during the blood transfusion. Check vital signs regularly.
It is important to recognize the **symptoms of reaction** to blood transfusion, so you can stop the transfusion and prevent serious complications.

For suspected transfusion reaction:

- Stop the transfusion and disconnect the set from the needle / cannula.
- Using a new infusion set, keep the line open with fluids unless suspect pulmonary oedema.
- Check that the patient received the correct blood / recheck the patient's blood group.
- Reconsider indication for transfusion.
- If the patient's condition is still severe, find another donor

PANCYTOPENIA

Pancytopenia is a condition that occurs when a person has low counts for all three types of blood cells: red blood cells, white blood cells and platelets. Pancytopenia is usually due to a problem with the bone marrow that produces the blood cells.

DIAGNOSIS

- Bone marrow biopsy

TREATMENT

- Blood transfusion with packed red blood cells.
- Treat underlying causes.

CAUSES

See Table: Causes of Pancytopenia

APLASTIC ANAEMIA (AA)

Aplastic anaemia is a disease in which the body fails to produce blood cells in sufficient numbers. Blood

cells are produced in the bone marrow by stem cells that reside there. Aplastic anaemia causes a deficiency of all blood cell types red blood cells, white blood cells and platelets.

SIGNS AND SYMPTOMS

- Anaemia may lead to feeling tired, pale skin and fast heart rate.
- Low platelets are associated with an increased risk of bleeding, bruising and petechiae.
- Low white blood cells increase the risk of infections.

CAUSES

1. Exposure to **toxins such as benzene**
2. **Certain drugs (Chloramphenicol, Carbamazepine, Felbamate, Phenytoin, Quinine, Phenylbutazone).**
3. Exposure to **ionizing radiation** from **radioactive material or radiation producing devices.**
4. **Parvo virus B1a** virus infection – **Acute viral hepatitis virus, Epstein-Barr Virus, CMV, HIV**
5. **Heredity**

DIAGNOSIS

- Bone marrow examination.
- Renal function test.
- Liver function test (LFT).
- CXR
- CT scan

TREATMENT

1. Blood transfusion
2. Antibiotics to control infection.
3. Bone marrow transplant
4. I**mmunosuppressive** treatment drugs e.g., **anti-thymocyte globulin (ATG), Cyclosporin A.**

PROGNOSIS

- Five – year survival rate: 45%.

LEUKEMIA

Leukemia is a group of blood cancers that usually begin in the bone marrow and result in high numbers of abnormal blood cells. These blood cells are not fully developed and are called **blasts** or **leukemia cells.**

CAUSES

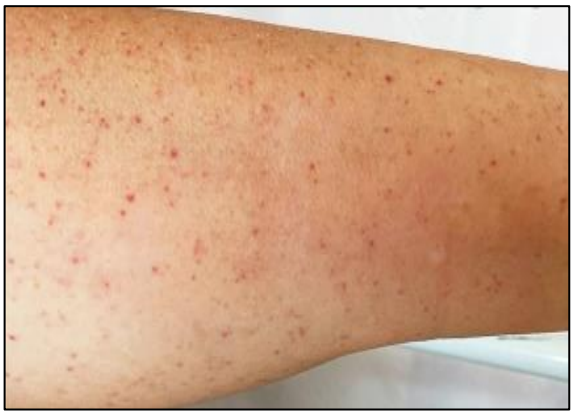
- Inherit and **environmental factors**.

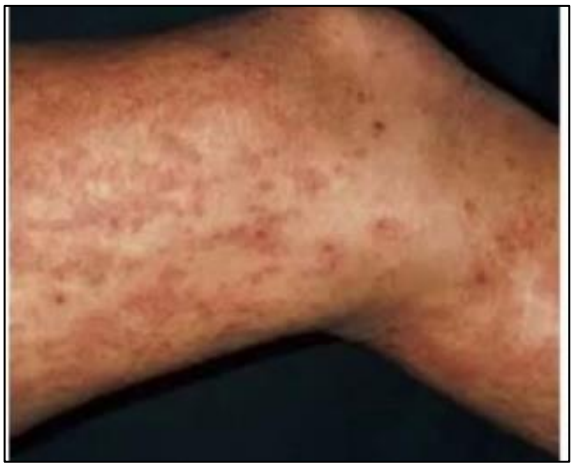
RISK FACTORS

- Smoking.
- Family history.
- Ionizing radiation.
- Some chemicals.
- Prior chemotherapy.
- **Down's syndrome.**

IDIOPATHIC THROMBOCYTOPENIC PURPURA

(Immune Thrombocytopenic Purpura, ITP)





ITP is an autoimmune disease with antibodies detectable against several platelets surface structures. ITP is diagnosed by identifying on low platelets account on a complete blood count.

SIGNS AND SYMPTOMS

- Spontaneous formation of bruises (purpura) and petechiae (tiny bruises), especially on the extremities, bleeding from the nostrils and gums, and menorrhagia, any of which may occur if the platelet count is below **20,000/µl**.

A very low count (**<10,000/µl**) may result hematomas. Bleeding time from minor lacerations or abrasions is prolong.

COMPLICATIONS

- Subarachnoid or intracerebral haemorrhage, GI bleeding.

In children

- Self-limiting the child is purpuric often after a viral illness. Platelet count is usually (**<10x10^9/L**).
- No specific treatment is needed.

In adults

- Acute or chronic and insidious, platelet count is low. **Ask about drug history (Thiazides, Quinine or Digoxin).**

TREATMENT

1. **Refer to hospital.**
2. **Prednisolone** 4mg/kg/day x 4 days **OR**
3. **Dapsone** 25-100mg OD x 1 month **OR**
4. **IV immunoglobulin** 0.8 gm/kg x 2 days **OR**
5. Splenectomy.

Table: how to interpret the CBC

Index	What it is	If lower than normal	If higher than normal
Red blood cell count (RBC)	Number of red blood cells	Acute or chronic blood loss; deficiency in Iron, vitamin B12, or folate; haemolysis; bone marrow damage; leukemia or lymphoma	Dehydration; kidney problems; thalassemia; genetic RBC defects; pulmonary disease; congenital heart disease
Reticulocytes	Immature red blood cells in the circulating blood; reticulocytes are bigger than mature RBCs	Bone marrow suppression	Anemia, recent blood loss (e.g., menstruation), red blood cell hemolysis
Hemoglobin (HGB)	Carries oxygen in RBC	Acute or chronic blood loss; deficiency of Iron, vitamin B12, or folate; haemolysis; bone marrow damage; leukemia or lymphoma; thalassemia and genetic RBC defects	Dehydration; kidney problems; pulmonary disease, congenital heart disease
Hematocrit (HCT)	How much of the blood volume is RBCs		
Mean corpuscular volume (MCV)	Average size of red blood cells	Iron deficiency; thalassemia and genetic RBC defects	Vitamin B12 or folate deficiency; very high reticulocyte count
Mean corpuscular hemoglobin (MCH)	The amount of hemoglobin in each RBC		Vitamin B12 or folate deficiency
Mean corpuscular hemoglobin concentration (MCHC)	The average amount of hemoglobin in an amount of RBC (ml)		Sickle cell disease, hereditary spherocytosis
Red cell distribution width (RDW)	Variation in RBC size; if high then many different sizes of RBC in the blood		Iron deficiency, vitamin B12 or folate deficiency; recent blood loss
White blood cell count (WBC)	Number of white blood cells, which protect the body against infection	Autoimmune diseases, immunosuppression, bone marrow failure, cancer chemotherapy, viral infections	Infection, inflammation, leukemia, intense exercise, stress, corticosteroids
Neutrophils (N)	Number or percentage of neutrophils; most common WBC	Immunosuppression, bone marrow failure, chemotherapy	Bacterial infection, inflammation, leukemia, intense exercise, stress, corticosteroids
Lymphocytes (L)	Number or percentage of lymphocytes	Immunosuppression, HIV-AIDS, bone marrow failure, chemotherapy	Viral infections, leukemia, lymphoma
Monocytes (M)	Number or percentage of monocytes	Immunosuppression, bone marrow failure, chemotherapy	Chronic infections, autoimmune diseases, leukemia
Eosinophils, absolute (E)	Number or percentage of eosinophils	NA	Parasitic infections (e.g., worms), asthma, allergy

Basophils, absolute (B)	Number or percentage of basophils	NA	Allergy
Platelet count (PLT)	Number of platelets; need for blood clotting	Viral infections; bone marrow failure; vitamin B12 deficiency; leukemia or lymphoma; sequestration (take up) in the spleen; some medications	Leukemia, myeloproliferative disorders (which cause some blood cells to grow abnormally in bone marrow), inflammatory conditions
Mean platelet volume (MPV)	Average volume of a platelet; new platelets are bigger than old ones	Aplastic anemia, thrombocytopenia	Some inherited disorders

MUSCULOSKELETAL DISORDERS

Disorders of the joints can be due to infection (septic arthritis), non-infectious causes (inflammatory diseases), or injury (strains and sprains).

INFECTIOUS ARTHRITIS

SEPTIC ARTHRITIS

Acute bacterial infection of the joints which commonly affects a single joint but can also affect more than one joint (usually not symmetrical). It is most often spread from the blood into the joint. The most common organism causing septic arthritis is Staphylococcus Aureus. However, Gonococcus can also cause infection in sexually active young adults and Haemophilus influenza infection can occur in unvaccinated children. Patients with other joint problems such as rheumatoid arthritis have a higher chance of getting septic arthritis.

SIGNS AND SYMPTOMS

Newborn or infant:

- Voluntary immobility of the limb with the infected joint (pseudo paralysis)
- Cries when the infected joint is moved
- Irritability
- Fever

Child or adult:

- Intense joint pain
- Joint swelling and redness
- Voluntary immobility of the limb with the infected joint (pseudo paralysis)
- Limping/ non-weight bearing (lower limbs)
- Fever

Consider gonococcal arthritis:

- Migrating joint pain
- Fever
- Skin rash (papular, pustular or vesicular with red base)
- Pain in the back of hands/wrists and ankles (due to tendon inflammation).

Consider especially in patients with symptoms of STI e.g., urethral, or vaginal discharge, lower abdominal pain.

DIAGNOSIS

- Clinical
- CBC, CRP - WBC/CRP usually raised in septic arthritis
- Aspiration of pus from the joint (where possible) - pus culture, gram stain
- Blood culture.

TREATMENT

Successful treatment of septic arthritis requires early drainage of infected joint fluid, resting of affected joint and use of appropriate antibiotics

Children < 5 years:

- Admit to IPD
- Give IV cloxacillin for 2 weeks AND IV gentamicin for 5 days followed by oral cloxacillin for a minimum of 2 weeks.
- If any blood or aspiration cultures grow any organisms, then treat as per sensitivities.
- If do not have culture available and no improvement at day 3 consider adding IV ceftriaxone.
- Drain infected joint fluid with needle as soon as possible (may need multiple drainage)
- Try to splint and rest the joint until signs of inflammation improve especially if it is a weight-bearing joint like the hip or knee.

Children > 5 years/Adults:

- Admit to IPD
- Give IV cloxacillin for 2 weeks, followed by oral cloxacillin for a minimum of 2 weeks.
- If any blood or aspiration cultures grow any organisms, then treat as per sensitivities.
- If do not have culture available and no improvement at day 3 consider adding IV gentamicin for 5 days +/-ceftriaxone.
- Drain infected joint fluid with needle as soon as possible (may need multiple drainage)
- Try to splint and rest the joint until signs of inflammation improve especially if it is a weight-bearing joint like the hip or knee.

If signs of gonococcal arthritis:

- IV ceftriaxone until 2 days after joint improvement begins.
- Then switch to oral ciprofloxacin for 2 weeks.
- Add **azithromycin** 1g STAT dose OR **doxycycline** 100mg BID for 7 days (for empirical treatment of chlamydia)
- ***To prevent muscle wasting and joint stiffness, start physiotherapy (moving the limb) early.***

PREVENTION

Preventive antibiotics may be helpful for high-risk people (e.g., recent land mine injury).

NON-INFECTIOUS ARTHRITIS

There are many causes of non-infectious arthritis.
The most common are **osteoarthritis**, **rheumatoid arthritis**, and **gout.**
It can be very difficult to decide if the joint is infected or inflamed. It is very important to get a clear history. If in doubt, treat for both infection and inflammation.

OSTEOARTHRITIS

Osteoarthritis is chronic inflammation of the joints. This is caused by damage to the cartilage which is a cushion that protects the bony surfaces of joints. Once this cushion is damaged, the bony surfaces rub together and cause the patient pain when the joint is used. Osteoarthritis is caused by overuse of joints and so it commoner in older people. The most common joints affected are the hips, knees, spine, feet and hands.

SIGNS AND SYMPTOMS

- Chronic joint pain and stiffness
- Muscle wasting
- Joint swelling and deformity
- Joint pain gets worse the more they are used
- Crackling noise on joint movement throughout the day.

DIAGNOSIS

- Clinical diagnosis.
- **X-ray** of the affected joint could confirm the diagnosis, discuss with doctor if appropriate.

TREATMENT

Medication treatments:

- Paracetamol
- Anti-inflammatory medication e.g., ibuprofen, aspirin.
- Often pain relief is needed long-term: be careful of side-effects, especially in older people.

Non-medication treatments:

- Regular gentle exercise is important for reducing stiffness and strengthening muscles and joints (swimming and riding a bicycle can take the weight of joints whilst exercising muscles).
- Weight loss
- Applying local heat before, and cold packs after exercise, can help relieve pain and inflammation, as do relaxation techniques.

RHEUMATOID ARTHRITIS

In rheumatoid arthritis, the body's immune system attacks the lining of the joint and this causes chronic inflammation of the joints. This often leads to severe destruction and deformity of the affected joints. Frequently more than one joint is affected in a symmetrical fashion (which means that if one knee or wrist is affected, the other knee or wrist will also be affected). Hands, feet, wrists, elbows, knees and ankles are commonly involved, and symptoms usually start after 40 years of age. (However, rheumatoid can begin in childhood).

SIGNS AND SYMPTOMS

- Joint stiffness, worst in the morning, which gets better the more they are used throughout the day.
- Joint deformity (usually obvious in hands)
- Active and passive movements are painful and restricted.
- Swollen and warm joints

Other features:

- Anaemia, skin nodules, pericarditis, lung fibrosis, inflammation of the eye (which can lead quickly to blindness).
- **Still's disease;** joint inflammation together with skin changes and spleen enlargement.

DIAGNOSIS

- Clinical diagnosis.
- X-ray of the affected joint could confirm the diagnosis.
- CRP can be used to monitor disease response to treatment.
- Check Hct to rule out associated anaemia.

TREATMENT

The aims of treatment are to:

1. Relieve pain.
2. **Slow down/ stop joint destruction.**

Medication treatment:

1. **Analgesia** e.g., paracetamol, tramadol; Anti-inflammatory medication such as Ibuprofen or aspirin

- **Anti-inflammatory medication** should not be used for long periods of time if possible.
- Try to avoid using high doses of anti-inflammatory medication if the patient's pain is better with lower doses.

2. **Methotrexate** OR **chloroquine** OR **penicillamin**e (if available).

- These are called **Disease Modifying Anti-rheumatic drugs (DMARDs)** and they suppress joint destruction in rheumatoid arthritis. (Always discuss with a doctor before giving these drugs).
- Treatment with DMARDs is usually required for a long time (at least 6 months). Doses should be adjusted up or down depending on patient response to treatment.

3. **Prednisolone** – short course

- Should be given when initially starting DMARDS
- Should be given during flare ups of rheumatoid arthritis.
- Remember: Use the lowest dose possible. De-worm before starting, never stop steroids suddenly, explain to the patient the possible side effects of

long-term steroid use (e.g., peptic ulcer, osteoporosis, glaucoma, more infections).

If a steroid need to be given together with ibuprofen or indomethacin, add omeprazole in order to prevent gastric bleeding.

Non-medication treatment:

- Regular gentle exercise to reduce stiffness and strengthen muscles.
- Wrist splints may give symptomatic help and may improve the function of the joint.
- Applying heat and cold packs can help reduce pain and inflammation.

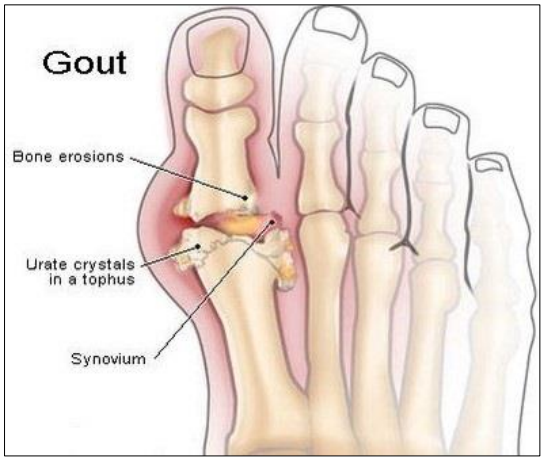
Table: Comparison table among Rheumatoid arthritis, Rheumatic arthritis, and Septic arthritis

Rheumatoid Arthritis	**Rheumatic Arthritis**	**Septic Arthritis**
CAUSE: Autoimmune response affecting the synovial membrane leads to joints destruction. **Age:** 25 - 50 years. **Sex:** More common in female. **Fever:** Low grade. **Signs:** Symmetrical, primarily affects small joints, especially hands (swan neck deformities of the fingers), non-migratory, Rheumatoid nodule (especially extensor surfaces of forearms), may involve large joints (e.g., elbow), muscle wasting, claw toes, cervical subluxation.	**CAUSE**: Abnormal immunological response to β – haemolytic streptococcal infection (e.g., 2-4 weeks after sore throat). **Age:** 5 - 15 years. **Sex:** > two-fold higher in female. **Fever:** high grade. **Signs:** Asymmetrical, migratory polyarthritis, larger joints, absent muscle wasting, subcutaneous nodule, carditis (50-70%).	**CAUSE:** Inflammation of synovial membranes with purulent effusion into the joint capsule due to infection. Also referred as infections arthritis considered as medical emergency. Failure to initiate appropriate antibiotic therapy within the first 24-48 hours of onset can cause subchondral bone **loss** and permanent joint dysfunction. It can cause septic shock, which can be fatal. **Risk factors:** Bacteremia, IVDU, overlying skin infection, Diabetes, HIV, Immuno-compromised, Old age, Recent surgery. **Common joints**: Knee, Hip, Shoulder, Wrist, Elbow. **Age:** common in older people. **Onset:** Rapid.
Symptoms: pain and morning stiffness of joint (at least 1 hour), fatigue, weight loss, Anaemia, malaise, neck pain, pain on walking.	**Symptoms:** polyarthralgia, no morning stiffness.	**Symptoms:** Fever, headache, weakness.
Onset: gradually, chronic. **Investigations:** Hypochromic microcytic Anaemia. Raised ESR and CRP, increased platelets. Rheumatoid factor, anti-CCP antibodies and ANA are positive, but Serology negative RA has negative RF, Anti-CCP and ANA. **X-rays:** loss of joint space, erosion, joint destruction. **Salicylates:** less response.	**Onset:** Acute, resolve with treatment there can be recurrence. **Investigation:** **ASO** titre positive >200 μ/ml. RA factor – negative. Throat swab – positive. Raised ESR and CRP. Prolong PR interval (use revise Jones criteria). **X-rays:** normal **Salicylates:** Response within 12-48 hours	**Investigation:** Raise WCC, Raised ESR and CRP, Blood culture positive, Synovial joint fluid analysis (Raised procalcitonin). **Signs:** Severe limitation of movement of the joint, held in extended position. **X-rays/MRI:** Increased joint space in the early. Later findings include joint space narrowing due to destruction of the joint.

GOUT

DEFINITION

Gout is a disorder that results from deposits of uric acid crystals in the joints. This is because of high levels of uric acid in the blood. The crystals cause attacks of painful inflammation in and around joints.

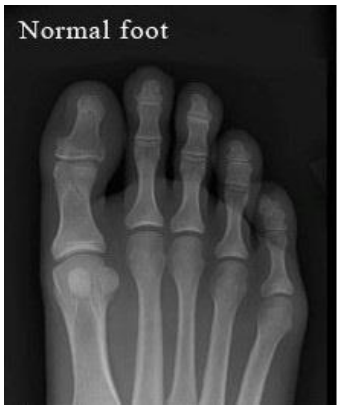


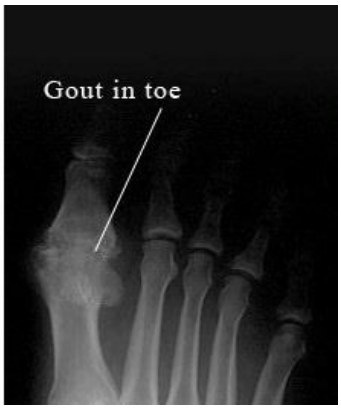
Gout is more common in:

- Men
- People over 30 years
- If female, more common after menopause
- People with family history of gout

RISK FACTORS

- Alcohol
- Eating a lot of liver/heart/kidney/intestines, mushrooms, sardines, shellfish, meat, bamboo shoots, dog fruit (Djenkol bean)
- G6PD deficiency
- Drugs including thiazide diuretics, aspirin, cyclosporin.
- Chronic kidney disease
- Hypothyroidism
- Obesity
- Lead poisoning (if exposure to paint).





SYMPTOMS

Gout is a chronic disease with acute flare ups which develop suddenly and then last for 3-10 days.
Symptoms during acute gout include:

- Very painful joints – unable to tolerate anything touching the joint
- Swelling around affected joint.
- Red shiny skin over joint
- Itchy peeling skin
- No fever

Gout most commonly affects the big toe, but other common areas include:

- Mid foot
- Ankles
- Elbows
- Knees
- Wrists
- Fingers

COMPLICATIONS

Tophi: Crystals of urate form in tissues both outside and inside the joint. The crystals that build up under the skin may form small white or yellow lumps. Tophi are usually painless.
Joint damage: if urate crystals continue to build up and form hard lumps (tophi) within the cartilage and bone of the joints, this could lead to permanent damage.
Kidney Stones: urate crystals may form in the kidneys. About 10-25 % people with gout develop kidney stones.

DIAGNOSIS

Diagnosis is made clinically during an acute gout episode. A history of multiple flare-ups key to the diagnosis.
If chronic gout, when no acute symptoms, consider checking uric acid level. If the level is high, this is an argument in favour of the diagnosis but beware that uric acid level can be normal.
The best diagnostic tool is normally aspiration of the joint looking for uric acid crystals.

LIFESTYLE ADVICE / HEALTH EDUCATION

All patients should be advised that their symptoms may improve with lifestyle changes.

- If overweight encourage patient to decrease to healthy weight.
- Avoid eating risk factor foods high in **purines and alcohol**.
- Encourage to drink low fat milk / yoghurt. Good to eat soybeans lentils and vegetables.
- Increase fluid intake to > 2 L water /day.
- Regular gentle exercise.
- **Vitamin C** – can take supplement 500 mg OD and advice to eat fruits.

Screen all patients for other chronic diseases including cardiovascular and diabetes.

MANAGEMENT OF ACUTE GOUT

- **Start NSAID** immediately and continue for 1-2 weeks.
  - **Colchicine 500mcg BID**
  - **Diclofenac** 50mg TID or ibuprofen 400mg TID

- **Prednisolone** is also an option but there is less evidence for its effectiveness.

- If history of **gastritis / peptic ulcer** considers giving with **omeprazole.**
- If already on **allopurinol** you can continue but do not start new patient on allopurinol during an acute attack, otherwise it risks making the symptoms worse.
- Consider adding other analgesics such as paracetamol and if pain is severe and not controlled with NSAIDs you can add tramadol.
- If on furosemide or thiazide diuretic for hypertension – stop and use another antihypertensive medication. If patient needs diuretics for heart failure, continue.

MANAGEMENT OF CHRONIC GOUT

The aim is to lower the serum uric acid level to < 0.3 mmol/l (< 6 mg/dl).

- Uric acid should be checked, and allopurinol should be considered for patients with
  - ≥ 2 acute attacks of gout
  - Chronic gout arthritis
  - Tophi
  - X ray changes in the joint
- **Allopurinol 100mg OD should be started at least 1 week after inflammation from an acute resolve.**
- **To prevent flare up of gout when starting allopurinol (or increasing its dose) advise the patient to buy colchicine 0.6mg bid for 3 months. (cheap and available in clinic sometimes).**
- Follow-up after 3 months and repeat uric acid level.
- If level still > 0.3 mmol/l (< 6 mg/dl) increase dose to 200 mg OD. Can increase to max. 10 mg/kg/day.
- Risk of acute attacks is higher during first year of allopurinol. **Do not stop allopurinol if new attack.**
- Allopurinol can be slowly reduced if there has been no acute attack for > 1 year and uric acid level is **< 0.3 mmol/l**. If there are tophi patients are likely to need to stay on allopurinol for life.
- Check the compliance to the treatment as it is often the cause of a new flare-up.

DISORDERS OF THE BONES

OSTEOMYELITIS

Osteomyelitis is an infection of the bone which occurs most commonly in children. Bacteria spread through the blood stream to the bone from an infection in another location, such as the lungs (pneumonia). Bacteria can also come from local areas of infection, such as cellulitis, ulcers, or penetrating wounds. The most common bacteria in osteomyelitis are Staphylococcus aureus. When an acute infection has not been treated well, osteomyelitis can become chronic leading to bone sclerosis and deformity. Common sites of infection are the tibia, femur, humerus, and the vertebral bodies. Osteomyelitis involving the vertebral bodies can also be caused by tuberculosis.

SIGNS AND SYMPTOMS

- Pain in the bone
- General discomfort, uneasiness, or ill feeling
- Local swelling, redness, and warmth (malaise)
- Fever
- Fracture without trauma
- Back pain
- Drainage of pus through the skin (in chronic osteomyelitis)

DIAGNOSIS

- **CBC** shows elevated **WBC.**
- **Blood cultures** when the fever is high may help identify the causative organism.
- Collect pus for culture from the area around infected bones by needle aspiration.
- X-ray does NOT give diagnosis in the acute stage but may help in the diagnosis in later stages.

TREATMENT

Osteomyelitis always requires prolonged antibiotic therapy, usually at least 4 weeks (minimum 2 weeks IV), and may require surgical debridement. Severe cases may lead to the loss of a limb. Never forget pain treatment.

Infant <4months:

- Admit IPD
- Give IV cloxacillin AND IV ceftriaxone for 4 weeks
- If no improvement, consider adding in gentamicin IV for 5 days
- After 4 weeks, if the patient's condition is much better, there is no more fever, and clinical signs are much improved, switch to oral cloxacillin.
- If any blood or aspiration cultures grow any organisms, then treat as per sensitivities.

Child > 4months/ Adult:

- Admit IPD
- Give IV cloxacillin for 4 weeks
- If no improvement, consider adding in gentamicin IV and/or ceftriaxone IV
- After 4 weeks, if the patient's condition is much better, there is no more fever, and clinical signs are much improved, switch to oral cloxacillin.
- If any blood or aspiration cultures grow any organisms, then treat as per sensitivities.
- **If associated with wounds, diabetes mellitus or ulcer:**
- **Clindamycin AND Ciprofloxacin**

(OR)

- **Cloxacillin AND Ciprofloxacin AND Metronidazole.**

Note: Longer courses may be needed – even a year may be required

For all age groups after initial weeks of treatment (5-6 weeks), review need to continue antibiotics based on clinical examination, CRP, and WBC.

Surgical Treatment:

- Always evaluate the need for surgical debridement in acute osteomyelitis, consider referral for orthopedic consultation for advice and treatment.
- Note: All cases of chronic osteomyelitis should be referred for surgical debridement if possible.

PREVENTION

- Appropriate diagnosis and treatment of primary bacterial infections will reduce the chance of spread of infection from other sites into bones.
- Direct inoculation osteomyelitis can be best prevented with appropriate wound management and consideration of prophylactic antibiotic use at the time of injury (particularly in immunocompromised patients e.g., diabetes, steroid use).

HEADACHE

Table: differential diagnosis of headache

	Causes	Features
Acute new headache	Meningitis	Fever, Photophobia, Stiff neck, Rash
	Encephalitis	Fever, Confusion, Decrease conscious level
	Subarachnoid Haemorrhage **(SAH)**	Thunderclap or very sudden onset headache ± stiffness
	Head Injury	Bruising/injury, Decrease conscious level, Period lucidity, Amnesia.
	Self-limiting viral illness	Very often associated with other symptoms, e.g., Coryza, Sore throat, Low grade fever.
	Sinusitis	Tender over sinuses ± history of **URTI.**
	Dental caries	Facial pain ± Tenderness
	Tropical Illness	History of Travel, fever
Acute recurrent headache	Migraine	Aura, Visual disturbance, Nausea/Vomiting, Triggers
	Cluster headache	Nightly pain in one eye for 2-3 months, then pain free for > 1 years
	Exertional or Coital headache	Suggested by history of association.
	Trigeminal Neuralgia	Intensive stabbing pain lasting seconds in Trigeminal nerve distribution
	Glaucoma	Red eye, haloes, decrease visual acuity, pupil abnormality.
Subacute headache	Giant cell arteritis **GCA** (Temporal arteritis)	> 50 years, Scalp Tenderness, **high ESR**, rarely decrease visual acuity.
Chronic headache	Tension Type headache	Band around the head, stress, low mood.
	Cervicogenic headache	Unilateral or Bilateral Band from neck to forehead, Scalp Tenderness.
	Medication overuse	Rebound headache on stopping analgesic.
	High intracranial pressure **(ICP)** (Tumors, Brain abscess, Cerebral oedema, Hydrocephalus, Haematoma, Granuloma, Cyst, Aneurysm)	Worse on waking, sneezing, Low pulse, High Blood Pressure, Neurological signs.
	Paget's disease (Abnormal osteoclast activity).	**>** 40 years, bowed tibia, High alkaline phosphate. **Male and Female 3:1**, most common in elderly.

Headache is a symptom and not a disease. Look for the cause. Only after a specific cause has been found should treatment be given.

CAUSES

- Tension (stress)
- Infections:
  - **Localized**
    - e.g., meningitis/encephalitis, sinusitis
  - **Systemic:**
    - Bacterial e.g., TB, leptospirosis, typhoid
    - Viral e.g., dengue fever
    - Parasitic e.g., malaria
- Depression
- Migraine
- Trauma related
- Temporal arteritis
- Cervical arthritis
- Glaucoma
- Drugs: alcohol, nifedipine, caffeine withdrawal.
- Brain tumors
- Stroke
- Subarachnoid haemorrhage

DIAGNOSIS

The most important part of the evaluation of headache is the HISTORY. You should ask:

- How bad is the pain?
- Where is the pain? (ask the person to draw the shape of the headache on his/her own head).
- Is it a new onset or a chronic headache?
- When does it start and how long does it last?
- Any thing that makes the headache worse e.g., coughing, poor sleep?
- Are there any associated systemic signs and symptoms?

DANGER SIGNS

- Acute severe headache.
- New onset never had headache before.
- Progressive (increasing in intensity and severity).
- Caused by, or worsens with coughing, sneezing, exercise.
- Associated neurological signs and symptoms (e.g., mental disturbance, loss of memory, convulsions, abnormal reflexes, loss of sensation, and loss of muscle power).

Treat the underlying disease (e.g., infections) and relieve headache with paracetamol. For specific causes of headache see below.

EMERGENCY CAUSES

MENINGITIS/ENCEPHALITIS

Acute inflammation of the membranes covering the brain (meninges) or the brain itself (encephalitis), often caused by infection. Refer to meningitis in Infectious Diseases Chapter.

SUBARACHNOID HAEMORRHAGE

Bleeding on the surface of the brain into the subarachnoid space.

CAUSES

1. Trauma
2. Aneurysm (weakness of the wall of blood vessels)

SIGNS AND SYMPTOMS

- Sudden onset of an extremely severe headache. Often starts at the back of the head and described as being hit/ kicked on the back of the head.
- May have nausea, vomiting, decreased consciousness, and occasionally neurological signs.

TREATMENT

Immediate referral to hospital. This patient needs a CT scan of the head +/- lumbar puncture and may need brain surgery.

STROKE

Death of brain cells because of a problem in the blood supply to a region of the brain. A stroke has specific signs and symptoms but may be accompanied by a headache.

ACUTE (CLOSED ANGLE) GLAUCOMA

When the pressure of the eye suddenly increases which can lead to blindness.

SIGNS AND SYMPTOMS

- Rapid onset severe pain of the eye and surrounding the eye
- Patient looks unwell
- Red eye
- Blurred vision
- Hazy cornea
- Nausea
- Non-reactive mid-dilated pupil usually only one eye
- Vomiting

TREATMENT

Immediate treatment with **acetazolamide and pilocarpine** then IMMEDIATE referral to hospital.

NON-EMERGENCY CAUSES:

TENSION HEADACHE

Most common form of headache which occurs because of chronic tension of head and shoulder muscles. It is a benign headache, often caused by stress, poor sleep, or straining eyes.

SIGNS AND SYMPTOMS

- The headache is usually bilateral (both sides of the head are involved), may be worst around the neck or back of the head and not associated with any neurological signs or symptoms.
- Generally daily and described as ‘tight’ or ‘band like’.
- The pain does not worsen with coughing, sneezing or exercise.

TREATMENT

- Explain to the patient that the headache is caused by chronic tension of head and shoulder muscles due to stress or to worry.
- Try to reduce tension by getting enough sleep, reducing stress at work or in the home environment and make time for exercise e.g., swimming, massages and/or hot baths.
- Use simple analgesics such as paracetamol. Note: overuse of painkillers e.g., paracetamol can also make the headaches worse.

MIGRAINE

Chronic episodes of headache that are moderate to severe, which may have a trigger, and may be associated with neurological findings.

SIGNS AND SYMPTOMS

- The typical migraine attack is a one-sided (sometimes both sides) beating or dull headache that can be worsened by activity.
- Commonly associated with nausea, vomiting, photophobia (not liking light), blurred vision and the sensation of a blocked nose on the side of the pain.

- Pain builds up gradually over hours and may last for several days.
- Visual disturbances (light flashes, zigzags, and/or vision field defects) occur quite commonly and can occur before onset of the headache
- There may be other neurological findings such as aphasia (cannot speak), numbness, tingling or weakness.
- Some people experience symptoms (e.g., change in mood, tiredness, yawning, stiff muscles, strange smell) a few hours or days before the migraine attack take place.
- Symptoms that occur before the headache that can help the patient know that a migraine headache will start are known as an 'aura'.
- There is usually a family history and attacks may have triggers e.g., stress, certain foods, alcohol, menstruation, and contraceptives.

TREATMENT

- Staying in a quiet dark room is often helpful.
- **Acute attack:** (doses for adults)
  1. **Aspirin** 300-900mg QID (max 4g/day) ****Note: do not give aspirin to children**** OR
  2. **Ibuprofen** 400mg TID (max 2.4g/day) OR
  3. **Diclofenac** (50mg at beginning of headache, repeat after 2 hours if needed then after 4-6 hours (max 200mg/d)
- If the attacks are frequent, refer to doctor for prophylaxis medication: (doses for adults)
  1. **Propranolol:** start at 40mg OD, increase by 40mg every week until good response (maintenance 80-240mg in divided doses). Monitor HR and BP. Advise do not stop suddenly as this can be dangerous.
     (OR)
  2. **Amitriptyline:** start at 10mg OD at night; increase to maintenance dose 50-75mg OD at night, max 150mg OD at night.

DEPRESSION

Headache is very common in depressed people, if there is no obvious cause for the headache then assess the patient's mental health to rule out depression.

TRAUMA RELATED

Headache that occurs after trauma.

SIGNS AND SYMPTOMS

- Non-specific symptoms including headache may often occur after a head injury, regardless of the severity of the injury.
- Headache usually starts within a day or so after the injury and worsens over the next few weeks and then gradually gets better.
- Usually, a dull constant ache with pulsating pain that may be localized.

DANGER SIGNS OF BLEEDING IN THE BRAIN

Nausea, vomiting, visual disturbances, impaired memory, difficulty concentrating and unstable emotions.

TREATMENT

If suspect bleeding in the brain, discuss with the doctor whether need to refer to hospital for more investigation (may need a brain CT/MRI scan).
Exercise of neck muscles, simple analgesics and occasionally amitriptyline.

TUMOURS

Mass in the brain that can be benign or cancer.

SIGNS AND SYMPTOMS

- Headaches
  - Vary from mild to severe
  - Described as different from any previous headache
  - May be of new onset and worsen over time.
  - If the headache is worsened by exertion and position, and associated with nausea and vomiting, this maybe a sign of increased intracranial pressure due to a mass.
- Neurological signs.
- Other symptoms depending on where in the brain the mass is e.g., personality change, decreased intelligence, emotional change, seizures.

DIAGNOSIS

- Brain CT/MRI.

TREATMENT

Treatment for tumors is mostly not available on the Thai-Myanmar border. Discuss with a doctor about providing symptomatic treatment of the headache.

TEMPORAL ARTERITIS

Inflammation of the blood vessels of the head that can lead to blindness. Very rarely occurs in people less than 50 years.

SIGNS AND SYMPTOMS

- Elderly patients (50 or older) with a one-sided headache (although both sides can also occur)
- May be associated with malaise, fever, muscle pain, anorexia, and weight loss.
- Palpation of the head reveals sensitive and thick (temporal) arteries with or without pulsation.

DIAGNOSIS

- Clinical history and examination.
- In 95% of cases the CRP is raised (above 90).

TREATMENT

Prednisolone:

- Always deworm before starting steroids.
- Start at 1mg/kg OD (max 60mg)
- After 1-2 weeks decrease the steroid by 10mg every 1-2 weeks depending on the response to treatment.
- Once below 30mg the dose can be dropped by 2.5mg every 2 weeks.
- From 10mg OD reduce slowly over months until the lowest effective dose is reached.
- Increase the dose again if the symptoms get worse.
- After 2 years of steroids, you can try to stop them but for 25% of patients a longer time is needed (some cases for life).

OTHER (DENTAL, OCULAR, SINUSITIS, CERVICAL ARTHRITIS OR COUGH HEADACHE)

Dental problems, sinusitis or eye problems can cause headaches. Muscle or bone problems in the neck e.g., arthritis of the neck often result in headache. Also, sudden increase of abdominal muscle tension (e.g., defecation) can cause headache. This pain lasts only a few seconds/minutes and disappears. The cause for cough headache is not known; it may persist for several years.

TREATMENT

- Find and treat the cause. Give painkillers according to cause.

PARKINSONISM AND PARKINSON'S DISEASE

Parkinsonism Syndrome of:

- **Tremor:** Coarse tremor, most marked at rest, pill-rolling.
- **Rigidity:** Limbs resist passive extension – lead pipe rigidity and juddering on passive extension of the forearm – cogwheel rigidity.
- Difficulty in initiating movement.
- Slowness of movement: mask like or expressionless face, decrease blink rate.
- **Abnormal gait**: small step-shuffling gait.
- **Micrographia:** small handwriting.

PARKINSON'S DISEASE

Incurable, progressive, degenerated disease affecting the dopaminergic neurons of the substantia niagra in the brain stem, resulting in deficiency of Dopamine and relative excess of acetylcholine transmitters.

Cause:

Unknown, peak age at onset: 65 yrs, **male = female,** Neuropsychiatric-apathy, anxiety/depression, visual hallucinations, psychosis, dementia, sleep-excess day time sleepiness. Autonomic-drooling, urinary dysfunction, dysphagic, sexual dysfunction, postural hypotension.

Drug treatment:

1. Dopamine receptor agonist- e.g., **Bromocriptine 2.5 mg tds** until optimum dose
2. Precursor of Dopamine: **Levodopa 250 mg BID or QID.**
3. Anticholinergic: **Trihexyphenidyl (Artane) 6-10 mg** daily in divided doses.

MULTIPLE SCLEROSIS

Multiple sclerosis (MS) is a potentially disabling disease of the **brain and spinal cord (CNS).** In **MS**, the immune system attacks the protective sheath (myelin) that covers nerve fiber and causes communication problems between your brain and the rest of your body. It is a lifelong condition that can cause **serious disability**, although it can occasionally be mild.

CLINICAL FEATURES

1. **Central:** Fatigue, cognitive impairment, Depression, Anxiety, Unstable mood.
2. **Visual:** Diplopia, Optic neuritis, blurred vision, Nystagmus, pain on eye movement, pupil defects.
3. **Speech:** Dysarthria, monotonous speech, slurred speech.
4. **Throat:** Dysphagia
5. **Musculoskeletal:** weakness, spasm, Trunk and limbs ataxia, Intension tremor.
6. **Sensation:** pain, pins, and needles, Trigeminal (neuralgia), tingling, chilling, burning.
7. **Bowel:** Incontinence, Diarrhoea, or constipation.
8. **Genito-urinary:** Urinary incontinence, Frequency or retention, Erectile dysfunction, Anorgasmia.

DISEASE COURSE

Most people with MS have a relapsing-remitting disease course.

- **Primary-progressive MS:** some people with MS experience a gradual onset and steady progressive of signs and symptoms without any relapse or new symptoms. **PPMS** causes gradually worsening symptoms.
- **Secondary- progressive MS:** At least 50% of those with relapsing-remitting **MS** develop a steady

progression of symptoms, with occasional relapses and minor remission, within 10-20 years from disease onset.

CAUSES

- **Unknown**. It is considered an **autoimmune disease**. A combination of **genetics and environmental factors** appear to be responsible.

RISK FACTORS

- **Age:** 20-40 years, female and male 3:1.
- **Family history:** If one of your parents or siblings has had **MS**, you are at higher risk.
- **Certain infection:** A variety of viruses have been linked to MS. (e.g., **EB virus** that cause infectious mononucleosis).
- **Vitamin D:** Low level and low exposure to sunlight.
- **Race:** White people (Northern, European), Asian have low risk.
- **Certain autoimmune disease:** Thyroid disease, pernicious anaemia, psoriasis, type 1 diabetes, IBD (Irritable Bowel Disease).
- **Smoking:** Smokers.
- **Climate:** Temperate (Canada, Northern USA, Europe, Southeastern Australia).

COMPLICATIONS

1. Muscle stiffness or spasm.
2. Paralysis, typically in the legs.
3. Problem with bladder, Bowel, and sexual function.
4. Forgetfulness or mood swings.
5. Depression
6. Epilepsy.

DIAGNOSIS

1. **MRI** for plaque detection.
2. **CSF** shows oligoclonal bonds of **IgG** on **electrophoresis.**
3. Clinical.

MANAGEMENT

1. Regular exercise, stopping smoking, avoiding stress, yoga, acupuncture.
2. **Vitamin D**
3. Disease **modifying drugs:**
   - **Interferon beta-1a**
   - **Interferon beta-1b**
   - **Natalizumab, Dimethyl fumarate, Alemtuzumab**
4. Treating relapses:

Methyl prednisolone 0.5-1 mg/24 hr.
IV/PO for 3-5 days.

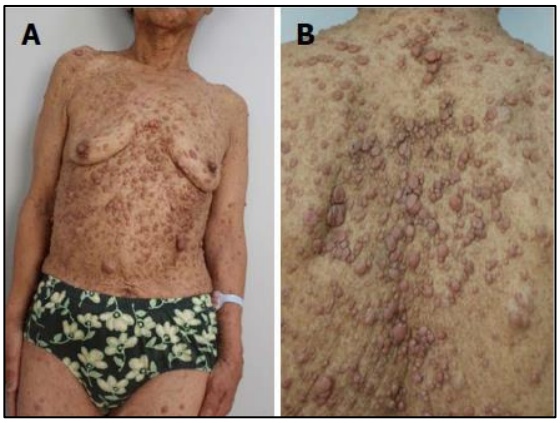
Prognosis – 5 to 10 years shorter life expectancy.

NEUROFIBROMATOSIS TYPE I (NF 1, VON RECKLINGHAUSEN'S DISEASE)

Autosomal dominant trait

Criteria for diagnosis: ≥ 2 of:

1. ≥ 6 cafe – au – lait spots of > 5 mm in size (before puberty) or > 15 mm (after puberty).
2. ≥ 2 neurofibromas.
3. Freckling in axilla, groin, neck base and sub mammary area (women).
4. Abnormal clumps of pigment (Lisch nodules) of iris (only visible with a slit lamp).
5. Bony abnormality in the head (sphenoid wing dysplasia) or abnormal bowing of bones.
6. An affected parent, sibling, or child with confirmed **NF1**.



Complications: Affect 1 in 3 patients:

1. Mild learning disability.
2. Short stature.
3. Macrocephaly.
4. Nerve root compression.
5. GI bleeding or obstruction.
6. Scoliosis.
7. Pseudoarthrosis.
8. High BP due to renal artery stenosis or Phaeochromocytoma.
9. Malignancy (5%) optic glioma (or) sarcomatous change of neurofibroma.
10. Epilepsy.

TREATMENT

Selumetinib (koselugo) [FDA **approved on, April 2020**] **25mg/m^2** orally twice daily on an empty stomach.

GUILLAIN – BARRE SYNDROME

- It is a rare disorder in which your body's immune system attack in your nerves.
- Weakness and tingling in your extremities are usually the first symptoms. These sensations can quickly spread, eventually paralyzing your whole body.
- Most cases usually start a few days or weeks following surgery, flu vaccination, or infection

(URTI, Flu, **VZ (Varicella Zoster),** HSV, CMV, EBV, Campylobacter, Mycoplasma).
- 80% make complete or near complete recovery 10% are unable to walk alone at 1 yr. 10% mortality.

INVESTIGATIONS
1. **Elevated CSF** protein and normal cell count.
2. Nerve conduction study.
3. Exclude poliomyelitis by checking fresh stool test for Enterovirus.

MANAGEMENT
1. If suspect admit immediately to hospital as an emergency ventilation on **ICU (Intensive Care Unit)** is required.
2. IV immunoglobulin.

BELL'S PALSY
DEFINITION
Acute peripheral facial nerve palsy (weakness of face muscles) of unknown cause. The risk is higher during pregnancy especially the third trimester and in the first postpartum week.

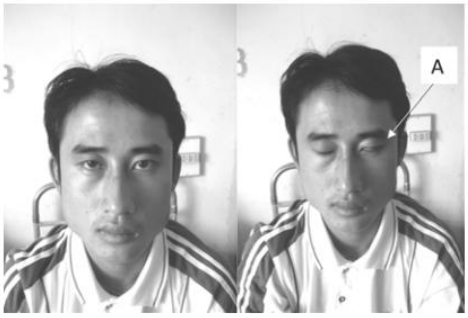
CAUSES
- Herpes zoster.
- Otitis media.
- Guillain-Barré syndrome.
- HIV infection.
- Autoimmune disease (sarcoidosis, Sjogren syndrome).
- Tumor.
- Stroke.

DIAGNOSIS
The diagnosis is made clinically.
- Sudden onset may get worse until 3 weeks.
- Unilateral facial paralysis.
- Cannot close the eye on the affected side.
- HIV infection.
- Drooping mouth on the affected side.
- Decreased tears on affected side.
- Possible loss of taste of the anterior 2/3 of tongue.

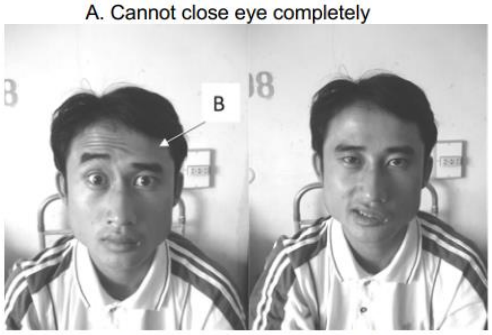
SIGNS AND SYMPTOMS
On examination you need to confirm this is a peripheral (not central – in the brain) facial nerve palsy. If the patient cannot wrinkle the forehead, then it is a peripheral problem.

TREATMENT
- If you think the examination shows a central lesion (CAN wrinkle the forehead), the patient should be referred for head imaging to rule out a more serious problem.
- For a peripheral facial palsy (most common cause is Bell's palsy), counsel the patient that they may improve after 6 months – 1 year but need to have follow up. Older patients may not have much improvement.
- If ≤3 days since onset of symptoms, start **prednisolone** 60 mg daily for 1 week only.
- If severe pain in the ear precedes facial nerve palsy (Ramsay Hunt Syndrome, herpes zoster otitis), add **Acyclovir 800 mg** 5times per day for 1 week.
- Use artificial tears (**eye drops or ointment**) to protect the cornea because the eye cannot close normally.
- Treat the underlying problem if found on examination (e.g., otitis media).
- Consider referral or other investigation (**head CT**) if the patient becomes worse.

Figure: Signs of Bell's palsy



A. Cannot close eye completely



B. Cannot wrinkle the forehead

EPILEPSY
DEFINITION
An epileptic seizure is a sudden onset event where there is a disturbance of consciousness, posture, movement, or behavior due to increased electrical activity in the brain. **It is diagnosed ONLY after a person has had more than two epileptic seizures**. There are many different types of seizure.

Status Epilepticus = several separate seizures where the patient does not become completely conscious in between or an uninterrupted seizure lasting more than 10 minutes.

The most common types of epileptic seizures are:
GENERALISED (TONIC CLONIC) CONVULSIONS

- In this type of seizure there is a sudden loss of consciousness with or without cyanosis and strong jerking movements of the arms and legs (sometimes the patient also passes urine or bites their tongue). When the movements stop, the patient may be very sleepy.
- In small babies, obvious arm or leg movements might be absent but their eyes may blink, and they may smack their lips together or clench their hands.
- **Note: If the patient is still conscious during the episode, it is not a generalized convulsion, but it could be a different type of convulsion.**

CHILDHOOD ABSENCE ATTACKS

- In this type of seizure, the child suddenly stops talking or playing for a few seconds and then starts again to do what he was doing. The child does not remember the attack.

If a patient presents with a history of strange sensations or movements of their limbs, or suddenly going floppy or stiff, epilepsy should be considered. Discuss with a doctor.

DIAGNOSIS

The most important step in diagnosing epilepsy is to take a good history of the episode from someone who has seen the seizure. Not all seizures are due to epilepsy: you must consider other diagnoses:

Seizures with fever:
e.g., malaria, meningitis, hyperthermia, encephalitis

Seizures with or without fever:
e.g., hypoglycaemia, severe dehydration, head trauma, amphetamines, alcohol, renal failure (uraemia).

Seizures in pregnant women:
e.g., eclampsia.

Repeated seizures without fever:
e.g., brain tumor, cysticercosis.

- Every patient presenting with a seizure should have a full neurological examination performed.
- If possible, do an ECG as some cardiac arrhythmias can present as an absence seizure (or sudden collapse).

TREATMENT

1. Consider starting patients on medication if the patient is having **more than two convulsions in one year.**
2. Explain to the patient that this therapy is long-term and stopping suddenly could cause severe convulsions.
3. Talk to the patient about epilepsy and explain to him/her that it is a disease that can be controlled.
4. If the patient agrees to treatment, treat with **one medication only.**
5. If the seizures are not controlled on one medication at the maximum dose, discuss the case with a doctor. It may be dangerous to stop one medication and switch to another one very quickly.
6. Start with a small dose and then increase the dose until convulsions are controlled or the patient has side-effects.
7. Encourage the patient to come back every month. If possible, ask them to write a diary of when they are having seizures and what they were doing at the time.

Many epilepsy medications react with other medications so always check carefully when prescribing. **Check baseline CBC and LFT's before starting epilepsy medication**

STOPPING EPILEPSY MEDICATION

The majority of patients will have no more convulsions after a few years on medication.

Consider stopping medication if the patient has had no convulsions for more than 2 years AND has a normal neurological examination.

Discuss the possibility with the patient and take the decision together. Some patients will be too afraid of having convulsions if medications are stopped, other patients will wish to stop as soon as possible.

- More than 60% will have no more convulsions if medication is stopped.
- Less than 40% will start having convulsions again after medication is stopped.

If you and the patient decide to stop the medication, you must gradually decrease the medication every 4 weeks. Schedule for adult patients:

- Decrease carbamazepine by 100mg every 4 weeks.
- Decrease phenobarbitone by 30mg every 4 weeks.
- Decrease sodium valproate by 200mg every 4 weeks.

If switching anti-epileptic medication do not stop any of the medications suddenly.

Table: for Treatment of different kinds of seizure

Seizure type	Medication to treat	Medication to avoid
Infant (<1year) Generalized tonic clonic seizures	1st line: Phenytoin	Sodium valproate
	2nd line: Phenobarbitone	
Child Generalized tonic clonic seizures	1st line: Sodium valproate	
	2nd line: Carbamazepine	
Child Absence seizures	Sodium valproate	Carbamazepine, Phenytoin, Phenobarbitone
Adult Generalized tonic clonic seizures	1st line: Carbamazepine	
	2nd line: Sodium valproate	

PREVENTION

- Take long-term epilepsy treatment to prevent new seizures.
- Teach families about the coma position and how to prevent aspiration after a seizure. If seizure not stopping by itself after a few minutes must go to the clinic.

TREATMENT OF ACUTE CONVULSIONS

EMERGENCY TREATMENT

Note: For all unwell patients, a full DRS AB-CABDE/S assessment and treatment should be done. You should ALWAYS assess for everything and TREAT any abnormality BEFORE moving to the next step.

Diazepam IV

1 vial = 10mg / 2ml

Give IV injections SLOWLY (max 0.5 ml in 30 seconds)

Diazepam Rectally (PR) or IM

Diazepam PR or IM is NOT diluted

How to give PR:

Draw up the dose from an ampoule of diazepam into a 1ml syringe.

Remove the needle.

Insert the syringe into the rectum 4 to 5 cm and inject the diazepam solution.

Hold buttocks together for a few minutes.

If the patient is still fitting:

- After 10 minutes give a **second dose of diazepam**.
- CALL DOCTOR AND BEGIN **REFERRAL** PROCESS.
- After another 10 minutes give a **third dose of diazepam**.
- If still fitting after 3 doses of diazepam, we should give IV phenobarbitone but not available so need to refer the patient is at risk of hypoxia to the brain, so referral is urgent.

Remember:
After several doses of diazepam, the patient will be asleep and cannot be woken for a while. Monitor vital signs carefully during this time.

See Table: DRS ABCDE for convulsion

STATUS EPILEPTICUS

MANAGEMENT

See Figure: Management of Status Epilepticus

STROKE

A stroke, also called a **cerebro-vascular accident (CVA),** is the sudden death of cells in a specific area of the brain due to a problem in the blood supply to a region of the brain. The brain tissue beyond that artery is damaged or dies. (Brain cells need blood to supply oxygen and nutrients and to remove waste products.) The effects of a stroke depend on how much damage occurs, and which part of the brain is affected.

STROKE IS A LIFE-THREATENING EMERGENCY

Using FAST technique can be very helpful.

F - Facial weakness: Has their face fallen on one side? Can they smile?

A - Arm weakness: Can the person raise both arms and keep them there? Is there weakness on one side?

S - Speech and communication difficulties: Is their speech slurred?

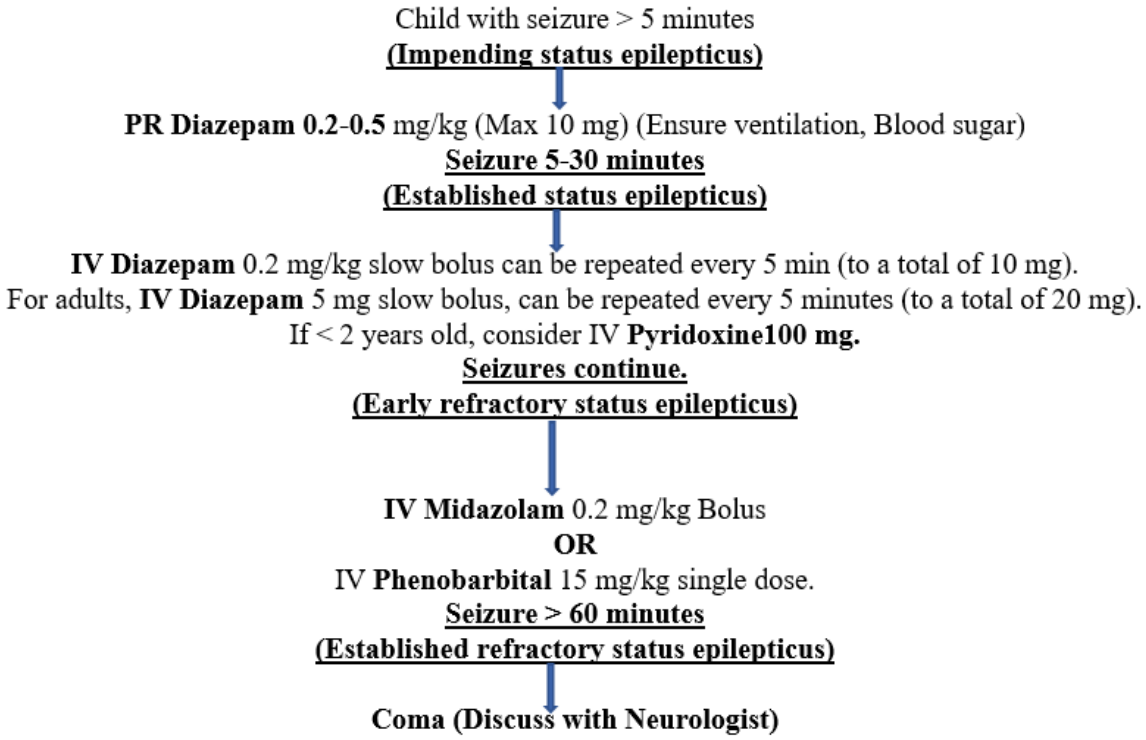
T - Time: Time is important, needs URGENT to transfer to the hospital if you see any single one of these signs.

Note: hypoglycaemia can also cause these symptoms. Treat hypoglycaemia if the dextrose is low. If the patient does not recover when the dextrose is normal, then think of stroke.

Table: DRS ABCDE for convulsion

	ASSESS FOR	TREATMENTS LIKELY TO BE NEEDED FOR **CONVULSIONS**
DR S	Danger Response Send for help	Gloves Safe place Call for help
A	Airway obstruction Speaking, stridor, Swelling, secretions	Simple airway manoeuvres +/- airway if needed. **Suction any secretions/vomit** if needed (and available)
B	RR, SpO2, cyanosis Chest indrawing/ tracheal tug. Listen to chest	**Oxygen** (high flow)
C	HR, BP, Cap refill Urine output, Temp Listen to HS	**Put in IV cannula** **Take bloods e.g., Hct, CBC, MS, BC etc. (may need to wait till fitting stops)**
D	Check dextrose, Any drugs needed, e.g., antibiotics, paracetamol.	If fitting continues for <u>more than 3 minutes</u> give: **Diazepam Slow IV or IM or PR** **Adults: 10mg** (1 vial) (if IV max 0.5ml in 30 seconds) **Child: 0.4mg/kg** (max 10mg) can repeat after 10 minutes if needed. **When the patient is moving, it can be easier to give first dose IM or PR but IV is quicker and better. ** **If dextrose low give IV** **Adult: dextrose 50% (20-50) ml** **Child: dextrose 25% (20-50) ml** **Neonates**: **2ml/kg dextrose 10 % bolus** Give any other drugs according to cause
E	GCS/BCS/AVPU Expose and examine all over body	History, further investigations, treatment plan. Assess for cause of convulsion and treat. **Coma position** to prevent aspiration after fitting if no respiratory distress
DISCUSS WITH DOCTOR		
ASSESS RESPONSE – continue cycle with CABDE/S assessment		

Figure: Management of Status Epilepticus



CAUSES

1. **Ischaemic stroke:** caused when a blood vessel supplying the brain becomes blocked. This can happen due to hardening of the arteries (arteriosclerosis), fatty plaques that build up in the arteries (atherosclerosis) or a clot that travels from another part of the body (embolism). Responsible for 80% of all strokes.
2. **Haemorrhagic stroke:** caused when an artery in the brain ruptures. Responsible for 20% of all strokes. Hypertension is the most common cause of brain haemorrhage. Other causes: aneurysms (weakness of the wall of blood vessels) and arteriovenous malformation (an abnormal connection between arteries and veins)
3. **Transient ischaemic attack (TIA):** also known as temporary or mini stroke causes symptoms similar to those of a complete stroke, however the symptoms disappear completely within 24 hours as the disruption of blood supply is only temporary (in a stroke, the symptoms are usually more permanent). It is a serious warning sign of worsening cerebrovascular disease. A complete stroke may follow a TIA in a matter of hours or weeks to months.

A stroke may also be caused by different infections: malaria, tuberculosis, cysticercosis and syphilis.

RISK FACTORS

Age: The risk of stroke increases with age, especially after age 55.
Sex: Men are at greater risk than women.
Family: People with a family history of stroke have an increased risk of stroke themselves.
Diseases: People with diabetes, heart disease especially atrial fibrillation (irregular heartbeat), high BP, HIV or prior stroke are at greater risk of stroke.
Lifestyle: Stroke risk increases with obesity, cigarette smoking, alcohol consumption and use of IV drugs.

DIFFERENTIAL DIAGNOSIS

- Hypoglycaemia.
- Brain abscess.
- Cerebral malaria.
- Brain tumor.
- Complex migraine.
- Head trauma.
- Meningitis/encephalitis.

SIGNS AND SYMPTOMS

Depending on the region of the brain affected. Strokes on the left side of the brain primarily affect the right half of the body, and vice versa. In addition, in left brain-dominant people, left-brain strokes usually lead to speech and language deficits. A stroke can cause:

- Limb weakness – usually one sided
- Acute severe headache – described as 'worst headache of my life'
- Facial weakness – drop of one side of the face
- Speech impairment
- Memory loss and reduced reasoning
- Loss of vision
- Initial low tone followed by high tone and
- Reduction in sensation increased reflexes and up going planters on side affected
- **Haemorrhagic stroke**: more likely to get loss of consciousness, seizure, vomiting, very high BP
  - Coma
  - Death

DIAGNOSIS

Clinical diagnosis

- If acute symptoms, then refer to hospital immediately
- If chronic symptoms: careful medical history, especially about when the symptoms started and what parts of the body are affected, and the presence of risk factors. Ask about any previous similar symptoms to see if the patient has had TIAs before.
- Perform a neurological examination.
- Ideally a CT scan or MRI scan should be done to confirm stroke and rule out other causes e.g. tumor.
- ECG is important to look for abnormal heart rhythms or heart abnormalities which can make people more at risk of stroke.
- Check dextrose to rule out diabetes
- If available: ultrasound scan of the carotid arteries to see if there is any blockage.

TREATMENT

Treatment of Acute stroke:

Table for General Management of Patients with Acute Stroke

Blood glucose	Treat hypoglycemia with **D50** Treat hyperglycemia with insulin if serum glucose >200 mg/dL
Blood pressure	
Cardiac monitor	Continuous monitoring for ischemic changes or atrial fibrillation
IV fluids	Avoid D5W and excessive fluid administration. IV isotonic sodium chloride solution at 50 mL/h unless otherwise indicated
Oral intake	NPO initially; aspiration risk is great, avoid oral intake until swallowing assessed
Oxygen	Supplement if indicated (**SaO_2**< 94%)

Temperature	Avoid hyperthermia; use oral or rectal acetaminophen and cooling blankets as needed

Long-term treatment

- Fever: sometimes a stroke can cause a mild fever but need to rule out other causes as a stroke makes people more at risk of infection.
- Fluids: in an acute stroke do not give D5W as this can worsen the blood flow to the brain.
- Medication to lower the BP should be used very cautiously as it can cause more damage – discuss with a doctor.
- Check dextrose BID and correct if low
- Start feeding as soon as possible. Strokes can affect the nerves that make the muscles of swallowing work. This means that there is a risk of food and liquid ending up in the lungs which can cause an aspiration pneumonia. When patients feed, they should be sitting up right, try to have thickened fluid, and they may need a soft diet. If the patient starts to cough when eating, stop and re-start again when stop coughing. Explain this to the family.
- Encourage the patient to move their limbs especially the weak side to try to re-gain the strength. Encourage the family to help massage and move the limbs.
- Long term aspirin might be beneficial in some patients – discuss with a doctor.
- If available patients may benefit from a rehabilitation programmes for strokes which include physical, speech, language, and mental therapy.

PREVENTION

- Treat diseases that put patients at risk e.g., medications for high BP, diabetes
- Give prophylactic aspirin treatment for conditions e.g., angina).
- Advise your patients about lifestyle advice - to stop smoking, do regular exercise, eat healthy diet, and avoid excessive alcohol consumption.
- Education of the community about early recognition of stroke symptoms is important: early treatment depends on the victim, family members or other bystander.

INFECTIOUS DISEASES: BACTERIAL DISEASES

DEFINITION

Table: Definition of infectious disease

VIRUS	• very small and simple infection particle. • replicate (copy themselves) inside the cells of other organisms e.g., humans. • examples: HIV, hepatitis B virus, measles. • antibiotics DO NOT work against viruses
BACTERIA	• A complex infection particle that come in a range of sizes and shapes e.g., rods • (E.g., diphtheria), spheres also known as cocci (e.g., streptococcus pneumoniae) and spirals (e.g., leptospirosis). • Antibiotics work against bacteria but changes in the bacteria are causing resistance to drugs.
FUNGUS	• Includes yeasts (e.g., candida), mold (e.g., that grows on food that has not been eaten for too long) and mushrooms. • Some antifungal drugs exist e.g., fluconazole, nystatin.
PROTOZOA	• Organisms made up of one cell. • Examples: malaria, amoeba, giardia, trichomoniasis.
PATHOGENIC ORGANISM	• Pathogenic organisms are organisms that cause disease. •
NON-PATHOGENIC ORGANISM	• Some micro-organisms live in the body and are a normal part of how the body. E.g., your gut has lots of bacteria that live there normally, and these are called non-pathogenic. These organisms do not cause disease.
IMMUNE SYSTEM	• The process in the body that occurs to fight infection. It does this by increasing the number of white blood cells (WBC). • WBC have lots of functions including producing antibodies (see below) and toxins to fight the infection. • In some conditions e.g., HIV, diabetes, malnutrition, cancer, the immune system does not work very well (this is known as being immune-compromised). These people are more at risk of getting infections.
ANTIGEN	• Anything that causes the body to make an immune response (i.e., produce antibodies against).
ANTIBODY	• The body makes these as part of the immune response to fight against a virus or known as bacteria.
IMMUNOGLOBULIN	• **IgM (immunoglobulin M)** antibodies are produced quickly after an infection. • **IgG** (immunoglobulin G) antibodies are made later and may be found in the blood for longer time.
IMMUNITY	• the body has previously been infected or immunized so that if the body becomes infected again, the body can fight the infection without causing any symptoms/disease.
INFECTIOUS	• it is possible for the infection in a person to be transmitted to someone else. E.g., HIV.
VACCINATION (IMMUNIZATION)	• When you inject a small amount of antigen into the body that is small enough so that the body produces an immune response (i.e., produces antibodies) but not big enough to cause an infection. The antibodies mean that in the future the body can fight against the same infection without causing any symptoms and the person will not become ill.

BACTERIAL DIASEASES

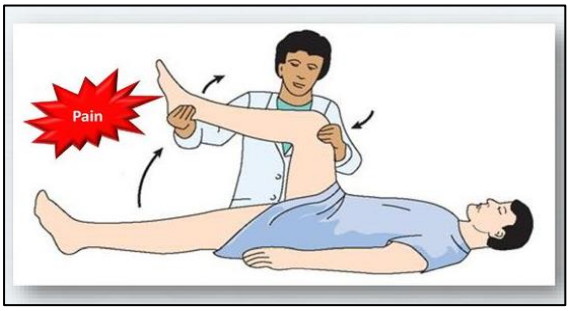
BACTERIAL MENINGITIS

- acute bacterial infection of the meninges
- irreversible neurological damage and auditory impairment.
- bacterial meningitis is a medical emergency
- early parenteral administration of antibiotics that penetrates well into the cerebrospinal fluid is required.
- empiric antibiotic therapy is administered if the pathogen cannot be identified or while waiting for laboratory results.

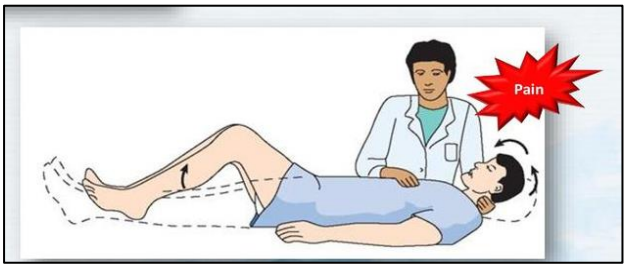
Main bacteria causing meningitis

- Gram-negative bacilli (Klebsiella spp, E. coli, S. marscesens, Pseudomonas spp, Salmonella spp) and group B streptococcus.
- Streptococcus pneumoniae
- Listeria monocytogenes
- Hemophilus influenza B
- Nisseria meningitidis

SIGNS AND SYMPTOMS



Kernig's sign – Patient supine with hip flexed 90°, knee cannot be fully extended



Brudzinski's neck sign – neck rigidity (passive flexion of neck causes flexion of both legs and thighs)

Children under 1 year

- irritable, fever or hypothermia, poor feeding or vomiting.
- seizures, apnoea, altered consciousness, bulging fontanelle (when not crying), neck stiffness and purpuric rash.

Children over 1 year and adults

- Fever, severe headache, **photophobia**, neck stiffness
- **Brudzinski's sign** (neck flexion in a supine patient result in involuntary flexion of the knees) and
- **Kernig's sign** (attempts to extend the knee from the flexed-thigh position are met with strong passive resistance).
- **Petechial or ecchymotic purpura** (usually in meningococcal infections) – In severe forms: coma, seizures, focal signs, purpura fulminans

Blanching sign:

- Positive test (non-blanching rash): likely bacterial meningitis

  Negative (blanching rash: rash unlikely due to bacterial meningitis.

TB meningitis → the fever is not very high and can be sporadic.

- suspect TB meningitis in young patients with neurological signs (e.g., hemiplegia, paraplegia)
- gradual onset - changes in their behavior
- **Cryptococcal meningitis** → more common in patients who are immunocompromised (e.g., HIV/AIDS)
- slow onset - temperature can be normal or only slightly elevated

  Severe persistent headache.

Signs of raised intracranial pressure

- Unequal pupil size
- Non-reactive pupils
- Very slow heart rate (<50 in adults)
- Irregular breathing
- Severe respiratory distress
- GCS <15
- Seizure

  Focal Neurological signs

INVESTIGATIONS

(1) Lumbar puncture (LP):

- Macroscopic examination of the cerebrospinal fluid (CSF)
- turbid CSF → antibiotic therapy should be initiated immediately

(2) Microscopic examination: Gram stain (but a negative examination does not exclude the diagnosis)

(3) White blood cell count (WBC).

Do NOT perform a lumbar puncture if there are signs of raised intracranial pressure or risk of bleeding such as low plates or a bleeding disorder

Do not delay starting antibiotics waiting to do a lumbar puncture because the patient might die. If you cannot perform a lumbar puncture but you are concerned about meningitis: **start antibiotics.**

TREATMENT

1. **Admit to IPD**.
2. **Give antibiotics**:
   - **Ceftriaxone 2g** BID - if patient >60 years → add ampicillin (to treat for Listeria infection).

3. Dexamethasone

- given before the antibiotic → reduces risk of hearing loss, neurologic complications and death.
- does not help if given after the antibiotic.
- **Adults:** IV 0.4mg/kg every 12 hours (max 10mg) for 4 days or 10mg QID for 2-4 days.
- **Children ≥6 weeks old:** only if H. influenzae meningitis → 0.15mg/kg (max 10mg) QID for 2-4 days.

4. **Give supportive treatment**: fluids and oxygen.
5. Treat fever with **paracetamol**.
6. Treat convulsions with **diazepam**.
7. **Give special nursing care** if the patient is in a coma.

PREVENTION

- individuals at risk (e.g., people without a spleen).
- close contact with a patient (family/household) → ciprofloxacin PO STAT **Adults:** 500mg; **Child:** 15mg/kg).

VACCINATION

Several vaccines have been proven to be safe and effective with infrequent and mild side effects. In our region there is no routine vaccination for meningitis.

LEPROSY

Leprosy can look like many other skin conditions, some nerve and bone and eye conditions.

DEFINITION

Leprosy is caused by a bacterium, ***Mycobacterium Leprae***. If treatment is not given, smear positive patients can spread the bacteria from their noses into the air. Risk of infection from air is not very high. Touching the skin of a person with leprosy does NOT cause infection. Almost all properly treated patients are NOT infectious. Most people do NOT get leprosy illness even if they are in contact with the bacteria.

Think of leprosy when you have a patient with:

- **One or more skin patches** that is
  - Pale or discoloured (reddish or copper-brown colour).
  - Do not itch.
  - Lasts for 6 weeks or more.
  - Does not look like one of the common skin conditions.
  - Does not improve with other treatment.
- **Both skin changes AND nerve signs** (enlargement of nerve, reduced feeling, or loss of movement). A pale or discoloured skin patch with reduced feeling and an enlarged nerve is very likely to be leprosy.

Leprosy should be considered in all patients with painless injuries, burn wounds or ulceration of the hands or feet.

SIGNS AND SYMPTOMS:

Skin Maculae (flat), often pale center with raised red edges. Papules (raised, solid, rounded), often red. Plaques (raised, spread), often red.

Nerves Enlargement of peripheral nerves in legs, arms, neck, or head outside brain. Peripheral nerve pain, nerve tenderness, reduced skin feeling, weakness or loss of muscle strength (claw hand, wrist drop, foot drop, facial palsy), muscle wasting.

Eyes Loss of feeling over conjunctiva (front surface of eye). The patient is not able to close the eye (lagophthalmos), the lower eye lid turns out (ectropion). Eyebrow loss, eyelashes thin and turn in (entropion). Dry eyes, conjunctivitis, corneal damage, iritis (inflammation of the iris), blindness.

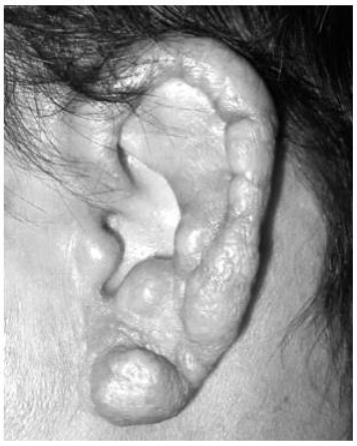
If your area has a leprosy control Programmes, refer any suspected patient for diagnosis and management.

History

Short duration (3 weeks or less), and itching make the diagnosis less likely.

Physical examination

Figure 25.3 Leprosy nodules on auricle and pinna



1. Check the patient's **entire body**, in a good light, for abnormal patches of skin - colour change, dryness, thicker than normal, loss of hair.
2. Check **nerves for enlargement** (can see or palpate nerve):

- **Ulnar** - inside and slightly above the elbow in the ulnar groove (keep arm bent).
- **Median** - in front of the elbow and in front of wrist.
- **Radial** - over the distal radius, on the thumb side above the wrist.
- **Peroneal (lateral popliteal)** - behind the fibula at the outside of the knee (knee bent).
- **Tibial** - behind the medial malleolus at the inside of the ankle.
- **Posterior auricular** - in the neck, below and behind the ear, turn the neck.
- Cutaneous nerves near to a skin patch.

3. Check for **sensation** by testing the center of skin lesions for loss of 'light touch' feeling using a piece of cotton wool or paper. Also, for pain with a common pin (pinprick) and temperature sensation loss. Loss of sensation suggests leprosy. 'Light touch' feeling is lost before pain sensation.
4. Check **cornea** (trigeminal nerve) for loss of touch sensation, using cotton wool.
5. Check muscles of the feet, hands, and face for **weakness** and for loss of muscle.

If suspect a patient has leprosy – discuss with a doctor, the patient will need to be referred to a special leprosy Programmes for diagnosis and treatment

DIAGNOSIS

Diagnosis is confirmed by finding the bacteria in:

1. Split skin smear test- scraping of skin from 2-4 areas with lesions and 2 normal areas of skin (normally ear lobes) and sent on a slide for **Ziehl Neelsen (ZN)** and AFB testing. This is often only done in specialist clinics/ hospitals.
2. Nasal swab.
   Even if the skin and nose smears are negative, a patient can still have leprosy. Therefore, diagnosis of leprosy relies on clinical signs and symptoms in cases when split skin/nasal swab smear is negative. Thorough clinical examination is important.

TREATMENT

(if not available, refer for treatment)

1. Medical treatment with drugs is the best way to help patients with leprosy.
2. It is easy to treat the infection, but nerve damage will never go away. It is important to diagnose and start treatment early, to prevent nerve damage.
3. **Early recognition and effective treatment can prevent deformity and disability.**
4. Multiple drug treatment (MDT) is used for leprosy in order to prevent development of drug resistance.
5. **Counsel the patient to:**
   a. Take the drugs regularly as prescribed.
   b. Take correct doses.
   c. Finish all treatment until finished.
   d. Finishing treatment is very important to prevent drug resistance and to prevent disease from returning (relapse).
6. Treatment regimen varies depending on the clinical staging of the disease (by **World Health Organization (WHO)**).

Drug side-effects:

- **Dapsone** can produce haemolytic anaemia and G6PD activity should be tested before giving. Dapsone should be used under close supervision or avoided in **G6PD**-deficient patients.
- **Dapsone** may cause skin rash/skin reaction, sometimes severe.
- Clofazimine turns the skin dry or reddish /brown. Skin discoloration fades slowly when the drug treatment is finished. Vaseline or vegetable oil can be applied to relieve from skin dryness.
- **Ethionamide** or **protionamide** are alternatives to clofazimine and may cause liver problems.
- Rifampicin turns urine reddish colour. This does not cause any harm.

WHO treatment guideline 2018

Age group	Drug	Dosage and frequency	Duration	
			MB	PB
Adult	Rifampicin	600 mg once a month	12 months	6 months
	Clofazimine	300 mg once a month and 50 mg daily		
	Dapsone	100 mg daily		
Children (10-14 years)	Rifampicin	450 mg once a month	12 months	6 months
	Clofazimine	150 mg once a month, 50 mg on alternate days		
	Dapsone	50 mg daily		
Children < 10 years old or < 40 kg	Rifampicin	10 mg/kg once month	12 months	6 months
	Clofazimine	100 mg once a month, 50 mg twice weekly		
	Dapsone	2 mg/kg daily		

Acute medical emergencies in leprosy include:

1. **Severe reaction with sudden onset,** usually whilst on treatment, due to a strengthening of immunity reaction causing new nerve or skin damage and presenting with:
   a) rapid nerve swelling with pain and tenderness.
   b) sudden loss of motor function (wrist drop, foot drop, facial palsy).
   c) old skin lesions becoming painful, tender, may ulcerate.
   TREATMENT: **prednisolone** in high dose (adult 1mg/kg/day) for 3-5 days then decrease the dose every week (decrease by 5mg/day each week) over 3 to 4 months. Continue anti-leprosy treatment.

2. **Severe reaction in an inadequately treated patient**, due to weakening of immunity, with increasing new skin lesions and change in old lesions to become more 'lepromatous' (uniform, thick, extensive, nodular) in nature.
   TREATMENT: Restart anti–leprosy drugs in proper dosage and use prednisolone.

PREVENTION

of damage to feet, hands and eyes that have lost sensation is very important.

- Use shoes with strong bottom sole (**like car tyres rubber**) to protect against trauma from walking.
- Gloves can help to protect hands during manual work and cooking.
- Plain glasses or goggles can help to protect eyes without sensation.
- Joint stiffness can be prevented by gentle rotation of affected joints every day.

EDUCATION

Educate patients how to prevent injury to numb hands, feet, and eyes. Rest is the best but is often not possible. Every day, the patient should check the numb area for trauma and come to the clinic if there is any wound. Be careful to avoid burns.

REHABILITATION

Surgery and physiotherapy are important for management of ulcers and bone and muscle deformities of the hands, feet and face. Many paralyzed muscles can be helped by reconstructive surgery. It is important to emphasize that surgery and drugs cannot improve lost sensation. Organizations such as Handicap International may be able to help and referral should be considered.

IMPORTANT POINTS FOR LEPROSY

- Early detection, and treatment of the disease.
- Early recognition and adequate treatment of complications.
- Patient education in self-care.

Note: Many people with leprosy become depressed by how they are treated by other people. It is important to recognize the patient's feelings. It is also important to educate the community about the disease because it is easy to treat and not so infectious. This can help the community to accept leprosy patients.

LEPTOSPIROSIS

Causal organism - spiral bacterium (spirochetes) called Leptospira.

- live in animals (especially rats, but also dogs, cats, and cattle) and are excreted in their urine.
- alive in the soil for months.
- enter the human body through damaged skin, mucous membranes and conjunctivae following contact with contaminated water (e.g., by animal urine) or through close contact with infected animals.

RISK FACTORS

- Farmers and miners.
- Walking without shoes in rivers, sewage, and canals
- Swimming in rivers and lakes
- Working in abattoirs (factories where animals are killed for food).

SIGNS AND SYMPTOMS

- Sudden high fever with chills and rigors.
- Conjunctival suffusion (eyes are red, no pus).
- Severe muscle pain (particularly calves) and tenderness.
- Headache.
- **Other symptoms:** abdominal pain, nausea and vomiting, diarrhoea, cough and pharyngitis, chest pain, arthralgia (joint pain). This phase lasts 5-9 days and can be very mild or very severe. In many patients the disease stops here. However, sometimes these symptoms persist or return after stopping for a few days and complications appear.

COMPLICATIONS

1. **Meningitis:** severe bitemporal and frontal headache.
2. **Liver and Kidney failure (Weil's disease):** high fever over 40ºC, jaundice, oliguria/ anuria, (accompanied by hemorrhagic pneumonia, cardiac arrhythmias, and circulatory collapse). In some patients → enlarged liver and spleen (hepato-splenomegaly).
3. **Haemorrhagic pneumonia** with acute respiratory distress syndrome: can happen also without liver

and kidney failure. Patient coughs up blood (haemoptysis) and often chest examination is normal (no crackles).
4. **Uveitis** (very red eye, blurred vision, eye pain, irregular pupil, photophobia, headache).
5. Liver failure usually gets better, but kidney failure and respiratory distress syndrome have poor prognosis.

DIAGNOSIS

Clinical, but some investigations could be helpful:

- **Dipstick:** protein and blood in urine.
- **Lab (if available):** raised CK and bilirubin.
- Definite diagnosis by special blood test (serology), but it is not available.

TREATMENT

Should be started as early as possible, but it is now thought effective also if started late:

- Treat the fever and the pain with paracetamol.
- Give IV fluids
- Antibiotics:

Mild infections

- **PO doxycycline** 200mg OD (OR 100mg BID) x 7 days.
- In pregnant women: PO amoxicillin 1g BID x 7 days.
- In children <8yrs: PO amoxicillin 25mg/kg BID x 7 days

Severe infections

- IV ampicillin **Adults:** 2g TID **Child**: 100mg/kg/day in 3 divided doses
- Then switch to PO amoxicillin when improving e.g., 48 hours after fever stops (total 7 days of antibiotics).

PREVENTION

Collection of rubbish to reduce rat population, education of people at risk, doxycycline (200mg weekly) prophylaxis for high-risk groups.

VACCINATION

There is a vaccine for animals available, but this works only for a few months. There is a vaccine for human, but it is of limited benefit and is not used in our region.

MELIOIDOSIS

DEFINITION

- Causal Organism - ***Burkholderia pseudomallei***
- found in soil and water
- infection through the skin, contamination of wounds, ingestion, and inhalation.

PATIENTS AT RISK

- People with diabetes, alcohol use, chronic kidney disease, chronic lung disease, immunocompromised persons (e.g., HIV, TB) and rice farmers are at risk.

SIGNS AND SYMPTOMS

- pain in chest, bone, joints, cough, skin infections, lung nodules, pneumonia.
- symptoms 9-21 days after becoming infected but may be many years later.
- depends on the site of infection e.g., pneumonia, osteomyelitis, septic arthritis, cellulitis, skin abscess & ulcer, **meningo-encephalitis**, brain abscess.
- Most common presentation is pneumonia and septicemia like signs and symptoms.
- Can be mistaken as pneumonia or tuberculosis.

DIAGNOSIS

- Blood and/or sputum culture is reliable diagnostic
- take 2-3 days to see the growth of bacterial in the culture media.
- consider sending urine, pus, throat swab or rectal swab samples for culture.
- CXR and abdominal/pelvic ultrasound can be used to find internal abscesses.

TREATMENT

- Admit to IPD: give fluids: **ORS** or IV fluids **(NSS).**
- Treat the fever with **paracetamol**.
  - **Antibiotics (doses for adults), ALWAYS start with initiation therapy:**
    - **Initiation Therapy**

      Ceftazidime: 2g (or 40mg/kg) TID for 2 weeks.

      If suspect neurologic involvement, bone, joint, genitourinary (prostate), or skin/soft tissue infection:

      ADD

      Cotrimoxazole: 10/50mg/kg (maximum 320/1600mg – 4 tablets of 480mg of cotrimoxazole) BID for 2 weeks.

    - **Maintenance Therapy**

      Cotrimoxazole

      (Trimethoprim+Sulphamethoxazole): 8/40mg/kg BID for 12-20 weeks

PREVENTION

- Rice farmers should wear boots, which can prevent infection through the feet and lower legs.
- Health care workers can use standard contact precautions (mask, gloves, and gown) to help prevent infection.

VACCINATION

There is no vaccine available for melioidosis.

RESISTANT BACTERIAL INFECTION

- Antibiotic resistance is when bacteria change so that the antibiotics that we use against them stop working
- resistance occurs because health care providers prescribe too many antibiotics (e.g., for viral illnesses when they will not work) and patients do not complete full courses of antibiotics.
- Being able to buy antibiotics or Yaa **Chud** in pharmacies and shops without health care advice is also a big problem causing resistance
- bacteria may be resistant to a specific antibiotic, or it may have a special pattern of resistance such as ESBL (Extended-spectrum beta-lactamases)/ MRSA (Methicillin -resistant Staphylococcus aureus).

ESBL (EXTENDED SPECTRUM BETE LACTAMASE) PRODUCTING BACTERIA

- able to break down certain antibiotics that have a beta lactam ring therefore making them resistant.
- The 2 main bacteria that produce ESBL are E. coli and Klebsiella. (Therefore' ESBL UTIs are common.)
- The antibiotics most commonly affected are penicillin e.g., ampicillin, and cephalosporins e.g., ceftriaxone.

TREATMENT

- sensitive antibiotic (that does not have a beta lactam ring) e.g., meropenem for 7-14 days.

MRSA (METHICILLIN RESISTANT STAPH AUREUS)

- **MRSA** is a type of Staph Aureus bacteria that is resistant to penicillin.
- resistant to cloxacillin which is normally used for Staph Aureus infections e.g., cellulitis.
- sometimes found on people's skin and does not cause any harm. However, if someone is unwell/ immunocompromised and they get **MRSA** in the blood they can become severely unwell.

TREATMENT

Stronger very expensive antibiotics e.g., vancomycin is needed to treat **MRSA.**

TO STOP BACTERIA FROM BECOMING RESISTANT WE NEED TO

1. Carefully prescribe antibiotics only to those that need them. DO NOT prescribe antibiotics if you **suspect a viral infection**.
2. **Educate patients** not to buy **antibiotics** from the pharmacy/shop.
3. Educate patients that they should complete the course of antibiotics that we prescribe even if they feel better.

SCRUB TYPHUS

Causal Organism - ***Orientia Tsutsugamushi,*** a type of rickettsia.

- transmitted by the bite of a mite that inhabits moist grasslands and jungle. Rodents are normal carriers.
- Common in our region - one of the most common causes of '**Fever Don't Know' (Fever DK)** in the tropics. Left untreated many people recover, but some will die.

SIGNS AND SYMPTOMS

- Fever
- Severe headache
- **Red eyes** (conjunctival injection)
- Enlarged, painful lymph nodes (**adenopathy**) first near the site of the bite → generalized.
- **Skin lesion at the site of the infecting mite's bite:** small, round, hard red papule becoming bigger with a dead (necrotic) center, covered by a black hard surface (eschar) - back, inguinal area and scrotum.
- After a few days of fever, a typical (maculopapular) rash appears → trunk → limbs.
- Sometimes signs and symptoms of meningitis/ encephalitis.
- Rarely atypical bronchitis, enlarged spleen, inflamed heart (myocarditis), strange behavior (neuropsychological signs) and kidney failure.

DIAGNOSIS

- **The diagnosis is clinical** → history and examination suggestive of scrub typhus
- negative malaria smear and no other obvious finding on history and examination, think of scrub typhus.

TREATMENT

- Treat the **fever and the pain**.
- **Antibiotic** for 5 to 7 days or until 3 days after the fever has disappeared:
  - **Doxycycline** PO (except in pregnant or lactating women)
    - **Children over 8 years:** 50 mg 2 times daily or 100 mg once daily
    - **Adult:** 100 mg 2 times daily or 200 mg once daily
    - **Note: doxycycline is usually contraindicated in pregnant or breast-feeding women and children under 8 years**
  - **Azithromycin**
    - Pregnant: 500mg PO STAT
    - Child 6mths - 8yrs: 20mg/kg PO STAT

PREVENTION

- Reduction of vector populations - personal hygiene improvement (including de-lousing)
- avoid mite-infested areas, use thick repellents and protective clothing.
- Patients should wash themselves and disinfect their clothes by washing in hot water or impregnate with **1% permethrin.**
- those working in high-risk areas → **doxycycline prophylaxis (200mg weekly**)
- Regular preventive treatment of medical/nursing staff is recommended in endemic areas.

VACCINATION

There is no vaccine available.

TETANUS

Causal Organism - Clostridium tetani

- an acute, often fatal disease
- characterized by a prolonged contraction of muscles caused by a toxin produced by the bacterium
- infection through contamination of a cut or deep puncture wound.
- muscle spasms in the jaw → 'lockjaw' → difficulty swallowing, general muscle stiffness and spasms in other parts of the body.
- toxins (or spores) are widely distributed in soil and animal faces.

Neonatal tetanus - generalized tetanus in newborn infants.

- infants born to mothers never been immunized for tetanus
- infection of the unhealed umbilical stump, especially when the stump is cut with a non-sterile instrument.

SIGNS AND SYMPTOMS

- Generalized tetanus → most frequent and severe form → muscular rigidity → entire body→ painful muscle spasms
- level of consciousness → not altered.

Children and adults

- Average time from exposure to onset of symptoms – 7 days (3 to 21 days).
- Muscular rigidity
  - jaw muscles (inability to open mouth [trismus] preventing the patient from speaking, eating
  - face (fixed smile)
  - neck (difficulty with swallowing)
  - trunk (restriction of respiratory muscles
  - hyperextension of spine [opisthotonos])
  - abdomen (guarding)
  - limbs (flexion of the upper limbs and extension of the lower limbs).
- Muscle spasms
  - very painful, appear at the onset or when muscular rigidity becomes generalized.
  - triggered by stimuli (noise, light, touch) or arise spontaneously
  - spasms of the thoracic and laryngeal muscles → respiratory distress or aspiration.

Signs and Symptoms in neonates

- **In 90% of cases** → initial symptoms appear within 3 to 14 days of birth.
- significant irritability and difficulty sucking (rigidity of the lips, trismus) then rigidity becomes generalized, as in adults.
- Any neonate, who initially sucked and cried normally, presenting with irritability and difficulty sucking 3 to 28 days after birth and demonstrating rigidity and muscle spasms should be assumed to have neonatal tetanus.

TREATMENT

Hospitalization is needed and usually lasts 3 to 4 weeks. Correct management can reduce mortality even in hospitals with limited resources.

General measures

- Ensure **intensive nursing care**.
- The patient should be in a dark, quiet room. Blindfold neonates with a cloth bandage.
- Handle the patient carefully, while sedated and as little as possible; change position every 3 to 4 hours to avoid bedsores.
- Teach family the danger signs and instruct them to call the nurse for the slightest respiratory symptom (cough, difficulty breathing, apnoea, excessive secretions, cyanosis, etc.).
- **Establish IV** access for hydration, IV injections.
- **Gentle suction of secretions** (mouth, oropharynx).
- Insert a **nasogastric tube** for hydration, feeding and administration of oral medications.
- Provide **hydration and nutrition** in feeds divided over 24 hours. In neonates, give expressed breast milk every 3 hours (**risk of hypoglycemia**).

Neutralization of toxin

Human tetanus immunoglobulin IM: Neonates, children, and adults: 500 IU single dose, injected into 2 separate sites.

Inhibition of toxin production

Metronidazole IV infusion (30 minutes; 60 minutes in neonates) for 7 days

- **<u>Neonates:</u>**
  - 0 to 7 days: 15 mg/kg on D1 then, after 24 hours, 7.5 mg/kg every 12 hours

- 8 days to < 1 month (< 2 kg): same doses
- 8 days to < 1 month (≥ 2 kg): 15 mg/kg every 12 hours

- **Children 1 month and over**: 10 mg/kg every 8 hours (max. 1500 mg daily)
- **Adults**: 500 mg every 8 hours.

Control of rigidity and spasms, and sedation of the patient

Diazepam should decrease the frequency and intensity of spams without causing respiratory depression. The dose and frequency of administration depend on the patient's clinical response and tolerance.

There is a high risk of respiratory depression and hypotension when using **diazepam**, especially in children and elderly patients. Constant and close monitoring of the patient's **respiratory rate (RR)** and **oxygen saturation (SpO2)** is essential, with immediate availability of equipment for manual ventilation (Ambu bag, face mask) and intubation, suction (electric if possible) and Ringer lactate. A continuous **IV infusion of diazepam** requires the use of a dedicated vein (no other infusion/injection in this vein); avoid the antecubital fossa if possible. Do not stop treatment abruptly; an abrupt stop can cause spasms.

TREATMENT OF THE POINT OF ENTRY

- **Search systematically the entry wound**
- **Provide local treatment under sedation** →cleansing and for deep wounds, irrigation, and debridement.
- **Cord infection**
  - do not excise or debride
  - treat bacterial omphalitis and sepsis

add to metronidazole IV: cloxacillin IV + cefotaxime IV or cloxacillin IV + gentamicin IV (for doses, see Bacterial meningitis).

Tetanus vaccination

- tetanus does not confer immunity
- immunization against tetanus must be administered once the patient has recovered.
- in case of neonatal tetanus, initiate the immunization of the mother.

PREVENTION

Post-exposure prophylaxis

In all cases:

- **Cleansing and disinfection** of the wound, and removal of any foreign body.
- **Antibiotics are not prescribed routinely for prophylaxis.**

Antibiotic (metronidazole or penicillin) according to the patient's clinical status.

TYPHOID FEVER (ENTERIC FEVER)

- bacterial infection caused by ***Salmonella typhi***
- transmitted by contaminated food, water, or dirty hands.
- Incubation period - 10 - 15 days.

SIGNS AND SYMPTOMS

- **Prolonged fever >38ºC** for more than 7 days.
- **Negative malaria smear**, no other identified cause of fever and at least one of the following:
  - Abdominal pain
  - Diarrhoea or constipation
- **Relative low pulse (bradycardia).**
- non-specific in the first week

Other symptoms - tiredness, headache, dry cough, patient does not want to eat (anorexia).

In the 2nd week:

- **Rash** (pink spots on the abdomen and the chest – called Rose coloured spots).
- **Relative bradycardia** (the pulse does not increase with high fever).

Enlarged liver and spleen (hepato-splenomegaly).

In the 3rd-4th week:

Complications can happen even when the patient seems to be cured:

- **Intestinal perforation/bleeding or peritonitis.**
- **Septic shock.**
- **Pneumonia**.

Confusion with signs of meningitis.

DIAGNOSIS

- confirmed by a positive blood (or bone marrow) culture for **Salmonella typhi.**
- not available at all clinics on the border.
- relative leukopenia (**normal WCC despite septicemia**).

Widal test - specific antibodies in serum of people with typhoid by using antigen-antibody interactions.

TREATMENT

- **Admit to IPD:** give fluids: ORS or IV fluids (NSS or RL)
- Treat the fever with **paracetamol**.
- **Antibiotics**: 1st choice:

Ciprofloxacin PO:

- **Adult** 500mg BID x 5-7days.
- **Child** 15mg/kg BID x 5-7days

For severe cases/ those who cannot swallow:

Ceftriaxone IV:

- **Adult** 1g OD x 7 days
- **Child** 50mg/kg OD x 7 days

Switch to PO ciprofloxacin when condition improving and can take oral antibiotics (total 7 days of antibiotics).

***Note**: Resistance of **Salmonella typhi** to ciprofloxacin has been described in our area. In case of suspected resistance (poor response to ciprofloxacin treatment) continue treatment for 10-14 days or switch to **azithromycin or ceftriaxone**).*

- **If signs of peritonitis** (hard abdomen, severe pain, altered bowel sounds): **REFER** to hospital.
- **For severe presentations (shock, coma):** dexamethasone IV loading dose 3mg/kg in 30 minutes, then 1mg/kg every 6 hours for 2 days.

PREVENTION

- Clean water and clean food are important for prevention
- family and the neighbors → use latrines and wash hands after passing stools and before eating.
- if increased number of cases→inform the doctor and prevent spreading of the disease in order to avoid an epidemic.

VACCINATION

- live oral vaccine
- in our region, there is no routine vaccination for typhoid fever.

INFECTIOUS DISEASES: PARASITIC DISEASE

LYMPHATIC FLARIASIS

- a parasitic disease caused by **thread-like worms**.
- spreads from person to person by mosquito bites (lymphatic filariasis).
- parasites (worms) enter the body through the skin, are transported through the lymph system and settle in lymph nodes. Different forms of lymphatic filariasis along the Thailand-Myanmar border are **Wuchereria bancrofti** and **Brugia malayi**.

SIGNS AND SYMPTOMS

- May be asymptomatic (no signs or symptoms).
- Fever with headache, lymphadenopathy, itchy skin (dermatitis), and sometimes bacterial super infection.
- Swollen lymph nodes mainly in the groin.
- Arm, breast, leg or scrotal swelling due to lack of lymph drainage.

Chronic infections lead to:

- Lymph oedema of the legs.
- Ascites.
- Glomerulonephritis with hematuria.
- Chyluria (passing white urine: urine mixed with chyle (lymph fluid) from ruptured lymph vessels).

COMPLICATIONS

- Due to extreme eosinophilia, severe pulmonary inflammation can develop tropical pulmonary eosinophilia.
- Patients present with dry cough (especially at night-time), wheeze, dyspnea, fever and sometimes coughing blood.

DIAGNOSIS

- **Blood smear**, preferably at night between 9pm to 3am, to see microfilariae (young worms) in the blood.
- **Lymph node biopsy** in lymphatic filariasis or specific antibody test.
- Urine examination for proteins.

TREATMENT

Basic principles for filariasis patients:

- Wash the affected parts twice daily with soap and clean, cool water, and dry them carefully.
- Raise the affected limb at night.
- Exercise the limb regularly.
- Keep the nails clean.
- Wear comfortable shoes.
- Treat wounds or abrasions.

Acute Attacks:

- Bed rest.
- Elevation of affected limb without bandaging.
- Cooling of limb.
- Pain control with paracetamol, NSAID or tramadol.
- Antibacterial or fungal cream if needed.
- Paracetamol if fever.
- Keep good hydration.

After acute attack treat with:

- **Diethylcarbamazine (DEC)** (is available via Thai hospital).
- Watch for side effects: fever, headache, myalgia, anorexia, abdominal discomfort.
- DEC is effective against microfilariae and adult worms of *Wuchereria bancrofti* and *Brugia malayi*. A single dose kills only 40% of adult worms, but longer dose is not more effective.

Dosing: (WHO recommendations: *https://www.who.int/lymphatic filariasis/epidemiology/treatment/en/)*

Adults:
Single dose of **Albendazole 400mg + DEC 6mg/kg** and

OR

Children:
DEC 6mg/kg alone for 12 days.
*There are different treatment protocols that can be used, discuss with the doctor.
Note: Do not give **DEC** during the **acute attack.**
Note: If there is co-infection with **onchocerciasis or loiasis** DO NOT use DEC because of severe adverse reactions (skin or eye symptoms, shock).

PREVENTION

- **Prevent mosquito bites:** use mosquito nets and repellents.
- Seasonal mass treatment with **diethylcarbamazine (DEC)** and albendazole are recommended in areas where filariasis is common.
- **Vector control**.

VACCINE

A vaccine is not yet available and is unlikely to be developed in the near future.

MALARIA
ACRONYMS

ACT	Artemisinin Combination Therapy
BP	Blood Pressure
BVBD	Bureau of Vector Born Diseases
CHQ	Chloroquine
DOT	Directly Observed Treatment
F/S	Ferrous Sulfate
G	Gametocytes
G6PD	Glucose-6-Phosphate Dehydrogenase
GF-M	Global Fund - Malaria
HCT	Hematocrit
Hb	Haemoglobin
HIS	Health Information System
IRBC	Infected Red Blood Cells
LLIN	Long Lasting Impregnated Net
LLIHN	Long Lasting Impregnated Hammock Net
LMP	Last Menstruation Period
MS	Malaria Smear
MTC	Mae Tao Clinic
PF	Plasmodium Falciparum
PM	Plasmodium Malariae
PMQ	Primaquine
PO	Plasmodium Ovale
PV	Plasmodium Vivax
RR	Respiratory Rate
RDT	Rapid Diagnostic Test
SMRU	Shoklo Malaria Research Unit
STAT	Single dose
T	Trophozoites

MALARIA SIGNS AND SYMPTOMS

- Fever with one or more of the follow signs and symptoms:
  - Headache
  - Chills and rigor
  - Vomiting, nausea
  - Muscle or joint pain
  - Anorexia, abdominal pain, diarrhoea
- Sometimes the patient arrives unconscious or with convulsions.
- Sometimes the patient has no fever at the time of consultation.
- Anaemia and splenomegaly are common.

LABORATORY TESTING

1. When do you need to do a malaria test?

When do you need to do a Rapid Diagnostic Test (RDT)?

- **Diagnosis**
  - All patients with **fever** or recent history of fever
  - All unconscious patients
  - Patients with **unknown causes of anemia**, with or without splenomegaly

When do you need to do a Malaria Smear (MS)?

- **Diagnosis**
  Only if RDT is positive:
  - Confirmation of the species (PF, PV, PM, PO) and blood stage
  - Parasitemia

- **Screening**
  Pregnant women (at least 2 malaria smear during all pregnancy):
  - 1 MS at the 1st ANC visit
  - 1 MS at another ANC visit during the 3rd trimester
  - 1 MS when admitted for delivery, if the 3rd trimester MS was not done.

  All neonates from mother tested positive for malaria during the 3rd trimester or before delivery
  All moderate and severe **malnutrition** cases <15 years old, even if no fever or no signs of malaria
  All **blood donors**

- **Follow-up**
  For **IPD** patients diagnosed with malaria:
  - Check the MS and H8 and H16 and then daily until the MS is negative

  For **pregnant women** diagnosed with malaria:
  - Every ANC visit until delivery

- **Retesting**
  If a patient had a 1st negative RDT, but has a persistent fever of unknown origin and Malaria is still suspected, check again malaria after 24/48 h using a MS

Diagnosis: the medic suspects malaria, because of the signs and symptoms of the patient.
Screening: the medic wants to check malaria, because the patient is part of a population at risk
All tests done for diagnosis and screening have to be requested together with Hb.

2. Lab request/result form

- Use the Lab general request/result form if you want to do a Malaria Smear
- Don't forget to fill all the details, including:
  - Patient details
  - Department
  - Type of patient: New / Follow-up / ANC
  - Malaria Testing: Diagnosis / screening / Follow-up / Retesting

3. **Rapid Diagnosis Test**
   - The Rapid Diagnostic Test (RDT) for malaria is easy to perform and reliable to detect malaria in a diagnostic situation.
   - The SD Bioline Malaria Ag PF/PV can be used on whole blood and can detect specific antigens of *Plasmodium*
   - *Falciparum* (HRP-II) and *Plasmodium Vivax* (p-LDH). It can be performed in 15-30 minutes and is very sensitive (PV 99.7% / PF 95.5%) and specific (99.5%).
   - All positive patients with a RDT must be confirmed with a Malaria Smear.
   - Be careful: RDT should not be used for follow-up, as they can remain positive for a few days/week, after a successfully anti-malarial treatment

4. **Malaria Smear**
   - The MS is positive if there are **trophozoites (T)**. Other blood stage of the parasite can also be reported (c.f. Malaria life cycle in Appendix L): **schizonts (S)** are associated with severe malaria, **gametocytes (G)** are the sexual form that can infect mosquitos and spread the infection.
   - Four plasmodia species are found in Myanmar. But results can be reported as mixed **MIX**) if PF if associated with another species.
     - *Plasmodium Falciparum* : PF
     - *Plasmodium Vivax* : PV
     - *Plasmodium Malariae* : PM
   - Parasite density is notified using the below categories:

- < 1 parasite / field:	Rare
- 1-2 parasites / field:	(+)
- 3-25 parasites / field:	(++)
-26-60 parasites / field:	(+++)
> 60 parasites / field:	(++++) = ≥ 4 % IRBC by definition

   - For high densities of parasite - (+++) and (++++) – the lab will also calculate the % of Infected Red Blood Cells (IRBC) by the malaria parasite:

≥ 4 % IRBC:	Hyperparasitemia = (++++) by definition
≥ 10 % IRBC:	Biological sign of severity (WHO)
≥ 20 % IRBC:	Very high parasitemia

   - Do not delay treatment waiting for a slide to be read the next day.
     But always take a blood smear before starting any malaria treatment, even if it isn't possible to read them (e.g. in emergency it will be read after to confirm or exclude the diagnosis)

DIAGNOSIS

1. **Diagnosis of Severity**
   Once you have diagnosed malaria with a positive MS, decide if the malaria is severe or uncomplicated before starting treatment.
   Severe *P. Falciparum* malaria is defined by WHO as a patient with a positive MS for *P. Falciparum* with one or more of the below criteria, in the absence of identified alternative cause.

2. **Case Definitions**
   diagnosis is coded according to 3 criteria:
   - Species: PF or PV or MIX or PM/PO (trophozoites and/or gametocytes)
   - Severity for PF cases: Uncomplicated or Severe (see WHO criteria)
   - First episode or failure (2nd episode within 2 months for PF or within 28 days for PV)
     Presumptive Malaria is a separate case and should only be used for severe patients with a high malaria clinical suspicion and with history of travel in high risk zones. If despite a negative MS, the medic decides to treat for Malaria and has no other differential diagnosis, the case will be classified as Presumptive Malaria.

Reporting
- All malaria cases should be notified on the same day to assigned person.
- After malaria cases are collected, they will appear in the monthly medical caseload report and in the weekly/monthly disease surveillance report.

Definition of severe *P. Falciparum* malaria (adapted from WHO)		
Criteria	**Clinical features**	**Laboratory findings**
Impaired consciousness	Glasgow coma score < 11	
Prostration	Generalized weakness so that the person is unable to sit, stand or walk without assistance	
Failure to feed	Patient is unable to drink from a cup by himself Or Infant unable to breastfeed	
Multiple convulsions	≥ 2 convulsions in 24 h	
Acidosis	Respiratory distress (rapid, deep, laboured breathing)	Plasma bicarbonate < 15 mmol/l (or venous plasma lactate ≥ 5 mmol/l)
Hypoglycaemia		Blood glucose < 2.2 mmol/l or < 40 mg/dl
Severe malarial anaemia		Hb < 6 g/dl or HCT < 20 % AND parasite density ≥ ++
Renal impairment		Plasma creatinine >3mg/dl or blood urea > 20 mmol/l (120mg/dl)
Jaundice	Clinical jaundice AND evidence of another vital organ dysfunction	Plasma/serum bilirubin > 50 µmol/l (3mg/dl) AND parasite density ≥ +++
Haemoglobinuria	Brown or black urine	
Pulmonary oedema	RR > 30 / min and oxygen saturation < 92 % often with chest indrawing and crepitations on auscultation	Pulmonary oedema signs on the Chest X-Ray (But don't do Chest X-Ray on every patient)
Abnormal spontaneous bleeding	Recurrent or prolonged bleeding from the nose, gums or venepuncture sites, hematemesis or melena	
Shock	Systolic BP < 80 mmHg in adults or Systolic BP < 70 mmHg in children with evidence of impaired perfusion (cool peripheries or prolonged capillary refill)	
Hyperparasitemia		Hyperparasitemia > 10 % for *P. Falciparum*

HIS Case definitions for Malaria	
CD-Malaria PF Uncomplicated	Malaria Smear positive for PF No signs of severity (WHO)
CD-Malaria PF Uncomplicated - Failure	Malaria Smear positive for PF + already had Malaria PF in the last 2 months No signs of severity (WHO)
CD-Malaria PF Severe	Malaria Smear positive for PF + signs of severity (WHO)
CD-Malaria PF Severe - Failure	Malaria Smear positive for PF + already had Malaria PF in the last 2 months + signs of severity (WHO)
CD-Malaria MIX Uncomplicated	Malaria Smear positive for PF + PV/PM No signs of severity (WHO)
CD-Malaria MIX Uncomplicated - Failure	Malaria Smear positive for PF + PV/PM + already had Malaria PF in the last 2 months or PV in the last 28 days No signs of severity (WHO)
CD-Malaria MIX Severe	Malaria Smear positive for PF + PV/PM + signs of severity (WHO)
CD-Malaria MIX Severe - Failure	Malaria Smear positive for PF + PV/PM + already had Malaria PF in the last 2 months or PV in the last 28 days + signs of severity (WHO)
CD-Malaria PV	Malaria Smear positive for PV
CD-Malaria PV - Failure	Malaria Smear positive for PV + already had Malaria PV in the last 28 days
CD-Malaria PO/PM	Malaria Smear positive for PO/PM
CD-Malaria Presumptive Severe	Signs & symptoms of Malaria or history of malaria treatment in the last 3 days + history of travel in high risk zone + signs of severity (WHO) But MS negative

Management
Where to treat malaria? – ALL CASES OF MALARIA ARE NOW ADMITTED TO ENSURE THAT TREATMENT IS SUPERVISED

CHECK BEFORE ADMINISTERING ANTIMALARIAL DRUGS

Before to choose and administer the antimalarial drugs, you will need all the below information. To make sure you did not forget anything, use the checklist in Appendix A. Keep the checklist in the IPD chart or in a specific folder in IPD/OPD.

- Confirmed positive MS or not? If yes, which species:
  - PF (PF or MIX)
  - Non-PF (PV, PM or PO)?
- For all women of childbearing age, check pregnancy status: ask LMP always and do a pregnancy test if any doubt.
- Is the patient breastfeeding? If yes, how old is the baby?
- Severity of Malaria:
  - Uncomplicated malaria
  - Uncomplicated malaria with Hyperparasitemia
  - Severe malaria
  - Presumptive malaria
- When was the last episode of malaria? Which species? Which treatment was used, and was it completed? Is it a new episode or a failure?
- Ask about malaria drugs allergy and check contraindications
- Weight of the patient
- Patient's body temperature? If fever, already treated with Paracetamol?
- If you will be using mefloquine then does the patient have: Mental problems? Epilepsy? Using Yabba? Mefloquine reaction before?

Although the number of Malaria cases diagnosed is decreasing very fast, the big problem for the coming years will be the growing resistance of parasites to antimalarial drugs.

If patient vomit after taking antimalarial tablets	
Vomit < 30 min after taking tablets	Give Metoclopramide IV After 10 min, repeat the full dose
Vomit 30 – 60 min after taking tablets	Give Metoclopramide IV After 10 min, repeat ½ dose
Vomit ≥ 60 min after taking tab	Give Metoclopramide PO Do not repeat dose
Vomit again <60 min after the 2nd dose	Treat like severe malaria using IV Artesunate

It is very important to respect the below guidelines to treat at the best the Malaria cases and detect early potential resistance problems.

1. PV, PM, and PO

1st line treatment of the episode

The 1st line treatment for a PV, PM or PO episode is Chloroquine during 3 days (CHQ3).

CHQ3		
D1	Chloroquine 10 mg base/kg OD	Check for contraindications to chloroquine: - Retinopathy - Allergy to chloroquine
D2	Chloroquine 10 mg base/kg OD	
D3	Chloroquine 5 mg base/kg OD	

Radical cure for PV

- For all PV cases, propose a radical cure with primaquine during 14 days (PMQ14) to avoid relapses.
- If possible start primaquine at Day 1, but you can delay the treatment according to patient's condition.
- To be taken after food

More than half of all patients with PV will relapse after treatment with CHQ3.

Relapse is due to the presence of resting stage hypnozoites in the liver. The only drug that can kill the liver stages and prevent relapses is primaquine.

- If any contraindication, don't give PMQ. If pregnant, consider giving ongoing chloroquine prophylaxis (see SMRU guideline)
- Always check for G6PD deficiency before to give PMQ14
- If G6PD deficiency, you can propose primaquine 0.75 mg/kg once a week during 8 weeks. This should be given using Directly Observed Treatment (DOT) with close monitoring for acute haemolytic anaemia (clinical ± lab).

PMQ14		
D1 to D14	Primaquine 0.5 mg/kg/day OD	Check for contraindications to primaquine 14 days: - Pregnancy - Mother breastfeeding a child < 28 days - Child < 6 months - Rheumatoid arthritis - Symptomatic anemia or Hb < 6 g/dl or Hct < 20 % - G6PD Deficiency or unknown status - Allergy to primaquine

2nd line treatments

- In case of recurrent episodes, always check if the right treatment was given (right drugs and right doses) and if the patient took the complete treatment. If not, give again the 1st line treatment: CHQ3 + PMQ14
- If recurrent episode ≥ 28 days after initial treatment, this is likely to be a relapse: give again CHQ3 + PMQ14
- If recurrent episode < 28 days after initial treatment, a failure is suspected: give ACT (e.g. DP3) + PMQ14
- In any case if there is a contraindication to Chloroquine: give ACT (e.g. DP3) + PMQ14

Severe malaria

- When a patient has signs of severity with PV treat him/her as having severe PF malaria (see section 3 page 10).

2. Uncomplicated PF (in adults and children >1 month)

All PF cases must be treated with an Artemisinin-based Combination Therapy (ACT). DO NOT give artesunate alone, this would contribute to create resistance of the malaria parasite.

1st line treatment

The 1st line treatment for uncomplicated PF is dihydroartemisinin + piperaquine OD during 3 days (DP3) or artemether and lumefantrine (COA3)

- ✓ **No hyper parasitemia**
- ✓ **(PF trophozoites < ++++)**
- ✓ **No sign of severity (WHO)**

	COA3	
D1 to D3	Each COA tablet contains 20mg artemether and 120mg lumefantrine (see dosing table in appendix E)	Each dose should be eaten with oily food to improve absorption (1.2mls cooking oil)
DP3		
D1 to D3	Dihydroartemisinin + piperaquine OD (see dosing table in Appendix C)	- check for allergy to any artemisinin derivate - check for allergy to piperaquine

2nd line treatments

In case of recurrent episodes, always check if the right treatment was given (right drugs and right doses) and if the patient took the complete treatment. If not, give again the 1st line treatment: DP3 or COA3 + PMQ STAT

- If recurrent uncomplicated PF episode ≥ 2 months after initial complete treatment, it is likely to be a reinfection: give again DP3 or COA3 + PMQ STAT
- If recurrent uncomplicated PF episode < 2 months after initial complete treatment, a failure can be suspected, and it is better to change the treatment:
  - If ACT was used for the first episode: give quinine-based treatment (Q7C7, Q7T7 or Q7D7) + PMQ STAT
  - If the previous treatment was not an ACT or don't know then try DP3, COA3 or MAS3

MAS3		
D1 to D3	Artesunate 4mg/kg OD (see dosing table in Appendix D) Mefloquine 8mg/kg OD (see dosing table in Appendix F)	Check for contraindications to artesunate: - Allergy to artemisinin Check for contraindications to mefloquine: - mental health problem - epilepsy - Yabba user - Allergy to mefloquine

Q7C7		
D1 to D7	Quinine 10mg/kg TID (see dosing table in Appendix J) Clindamycin 5mg/kg TID (see dosing table in Appendix H)	Check for contraindications to quinine: - Allergy to quinine Check for contraindications to clindamycin: - Allergy to clindamycin

AS7D7		
D1 to D7	Artesunate 2mg/kg OD (see dosing table in Appendix D) Doxycycline 4mg/kg OD (see dosing table in Appendix G)	Check for contraindications to artesunate: - Allergy to artemisinin Check for contraindications to doxycycline: - pregnancy - child <8 years - allergy to doxycycline

AS7C7		
D1 to D7	Artesunate 2mg/kg OD (see dosing table in Appendix D) Clindamycin 5mg/kg TID (see dosing table in Appendix H)	Check for contraindications to artesunate: - Allergy to artemisinin Check for contraindications to clindamycin: - allergy to clindamycin

Gametocyte Clearance

- All PF cases need to receive a single low dose of primaquine 0.25 mg/kg STAT on Day 1 to clear the gametocytes in the blood and decrease transmission.
- This low dose is safe, even for patients with G6PD deficiency, so no need to check anymore for this disease before to treat.

Do not give PMQ STAT if contraindicated: pregnancy, child < 6 months.**PMQ STAT**		
D1	Primaquine 0.25mg/kg STAT (see dosing table in Appendix L)	Check for contraindications to primaquine STAT: - Pregnancy - - Child <6 months

3. Severe Malaria (any species) and or Hyperparasitemia

IRBC≥4%
or PF trophozoites ≥ ++++
OR
Any species malaria with ANY SEVERE SIGNS

- Admit the patient in IPD. Complete malaria checklist
- Patients require treatment with IV artesunate and IV quinine
- Monitor closely the clinical condition
- Contact the supporting organization with all severe cases to get their advice
- Check the parasitemia every 6 hours until the MS is negative
- If the patient condition becomes worse or the parasitemia does not respond to treatment, this may be evidence of artemisinin resistance. Seek urgent advice from the supporting organization. If parasite count >20% then these patients are very high risk – also need urgent help from the supporting organization.

1st line treatment

H0	e.g. 1st Sept. 6AM/6-10AM	Artesunate IV 2.4 mg/kg (see dosing table in Appendix I)	Quinine IV 20 mg/kg in 4 h (see dosing table in Appendix J)
H8	e.g. 1st Sept. 2-4 PM		Quinine IV 10 mg/kg in 2 h (see dosing table in Appendix J)
H12	e.g. 1st Sept. 6PM	Artesunate IV 2.4 mg/kg	
H16	e.g. 1st Sept. 10-12PM		Quinine IV 10 mg/kg in 2 h
H24	e.g. 2nd Sept. 2-4 PM	Artesunate IV 2.4 mg/kg	Quinine IV 10 mg/kg in 2 h
H32	e.g. 2nd Sept. 6PM		Quinine IV 10 mg/kg in 2 h
H40	e.g. 2nd Sept. 10-12PM		Quinine IV 10 mg/kg in 2 h
Then, if patient cannot eat and drink		Artesunate IV 2.4 mg/kg / 24 h	Quinine IV 10 mg/kg in 2 h / 8 h
After the first 3 doses of artesunate IV and 6 doses of quinine IV, switch to oral treatment using COA3 or DP3 if patient can eat and drink by himself. If patient responded slowly to IV treatment, then give COA5 or DP5 (7 days treatment total)			

Gametocyte Clearance

- All severe PF cases need to receive a single low dose of primaquine 0.25 mg/kg STAT on the 1st day of feeding
- To clear the gametocytes in the blood and decrease transmission.
- Do not give PMQ STAT if contraindicated: pregnancy, child < 6 months.

PMQ STAT		
First day of feeding (e.g. D3)	Primaquine 0.25 mg/kg STAT (see dosing table in Appendix L)	Check for contraindications to PMQ STAT: - Pregnancy - Child < 6 months

4. Patient with PF Mix Infections

- Treat like a PF case
- If you decide to give PMQ 14 days for a PV, there is no need to give the PMQ STAT dose for the PF.

Treatment of patients with MIX infections	
PF+PV and 14 days PMQ is indicated and accepted	Treat according to PF protocol + PMQ 14 days (but no PMQ STAT dose)
PF + PV but cannot give PMQ 14 days (contraindicated, refused etc.)	Treat according to PF protocol + PMQ STAT (if no contraindication to PMQ STAT)
PF + PV but cannot give PMQ STAT (contraindicated)	Treat according to PF protocol (but no PMQ)
PF + PM or PO	Treat according to PF protocol + PMQ STAT (if no contraindication to PMQ STAT)

5. Patients with Gametocytes Only

With gametocytes (G) only, the patient is carrying the parasite, so make a full clinical exam and ask the history of the patient properly:

- If the patient has fever:
  - treat according to his condition using the standard malaria protocol (as if the patient was trophozoites positive)
  - look also carefully for other diseases.
- If the patient has no fever and had a documented complete treatment < 2 months (PF) or < 28 days (PV) but no PMQ:
  - give PMQ STAT for PF, or PMQ 14 days for PV
- If patient has no fever but did not have a documented complete treatment (no treatment or no record or partially treated or self-medicated) < 2 months (PF) or < 28 days (PV):
  - treat as an uncomplicated case with DP3 + PMQ STAT for PF, or with CHQ3 + PMQ 14 days for PV

Treatment of patients with gametocytes only on MS			
Clinical exam	Patient History	PF gametocytes	PV gametocytes
Fever		Treat according to standard malaria protocol (as if trophozoites pos.) Look carefully for other diseases	
No fever	No treatment or no record or partially treated or self-medicated	DP3 + PMQ STAT	CHQ3 + PMQ 14 days
	Documented complete treatment < 2 months (PF) or < 28 days (PV) but no PMQ	PMQ STAT	PMQ 14 days

6. PF malaria in Pregnant Women

- Admit all pregnant women with PF malaria in RH-IPD, because they can develop severe malaria very rapidly.
- Monitor closely the clinical condition.
- Treatment is the same as in non-pregnant women EXCEPT we DO NOT use primaquine or doxycycline (unless no other options)
- Treat anemia. Treat fever with regular paracetamol as can cause premature labour. Give dexamethasone and nifedipine (if BP stable) as normal in confirmed premature labour
- Check blood glucose regularly. Hypoglycaemia is common, especially if using IV quinine in pregnant patients.

- Gram negative sepsis is common in pregnant and post-partum patients with a fever. Look for a source and follow guidelines for severe malaria shock.

If mother is malaria positive at time of delivery – refer to malaria guideline

7. PF Malaria in infants <3 months or < 5 kg

˅ MS positive with PF trophozoites
✓ Infants < 3 months or < 5 kg

- Always admit in IPD as they can deteriorate rapidly
- Monitor closely the clinical condition
- Check the parasitemia with H8 and H16 MS and daily until the MS is negative
- Treat like a severe malaria case (see Paragraph 4), using artesumate IV followed by DP3 (if parasite count decreases after 1 dose) or A7C7
- Do not give PMQ

SUPPORTIVE TREATMENT AND MONITORING

1. F/S, deworming and Vit A

- Give Ferrous Sulfate (F/S) preventive dose 200 mg OD for 1 month to all patients with malaria
  - If anemia, give F/S 200 mg TID and plan a follow-up after 1 month and continue F/S if needed
  - If the patient is admitted in IPD, start iron only after MS is trophozoites neg.
  - If patient with thalassemia, do not give iron
- Give deworming preventive dose to all patients with malaria
  - Give Albendazole 400 mg STAT if ≥ 2 years
  - Give Albendazole 200 mg STAT if 1-2 years
  - Do not give if < 1 year or pregnant women.
- Give Vitamin A preventive dose to all children < 12 years
  - 100,000 IU / 4-6 months for children ≥ 6 months and < 1 year
  - 200,000 IU / 4-6 months for children ≥ 1 year and < 12 year
  - Do not give Vitamin A if the child already received Vitamin A < 4 month

2. Monitoring of PF cases admitted in IPD

- Temperature, RR, pulse, BP and consciousness (coma score) every 2-4 hours during the first 24 hours and then according to the clinical condition.
- Hb on admission
- MS at H8 and H16 and then daily until negative
- Blood glucose on admission (glucometer) and if the patient gets worse. If you use IV quinine, check glucose QID.
- Quantity of urine if the patient says there is little or if unconscious (catheterize and monitor the urine output).

3. Counselling and Prevention of Malaria

- All patients diagnosed with malaria should receive an individual and complete health education on malaria (see Appendix M)

4. Follow-up of patients after discharge

Advise to take the complete treatment, even if he feels better

- Propose a follow-up consultation with MS after 7-10 days
- Advise the patient to come back if get worse or fever continues > 48h or if fever start again.

CASE INVESTIGATION

As we move forward the elimination of Malaria, it is more and more important to conduct some investigations around the cases we diagnose.
All cases will be reported to local authorities so that they can complete a full investigation.

Appendix A. Checklist before Administrating Antimalarial Drugs

Name of Patient:			RN:	
Sex: ☐ F ☐ M	Age:		Address: ☐ Thailand ☐ Burma	
1)	Confirmed positive result: malaria smear or RDT	☐ Pf	☐ Other	☐ Neg
2)	**Pregnancy** status: urine pregnancy test if any doubt		☐ Pregnant	☐ Not pregnant
3)	**Breastfeeding** status (Lactation)		☐ No	☐ Yes
	If yes, what is the age of the breastfeeding infant?			
4)	**Severity** of malaria if <u>have</u> malaria smear:			
	a. Uncomplicated malaria (<4% IRBC and can sit or drink alone)		☐ No	☐ Yes
	b. Hyper-parasitaemia (≥4% IRBC) and/or severe malaria (cannot sit or drink alone)		☐ No	☐ Yes
4)	**Severity** of malaria if <u>not have</u> malaria smear:			
	a. Uncomplicated malaria (can sit or drink alone)		☐ No	☐ Yes
	b. Severe malaria (cannot sit or drink alone)		☐ No	☐ Yes
5)	Did the patient have malaria before?		☐ No	☐ Yes
6)	Antimalarial use in the last two months?		☐ No	☐ Yes
7)	Any history of allergy to antimalarials?		☐ No	☐ Yes
8)	Patient already treated for fever?		☐ No	☐ Yes
9)	If you intend to treat with mefloquine, check if the patient has a history of:			
	a. Neuropsychiatric disorder		☐ No	☐ Yes
	b. Epilepsy		☐ No	☐ Yes
	c. Other mefloquine reactions		☐ No	☐ Yes
	d. recent Yabba (amphetamine) use		☐ No	☐ Yes
10)	Patient weight on the scale:			kg
11)	Patient febrile?		_____	◦C

Proceed to the treatment guidelines when you know the answer to all of the above

Appendix B. Chloroquine Dosing Table

Weight (kg)	10 mg/kg (base) OD on D0	10 mg/kg (base) OD on D1	5 mg/kg (base) OD on D2
3-5	1/4	1/4	1/4
6-9	1/2	1/2	1/4
10-11	3/4	3/4	1/4
12	3/4	3/4	1/2
13-17	1	1	1/2
18-19	1 1/4	1 1/4	1/2
20	1 1/4	1 1/4	3/4
21-25	1 1/2	1 1/2	3/4
26-27	1 3/4	1 3/4	3/4
28	1 3/4	1 3/4	1
29-33	2	2	1
34-35	2 1/4	2 1/4	1
36	2 1/4	2 1/4	1 1/4
37-41	2 1/2	2 1/2	1 1/4
42	2 3/4	2 3/4	1 1/4
43-44	2 3/4	2 3/4	1 1/2
45-48	3	3	1 1/2
49-50	3 1/4	3 1/4	1 1/2
51-52	3 1/4	3 1/4	1 3/4
53-56	3 1/2	3 1/2	1 3/4
57	3 3/4	3 3/4	1 3/4
58-60	3 3/4	3 3/4	2
61-64	4	4	2
65-66	4 1/4	4 1/4	2
67	4 1/4	4 1/4	2 1/4
68-72	4 1/2	4 1/2	2 1/4
73	4 3/4	4 3/4	2 1/4
74-75	4 3/4	4 3/4	2 1/2
76-79	5	5	2 1/2
80-82	5 1/4	5 1/4	2 1/2

1 tablet contains 250 mg of chloroquine phosphate (salt) = approx. 150 mg base

Weight(kg)	**Tab**	**ml**	**Tab**	**ml**	**Frequency**
85-100	5.0 **(40 mg**				OD
5	*	1.3 ml	*	2.6 ml	OD
6	*	1.6 ml	*	3.2 ml	OD
7	*	2 ml	*	4 ml	OD
8-12	0.5		1		OD
13-20	1.0				OD
21-30	1.5				OD
31-40	2.0				OD
41-50	2 .5				OD
51-60	3.0				OD
61-70	3 .5				OD
71-84	4.0				OD

1 adult tablet contains 40mg of dihydroartemisinin and 320 mg piperaquine OR
1 paediatric tablet contains 20 mg of dihydroartemisinin, and 160 mg of piperaquine *A suspension is made by allowing 1 tablet to dissolve in 5ml clean water.

Appendix D. Oral Artesunate Dosing Table

Weight	4 mg/kg (high dose) OD				2 mg/kg OD			Frequency
(kg)	Tab		ml	Tab			ml	
2			0.8				0.4	
3			1.2				0.6	
4			1.6				0.8	
5			2.0				1.0	
6	(1/2)		2.4	(1/4)			1.2	
7	(1/2)		2.8	(1/4)			1.4	
8	(3/4)		3.2	(1/4)			1.6	
9	(3/4)		3.6	(1/4)			1. 6	
10	(3/4)		4.0	(1/2)			2.0	
11	1			1/2				
12	1			1/2				
13-14	1			1/2				
15-16	1 1/4			1/2				
17-20	1 1/2			3/4				
21	1 3/4			3/4				
22-23	1 3/4			1				
24-26	2			1				
27-28	2 1/4			1				
29	2 1/4			1 1/4				
30-32	2 1/2			1 1/4				
33-34	2 3/4			1 1/4				OD
35	2 3/4			1 1/2				
36-39	3			1 1/2				
40	3 1/4			1 1/2				
41-42	3 1/4			1 3/4				
43-45	3 1/2			1 3/4				
46	3 3/4			1 3/4				
47-48	3 3/4			2				
49-51	4			2				
52-53	4 1/4			2				
54	4 1/4			2 1/4				
55-57	4 1/2			2 1/4				
58-59	4 3/4			2 1/4				
60	4 3/4			2 1/2				
61-64	5			2 1/2				
65	5 1/4			2 1/2				
66-67	5 1/4			2 3/4				
68-70	5 1/2			2 3/4				

1 tablet contains 50 mg of artesunate.
For children, a suspension can be made by dissolving 1 tablet in 5 ml of clean water (10 mg/ml).

Appendix E. Artemether-lumefantrine (COA) dosing table

Weight (kg)	tab	Frequency
≤15	1	BID
16-25	2	BID
26-35	3	BID
>35	4	BID

1 tablet contains 20mg artemether and 120 mg lumefantrine.
Need to take with some fried or oily food or a carton of flavored milk.

Appendix F. Oral Mefloquine Dosing Table

Weight	Split dose in 3 days	
	8 mg/kg (OD)	
(kg)	tab	(ml)
5	0.5	0.8
6	0.5	1.0
7	0.8	1.2
8	0.8	1.3
9	1.0	1.5
10	1.0	1.7
11	1.0	1.8
12-14	1/2	
15-16	1/2	
17-18	3/4	
19-21	3/4	
22-23	3/4	
24-26	1	
27-28	1	
29-31	1	
32-33	1	
34-36	1 1/4	
37-38	1 1/4	
39-41	1 1/4	
42-43	1 1/4	
44-46	1 1/2	
47-48	1 1/2	
49-51	1 2/3	
52-53	1 3/4	
54-56	2	
57-58	2	
59-61	2	
62-63	2	
64-66	2 1/4	
67-68	2 1/4	
69-71	2 1/4	
72	2 1/2	
73-77	2 1/2	
78	2 3/4	
79-81	2 3/4	

Appendix G. Doxycycline Dosing Table				
Weight			4 mg/kg OD x 7 days	
(kg)		Cap	Frequency	Duration
15-37		1		
38-62		2	OD	7 days
≥ 63		3		
1 capsule contains 100 mg of doxycycline				
Contraindication: <8 years old and pregnant woman				

Appendix H. Clindamycin Dosing Table

Weight		5 mg/kg TID x 7 days		
(kg)	Cap	ml	Frequency	Duration
2		0.3 ml		
3		0.5 ml		
4		0.7 ml		
5		0.8 ml		
6		1.0 ml		
7		1.2 ml		
8		1.3 ml		
9		1.5 ml		
10		1.7 ml	TID	7 days
11		1.8 ml		
12		2.0 ml		
13		2.2 ml		
14		2.3 ml		
15		2.5 ml		
16-35	1			
36-69	2			
≥ 70	3			

1 capsule contains 150 mg of clindamycin.
For children, a suspension can be made by dissolving 1 tablet in 5 ml of sugar water (30 mg/ml).

Appendix I. Artesunate IV/IM Dosing Table		
Weight		2.4 mg/kg
(Kg)		ml
4-6		0.2
7-8		0.3
9-11		0.4
12-13		0.5
14-16		0.6
17-18		0.7
19-21		0.8
22-23		0.9
24-26		1.0
27-28		1.1
29-31		1.2
32-33		1.3
34-36		1.4
37-38		1.5
39-41		1.6
44-46		1.8
47-48		1.9
49-51		2.0
52-53		2.1
54-56		2.2
57-58		2.3
59-61		2.4
62-63		2.5
64-66		2.6
67-68		2.7
69-71		2.8
72-73		2.9
74-76		3.0
77-78		3.1
79-80		3.2

1 vial contains 60 mg powder of artesunate.
A suspension for slow IV (or IM) injection is made by dissolving 1 vial in 1 ml of 5% sodium bicarbonate (60 mg/ml).
The solution is light sensitive, prepare directly before injection and throw away the excess solution.

Appendix J. Quinine PO Dosing Table

Weight (kg)	10 mg/kg (salt) TID x 7 days			
	Tab	ml	Frequency	Duration
4		0.7	TID	7 days
5		0.8		
6		1.0		
7		1.2		
8		1.3		
9		1.5		
10		1.7		
11		1.8		
12		2.0		
13		2.2		
14		2.3		
15-18	1/2			
19-26	3/4			
27-33	1			
34-41	1 1/4			
42-48	1 1/2			
49-56	1 3/4			
57-63	2			
64-71	2 1/4			
72-78	2 1/2			
79-86	2 3/4			

1 tablet contains 300 mg of quinine sulphate (salt)
For children, a suspension can be made by dissolving 1 tablet in 5ml clean water (60 mg/ml)

Appendix K. Quinine Infusion Table

1 vial contains 600 mg of quinine dihydrochloride (salt) in 2ml (300 mg/ml).
Use D5W, D10W, D5S or NSS with infusion set: 1ml = 60 drops.
Use D10W for pregnant women and children.

Weight (Kg)	From HO until H4 Quinine loading dose 20 mg/kg (salt) Check blood glucose hourly		H8 until H10 Quinine maintenance dose 10 mg/kg (salt)		H16 to H 18 Quinine IV quinine 8 hourly if cannot take oral	
	Amount of quinine in IV Fluid	drop/min	Amount of quinine in IV Fluid	drop/min	Amount of quinine in IV Fluid	drop/min
4-5	0.3 ml in 10 ml	3 d/min or use syringe driver	0.15 ml in 10 ml	3 d/min or use syringe driver	0.15 ml in 10 ml	3 d/min or use syringe driver
6	0.4 ml in 20 ml	5 d/min or use syringe driver	0.2 ml in 10 ml	5 d/min or use syringe driver	0.2 ml in 10 ml	5 d/min or use syringe driver
7-9	0.6 ml in 50 ml	12 d/min	0.3 ml in 25 ml	12 d/min	0.3 ml in 25 ml	12 d/min
10-12	0.8 ml in 75 ml	18 d/min	0.4 ml in 40 ml	20 d/min	0.4 ml in 40 ml	20 d/min
13-15	1 ml in 100 ml	25 d/min	0.5 ml in 50 ml	25 d/min	0.5 ml in 50 ml	25 d/min
16-18	1.2 ml in 125 ml	31 d/min	0.6 ml in 65 ml	32 d/min	0.6 ml in 65 ml	32 d/min
19-21	1.4 ml in 150 ml	37 d/min	0.7 ml in 75 ml	37 d/min	0.7 ml in 75 ml	37 d/min
22-24	1.6 ml in 200 ml	50 d/min	0.8 ml in 100 ml	50 d/min	0.8 ml in 100 ml	50 d/min
25-27	1.8 ml in 250 ml	62 d/min	0.9 ml in 125 ml	62 d/min	0.9 ml in 125 ml	62 d/min
28-31	2 ml in 250 ml		1 ml in 125 ml		1 ml in 125 ml	
32-34	2.2 ml in 250 ml		1.1 ml in 125 ml		1.1 ml in 125 ml	
35-37	2.4 ml in 250 ml		1.2 ml in 125 ml		1.2 ml in 125 ml	
38-40	2.6 ml in 250 ml		1.3 ml in 125 ml		1.3 ml in 125 ml	
41-43	2.8 ml in 250 ml		1.4 ml in 125 ml		1.4 ml in 125 ml	
44-46	3 ml in 250 ml		1.5 ml in 125 ml		1.5 ml in 125 ml	
47-49	3.2 ml in 250 ml		1.6 ml in 125 ml		1.6 ml in 125 ml	
50-52	3.4 ml in 250 ml		1.7 ml in 125 ml		1.7 ml in 125 ml	
53-55	3.6 ml in 250 ml		1.8 ml in 125 ml		1.8 ml in 125 ml	
56-59	3.8 ml in 250 ml		1.9 ml in 125 ml		1.9 ml in 125 ml	
>59	4 ml in 250 ml		2 ml in 125 ml		2 ml in 125 ml	

Weight (kg)	For P Falciparum: 0.25 mg/kg STAT		
	Tab (7.5 mg)	ml	Duration
5		1.3	
6		1.5	
7		1.8	
8		2.0	
9		2.3	
10		2.5	
11		2.8	
12		3.0	
13		3.3	
14		3.5	
15		3.8	
16		4.0	
17		4.3	
18-22	3/4		
23-30	1		STAT
31-37	11/4		
38-45	11/2		
46-52	13/4		
53-60	2		
61-67	21/4		
68-75	21/2		
76-82	23/4		
83-90	3		

Weight (kg)	For P. Vivax (liver stage): 0.5 mg/kg OD x 14 days			
	Tab (7.5 mg)	ml	Frequency	Duration
4		2.0		
5		2.5		
6		3.0		
7		3.5		
8		4.0		
9		4.5		
10		5.0		
11		5.5		
12		6.0		
13		6.5		
14		7.0	OD	14 days
15-17	1			
18-20	11/4			
21-26	11/2			
27-34	2			
35-40	21/2			
41-48	3			
49-56	31/2			
57-65	4			
66-80	5			
81-100	6			

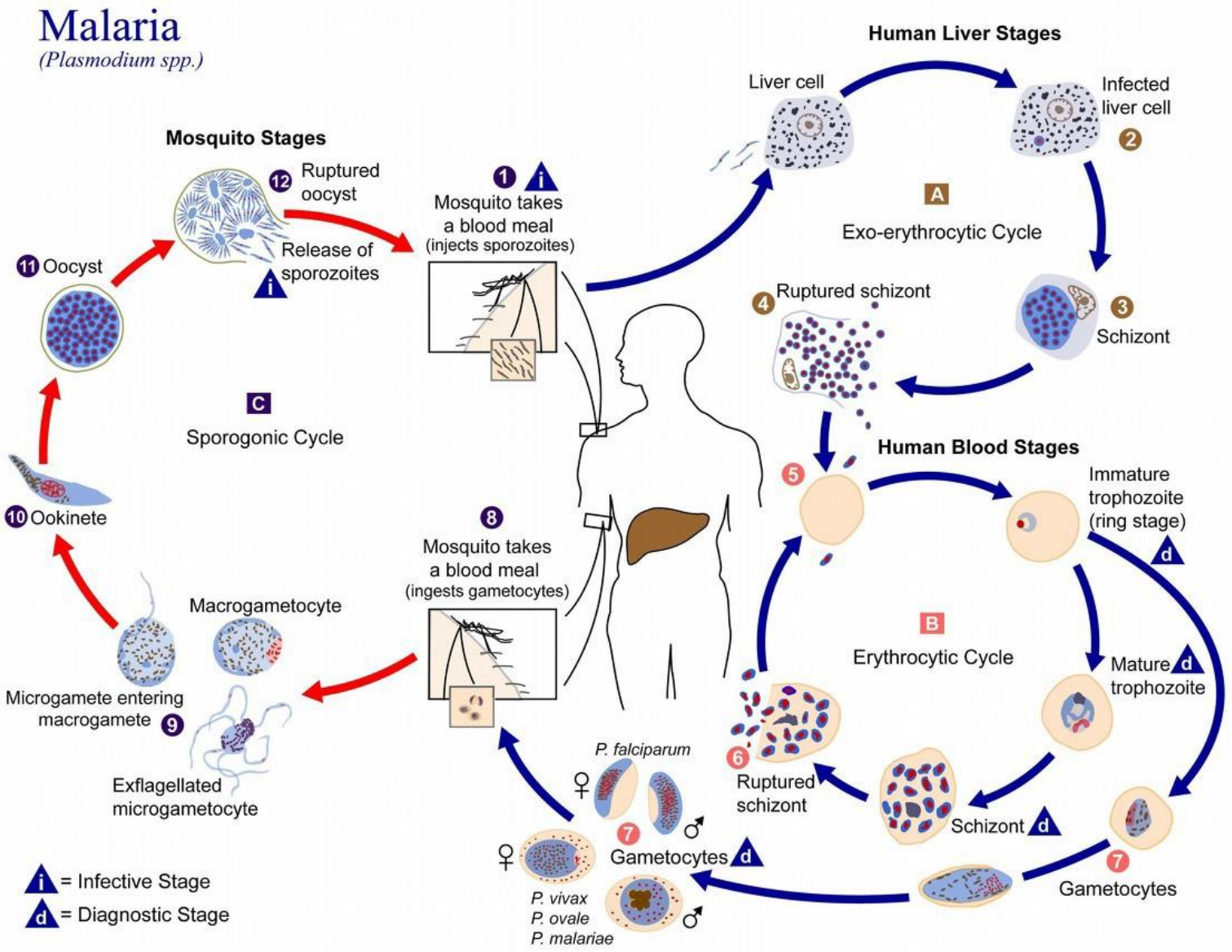
Appendix L. Primaquine Dosing Table

1 tablet contains 7.5 mg of primaquine.

For children, a suspension can be made by dissolving 1 tablet in 7.5 ml of sugar water (1 mg/ml).

Give food before dose to prevent abdominal pain and nausea.

For patient with G6PD deficiency, see Malaria Guideline of the supporting organization.



Appendix M. Malaria Life Cycle

Appendix N. Malaria Health Education

Health Education on Malaria	
The disease	• Infectious disease transmitted by a mosquito bite, mostly during the night time • Symptoms: fever, headache, chills, rigor, sweating, muscle or joint pain, nausea, vomiting, abdominal pain, diarrhoea • Can cause death if not treated
How to prevent	Avoid mosquito bites: • Long clothes: after 6PM and until the morning • Repellent (DEET 25 %): 1 application at 6PM on the skin that is not covered by clothes. Active for 7 hours. Repeat the application during the night if not protected by a LLIN/LLIHN. Maximum 3 applications per 24h. o contraindication for pregnant women. Contraindicated for children < 2 years old. • LLIN or LLHIN (Impregnated with Cypermethrin): to be used every night. Efficacy 3 years, can be washed 100 times)
Early diagnosis and treatment	• If you have fever, go to the clinic to check for malaria • Treatment can cure malaria, but you need to take the complete treatment
Follow-up	• Sometimes, the disease can come back after the treatment • If get worse of if fever ≥ 48 h or if fever starts again in the next 2 months, come back to the clinic to check for malaria

Appendix O. Malaria Case Investigation Form for GF-Malaria

MAE TAO CLINIC

Case investigation of new Malaria Cases

The Global Fund

Date of diagnosis: ….. / ….. / ……. (dd/mm/yyyy)
Species: ☐ PF ☐ PV ☐ MIX ☐ PM ☐ PO
Patient name (initials): …… Sex: ☐ Male ☐ Female
RN: …….. Age: …….. years

1. History of blood transfusion in the last 2 months? ☐ Yes ☐ No
   If Yes, when: ….. / ….. / ……. (dd/mm/yyyy)
2. History of Malaria in the last 2 months? ☐ Yes ☐ No
   If Yes: Date of last positive smear: ….. / ….. / ……. (dd/mm/yyyy)
   Species: ☐ PF ☐ PV ☐ MIX ☐PM ☐ PO ☐ Unknown
   Date of radical treatment: ….. / ….. / ……. (dd/mm/yyyy)
   Regimen: …… ☐ Completed ☐ Not completed
3. Country of residence: ☐ Thai ☐ Burma
   If Thai resident, history of travel to Burma side in the last 2 weeks? ☐ Yes ☐ No
4. Self-protection
   Mosquito nets used ☐ Yes ☐ No Repellents used ☐ Yes ☐ No

INFECTIOUS DISEASES: VIRAL DISEASES

CHIKUNGUNYA

- An acute viral infection that is transmitted by the mosquitoes Aedes aegypti and Aedes albopictus.
- These mosquitoes also transmit dengue and Zika viruses.
- The incubation period is 3-7 days (up to 14 days) like dengue virus.

SIGNS AND SYMPTOMS

Most common symptoms

- Sudden onset of high fever.
- Joint pain (hands, wrists, shoulders, ankles). This may be the first symptom, even before fever (in 70% of patients).
- Rash 3 days after illness starts but this can be different between patients. Starts on limbs and trunk. Can cause bullous lesions in children.

Other symptoms

- Headache.
- Face swelling (not oedema).
- Nausea, vomiting, diarrhea.
- Lymphadenopathy (cervical).
- Conjunctivitis.

COMPLICATIONS

- Respiratory failure
- Myocarditis or heart failure
- Acute hepatitis
- Renal failure
- Bleeding
- Meningoencephalitis or seizures
- Eye problems
- **Chronic arthritis or joint pain**

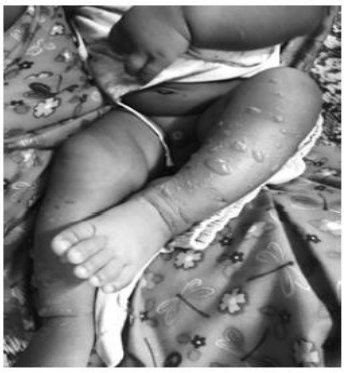


Figure: Bullous lesions on an infant with chikungunya infection

DIAGNOSIS

- PCR (1 ml in EDTA tube) up to day 7. Do not take PCR sample if symptoms are >7 days because it will be negative.

TREATMENT

1. Supportive treatment only.
2. **Paracetamol**.
   - If pain is not controlled with paracetamol, add NSAID or ASA. Avoid these drugs if you suspect dengue because it can affect the platelets and increase the risk for bleeding.
3. **Tramadol** can be used for severe pain.
4. For chronic arthritis:
   - Prednisolone (should NOT be used during the acute infection) – deworm before starting treatment.
   - **Methotrexate** if prednisolone is not helping.
   - **Avoid** using **NSAID** (gastritis) or Tramadol (addiction) for long duration.

PREVENTION

- Aedes mosquito bites during the day - lay eggs in still water.
- IPD patients should stay under the mosquito net even during the day, to prevent transmission to others.

Protection for yourself:

1. Long-lasting, impregnated bed nets for those who sleep in the daytime (e.g., patients in IPD).
2. Long sleeves, trousers, socks.
3. Insect repellents.
4. Burning mosquito coils.

Protection for your community:

1. Covering containers that have water.
2. Avoid leaving containers outside that can fill up with rainwater e.g., turn buckets upside down.
3. Empty containers (e.g., buckets, tyres) that collect water e.g., after it rains.
4. Clean drains from leaves so that they do not block, and water does not drain away.
5. Killing the mosquito larva in the water e.g., putting abate bags in containers.
6. If have still water that is difficult to cover e.g., water used to flush toilet you can leave the tap dripping slowly, this moves the water, so the mosquito does not want to lay its eggs there.

> It is very important to try to keep patients with dengue under a bed net in the daytime so that they do not get bitten by mosquitoes and transmit the dengue to other patients and staff.

VACCINATION

There is no vaccine available.

COVID-19

SYMPTOMS

Common symptoms include headache, fever, loss of appetite, loss of smell, fatigue, cough, shortness of breath, nasal congestion, sore throat, muscle pain, diarrhoea.

In severe disease

- Difficulty waking
- Confusion
- Bluish face or lips
- Coughing up blood
- Persistent chest pain
- High fever
- Dyspnoea
- Hypoxia
- Pneumonia
- Respiratory failure
- Shock

TRANSMISSION

- respiratory route
- virus containing particles exhaled by an infected person, either respiratory droplets or aerosols, get into the mouth, nose, or eyes of other people
- **indirectly by touching a contaminated surface or object before touching their own mouth, nose, or eyes.**
- **A person who is infected** can transmit the virus to others up to two days before they themselves show symptoms, even if symptoms never appear. People remain infectious in moderate cases for **7-12 days**, and up to two weeks in severe cases.
- evidence of reinfection in one person.

PATHOPHYSIOLOGY

- The lungs are the organs most affected by COVID-19
- also affects gastrointestinal organs
- **acute myocardial injury** and **chronic damage to vascular system**. Blood vessel disfunction (**Thrombosis, venous thromboembolism**)
- injury to kidney
- **cytokine storm** leading to **systemic inflammatory response syndrome (SIRS).**

DIAGNOSIS

1. Nucleic acid tests - detect the presence of virus RNA fragments - obtained by a nasopharyngeal swab.
2. Serology tests detection of past infection, which detects antibodies.
3. CXR
4. Chest CT scan

PREVENTION

1. FACE MASK
2. Social distancing
3. Frequent hand washing
4. Avoid crowd.
5. Vaccination

COMPLICATIONS

- Pneumonia
- Acute respiratory distress syndrome (ARDS)
- Multiorgan failure
- Septic shock
- Heart failure
- Elevated liver enzyme, liver injury
- Seizure
- Stroke
- Encephalitis
- Guillain-Barre's syndrome
- Death

Vaccination (January 14, 2022) Source - WHO

Company	Vaccine Platform	Schedule	Number of doses
Sinovac	Inactivated virus	Day 0 + 14	2
Sinopharm	Inactivated virus	Day 0 + 21	2
Astra Zeneca + University of Oxford	Non-replicating viral vector	Day 0 + 28	1-2
Gamaleya (Sputnik V)	Non-replicating viral vector	Day 0 + 21	2
Janssen + Johnson and Johnson	Non-replicating viral vector	Day 0 (or) Day 0 + 56	1-2
Novavax	Protein subunit	Day 0 + 21	2
Moderna	RNA based vaccine	Day 0 + 28	2
Pfizer/BioNTech	RNA based vaccine	Day 0 + 21	2
Sanofi + GSK	Protein subunit	Day 0 + 21	2

Treatment of mild COVID-19 cases

- (ရောဂါပိုး ကူးစက်ပျံ့နှံ့မှုမရှိစေရန် လူနာကိုအိမ်တွင်သီးသန့်ထားပါ။)
- ခံစားရသော ရောဂါလက္ခဏာများအတွက် ဆေးပေးပါ။ (ဥပမာ - ကိုယ်ပူခြင်း ၊ ကိုက်ခဲခြင်းတို့အတွက် paracetamol ပေးပါ။)
- အာဟာရသင့်လျော် လုံလောက်မှုရှိပါစေ။
- အရေးပေါ်ကုသရန်လိုအပ်သော ရောဂါလက္ခဏာများကို သိရှိစေရန်ဆွေးနွေးပါ။
- ပိုးသတ်ဆေး (antibiotic) မပေးရပါ။
- ဖြစ်လေ့ရှိသောသာမန်ရောဂါလက္ခဏာများအတွက် ကုသမှုများမှာ-
- ကိုယ်ပူခြင်း, ကိုက်ခဲခြင်းအတွက် paracetamol 500 mg tds or qid ပေးပါ။
- အာဟာရသင့်လျော်လုံလောက်မှုရှိပါစေ။
- ချောင်းခြောက်ဆိုးပါက Dextromethorpham 10 mg or 6 mg tds ပေးပါ။ သလိပ်ပါလျှင် Bromhexine or Acetylcysteine tds ပေးပါ။
- နှာချေခြင်းအတွက် Fexofenadine 120mg OD (or) Cetirizine 10mg od Chlorphenamine maleate 4mg (1) HS ပေးပါ။
- ဝမ်းလျှောခြင်းအတွက် ဓါတ်ဆားပေးပါ။ Zinc ဆေးပြားပါ ပေးနိုင်သည်။
- အနံ့ပျောက်ခြင်းအတွက် (၂ပါတ်) အတွင်းမည်သည့် ဆေးမှမပေးရပါ။
- နှာစေးနှာပိတ်လက္ခဏာများ ၂ပါတ်ကျော်လျှင် nasal steroid or spray ပေးနိုင်သည်။

Treatment of moderate Covid 19 cases

- ရောဂါပိုးကူးစက်ပျံ့နှံ့မှုမရှိစေရန် လူနာကိုအိမ်တွင်သီးသန့်ထားပါ။
- Pneumonia ရှိသည်ဟုယူဆလျှင် oral antibiotic ပေးပါ။
- ရောဂါလက္ခဏာတိုးတက်/ဆုတ်ယုတ်မှုရှိမရှိ စောင့်ကြည့်ပါ။
- ရောဂါလက္ခဏာပြင်းထန်မှု အသင့်အတင့်သာရှိသော်လည်း ရောဂါအခြေအနေပိုမိုဆိုးဝါးလာနိုင်သည့် အချက်များရှိပါက ဆေးရုံတက်ကုသရန် လိုအပ်လာနိုင်သည်။ (ဖြစ်နိုင်လျှင်လူနာကိုလွှဲပို့ပါ။)
- ရေနှင့်အရည်များ အဝင်နှင့်အထွက်သည်အရေးကြီးသဖြင့် နေ့စဉ်အဝင်၊အထွက်ကို မှတ်ထားရပါမည်။ ပုံမှန်အားဖြင့်နေ့စဉ်ရေနှင့်အရည် 2.5-3L အဝင် (သောက်သုံး+ ဆေးသွင်း) ရှိ၍ စွန့်ထုတ်မှုပမာဏမည်မျှကိုလည်းမှတ်ပါ။
- Pneumonia ၏ ရောဂါလက္ခဏာများမှာ ချောင်းဆိုးခြင်း (သလိပ်အစိမ်း၊ အဝါ၊ (သို့မဟုတ်) သွေးပါသောအချွဲများထွက်နိုင်သည်။)
- ကိုယ်ပူခြင်း ၊ ချွေးထွက်များခြင်း၊ ချမ်းတုန်ခြင်း
- မောပန်းခြင်း
- လေကောင်းစွာဝင်အောင် မရှူနိုင်ဘဲ အသက်ရှူမြန်ခြင်း
- ရင်ဘတ်ဆူးရှစွာအောင့်ခြင်း အသက်ပြင်းပြင်းရှူသော အခါနှင့် ချောင်းဆိုးသောအခါတွင်ပိုမိုရှုအောင့်ခြင်း
- အစားအသောက်ပျက်ခြင်း ၊ အားနည်းခြင်း ၊ နုံးခွေခြင်း

Defining pneumonia in COVID-19

	Pneumonia	Severe pneumonia
Adult and adolescents	Fever, cough, dyspnea, fast breathing, SpO2 ≥ 90%** on room air	Pneumonia plus one of the following: ▪ Respiratory rate > 30 breaths/min; ▪ Severe respiratory distress; or SpO2 < 90% on room air
Child	Cough or difficulty breathing, plus fast breathing* and/or chest indrawing	Pneumonia plus at least one of the following: ▪ Central cyanosis or SpO2 < 90%; ▪ Severe respiratory distress (e.g. fast breathing*, grunting, very severe chest indrawing); ▪ Any one general danger sign: inability to breastfeed or drink, lethargy or unconsciousness, or convulsions
	*Fast breathing is defined by age: <2 months of age ≥ 60 breaths/minute; 2-11 months ≥ 50 breaths/minute; 1-5 years ≥ 40 breaths/minute	

WHO: COVID-19 Clinical management: Living guidance (25 Jan 2021). https://www.who.int/publications/i/item/WHO-2019-nCoV-clinical-2021-1

Antibiotic for Pneumonia

Mild pneumonia

Augmentin 625 mg tds po + Azithromycin 500mg od po x 5 days

Alternatively, Azithromycin is not available Erythromycin 500 mg tds or qid

If Augmentin is not available, Amoxicillin 500 mg tds po X 5 days

Moderate / Severe pneumonia

IV Augmentin 1.2 g 8 hourly X 7 days + IV Azithromycin 500 mg OD for 7 days If not better Ceftriaxone inj: 1 to 2 g IV or IM once a day or 12 hourly. If not available

Inj: Cefotaxime 2 g IV 6 hourly or IV Cefuroxime (750 mg to 1.5 g IV or IM 8 or 6 hourly) + Azithromycin (above dose)

If Ceftriaxone, Cefotaxime, Cefuroxime is not available, Ampicillin Inj: 2 g IV 6 hourly X 7 days

Treatment of severe COVID-19 cases

- SPO2 < 93% on room air ဖြစ်နေသော ပြင်းထန်လူနာများနှင့် အလွန်ပြင်းထန်သော ရောဂါရှိနေသူများဖြစ်သည်။
- O2 ကို 2-5 L/minute မှ 15 L/minute အထိကို လူနာအခြေအနေပေါ်မူတည်၍ အတိုးအလျော့လုပ်၍ပေးပါ။ nasal prong or facemask or with reservoir bag စသော O2 ပေးရန်သုံးသည့်ပစ္စည်းများကို သင့်တော်သလိုပေးပါ။
- SPO2 <= 93% on room air ဖြစ်နေသော ပြင်းထန်လူနာများတွင် Corticosteroid therapy ပေးမည်။
- O2 မလိုအပ်သော သာမန်ရောဂါလက္ခဏာရှိသူများ (သို့) အသင့်အတင့်ပြင်းထန်လူများ Pneumonia မရှိသူများတွင် Corticosteriod ကိုကာကွယ်ရန်ဖြစ်စေ ကုသရန်ဖြစ်စေ မပေးသင့်ပါ။

  PO on injection Dexamethasone 6 mg for 7 to 10 days (သို့) Prednisolone 40 mg PO daily ပေးမည်။ Corticosteroid ကြောင့် အစာအိမ်ရောဂါဖြစ်ခြင်းမှ ကာကွယ်ရန် Omeprazole (or) Pantoprazole (40mg BD PO x 7 to 10 days) ပေးနိုင်သည်။

Treatment of Patients moderate to severe categories with co-morbidities

အကယ်၍လူနာသည် ဆီးချိုရောဂါရှိပြီး steroid လည်း သောက်နေရပါက သွေးအတွင်းသကြားဓါတ်ပုံမှန်အတိုင်း ထိန်းချုပ်ရန်မှာ စိန်ခေါ်မှုတစ်ခုပင်ဖြစ်သည်။ အခြားရောဂါများ (သွေးတိုးရောဂါ, နာတာရှည် အဆုတ်ရောဂါ စသည်ဖြင့်) ရှိနေသော COVID 19 လူနာများကို Clinician များနှင့် ဆွေးနွေးတိုင်ပင်ကုသရန် အထူးတိုက်တွန်းလိုသည်။

COPD patients should not give high oxygen because if oxygen concentration is high their lungs can't work properly. Their lungs used to work with lesser concentration of oxygen.

Covid with Diabetes

- Stop oral diabetic drugs and change to insulin therapy if severe COVID. If on insulin check ketone when BS is > 300 mg/dl. Start isophane insulin 10 IU once daily for insulin therapy and should refer to physician.
- Continue oral anti-diabetic drugs if non-severe COVID.
- Sometimes blood sugar will high in non-diabetic COVID patient because of steroid therapy. In these cases, start insulin if severe COVID. If non-severe COVID can prescribe oral anti-diabetic drugs.
- Metformin should stop in severe COVID and severe nausea & vomiting.
- If blood sugar is ≥ 250 mg/dl mg/dl, Use Gliclazide and Metformin together and if blood sugar is ≤ 250 mg/dl use only one drug.
- In diabetic patient TAKE ACTION if FBS is ≥ 130 mg/dl or RBS ≥ 200 mg/dl. RBS should be 140-180 mg/dl.

Rapid Insulin Therapy

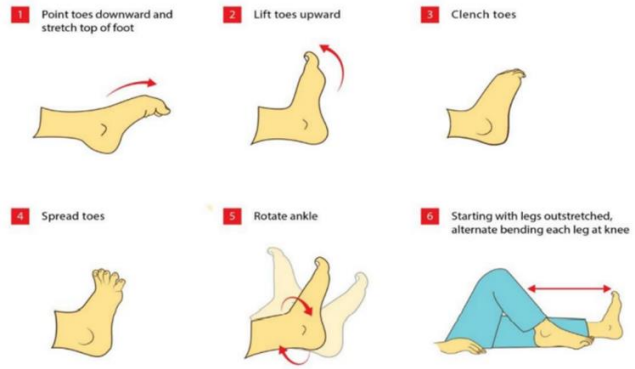
Glucose	<50 Kg	50-100 Kg	>100 Kg
200-299	2	2-4	4-6
300-399	4	6-8	8-10
400-499	6	8-10	10-12

Glargine OD	
Start	10 U
<100	6-8 U
100-199	Same U
200-300	12-14 U
>300	14-18 U

Prophylaxis for Thrombosis

- Thrombosis is a prominent feature in severe COVID-19 patients. Physiotherapy may help.
- Anticoagulation for hospitalized severe COVID-19 patients even in the absence of testing if no contraindications (renal failure- reduced dose 50%)
- Monitoring: risk of bleeding, heparin-induced thrombocytopenia
- SC Enoxaparin 40 mg (0.4 ml) OD (high risk of bleeding) or
- SC Unfractionated heparin 5000 U BD or Tinzaparin 4500 U OD or
- Dalteparin 5000 U OD or Fondaparinux 2.5 mg SC or PO Rivaroxaban 10mg OD (not in pregnancy)
- Duration: Standard thromboprophylaxis is until hospital discharge
- Suspect possible Venous Thrombo-embolism (VTE)
  Unilateral limb swelling
- Sudden deterioration of oxygenation/ Respiratory distress
- Reduced BP
- New onset tachycardia
- Hypoxia disproportionate to CXR findings
- USG, CT chest

Foot exercises to prevent/minimize DVT



When to start DVT Prophylaxis

PADUA Prediction Score for Risk of Venous Thromboembolism

1. Active cancer – 3 points
2. Previous VTE excluding superficial vein thrombosis –3 points
3. Reduced mobility – 3 points
4. Already known thrombophilic condition – 3 points
5. Recent (≤1 month trauma and/or surgery) – 2 points
6. ≥70 years of age – 1 point
7. Heart and/or respiratory failure – 1 point
8. Acute myocardial infarction and/or ischaemic stroke – 1 point
9. Acute infection and/or rheumatologic disorder – 1 point
10. BMI >30 – 1 point
11. Ongoing hormonal treatment – 1 point

Interpretation
- 0-3 points – No need DVT prophylaxis
- 4 and above – Need DVT prophylaxis

Anti-viral drugs
- Remdesivir Injection
- Favipiravir Tablet

Remdesivir Injection
- Age ≥ 18 year. Patient has severe pneumonia (SpO2 room air ≤ 94%).
- Remdesivir is safe in pregnancy.
- Recommendation for the use of Remdesivir only benefit in patient with pneumonia and required supplementary oxygen for treatment.
- Before using Remdesvir inj: LFT and renal function should be assessed and better to discuss with physician.
- Symptom onset of within 10 days is preferrable.
- Pulmonary infiltrates or pneumonia on CXR (if CXR available)
- Needing supplemental oxygen therapy with oxygen saturation of ≤ 93% on room air.
- Pregnant women in all trimesters with pneumonia, the use of Remdesivir may be considered because safety in pregnancy. Remdesivir benefit in patient with pneumonia and required oxygen for treatment. (Thai guideline)

Favipiravir Tablet
- Using Favipiravir in pregnant women may cause teratogenic effect. Therefore, if the patient is in the reproductive age, pregnancy test should be done before prescribing the medicine and recommendation must be given to engage patients and family in decision making.
- In general, Favipiravir can prescribe without LFT and renal function if facility not available because it is less toxic than Remdesivir.
- Recommend prescribing Favipiravir for 5-10 days, depending on clinical manifestation. Better to consultation with experts. (Thai guideline)
- Confirmed case with mild symptoms and no risk factors (Symptomatic COVID-19 without pneumonia and no risk for severe diseases) may consider Favipiravir tablet. (Thai guideline)

Dosage for Remdesivir & Favipiravir

Inj: Remdesivir Infusion
- DAY 1: IV Remdesivir 200 mg in 0.9% Normal Saline 200 ml within 1.5 hours (45 drops per minute with Adult set) for the first day. Flush line with at least 30 mL of normal saline after remdesivir infusion is completed.
- DAY 2: IV Remdesivir 100 mg in 0.9% NS 100 ml for next 4 days (Total 5 days). Flush line with at least 30 mL of normal saline after remdesivir infusion is completed.

Favipiravir Tablet
- DAY 1: Favipiravir (200 mg/tal) 1,800 mg (9 tablets) twice daily X 1day
- DAY 2: Favipiravir (200 mg/tab) 800 mg (4 tablets) twice daily up to total 7 days.

Criteria for admission & Discharge

Criteria for admission

Anyone of the following parameters:
- Respiratory rate > 30 breaths/min
- Severe RD
- Sp02 ≤ 93% on room air
- Systolic blood pressure < 100 mmHg
- Altered mental status (GCS < 15)

Criteria for discharge
- Patients who can leave the hospital are those who have passed the disease transmitted stage, no need to isolate or quarantine but have to maintain the principles of preventing infection according to the new standards.

- Improvement of symptoms.
- Body temperature not exceeding 37.8C for the past 24-48hr
- Respiratory rate of no more than 20 times/min.
- SpO2 room air >96% at rest without 02 supplement for 24 hr
- Patients who tested positive do not need a repeated swab and patients whose conditions improve can be discharged without swabbing.

End-of-life care

အကယ်၍လူနာသည်အသက်ရှူရခက်ခြင်းကိုပြင်းထန်စွာ ခံစားနေရလျှင် ရောဂါလက္ခဏာ တိုးတက်ကောင်းမွန်လာခြင်းမရှိလျှင်၊ ၎င်း၏အသက်ရှင်ရပ်တည်ရေးအတွက် ခက်ခဲစွာရုန်းကန်နေရလျှင် - လူနာနှင့်လူနာ၏ မိသားစုဝင်များကိုစိတ်ပိုင်းဆိုင်ရာအားတက်စေရန် သက်သာစေရန် ဆောင်ရွက်ရမည်။ ဆေးခန်း၏အကြီးအကဲနှင့် တိုင်ပင်ပါ။

အသက်ရှူရခက်ခြင်း ၊ မောခြင်းတို့ကို သက်သာစေရန် -

IV or PO Diazepam 2-5mg (up to 10 mg) every 8 hours နှင့်ပျို့အန်ခြင်းအတွက် သက်သာစေရန်

Metoclopramide oral 10mg (4x/day) or 10mg/IV tds ပေးနိုင်သည်။

OXYGEN THERAPY FOR COVID-19 PATIENTS

Patients with Covid-19 pneumonia present with hypoxaemia of varying degrees. The cornerstone for the management of the hypoxaemia is the application of oxygen therapy via a variety of delivery methods.

General principles of Oxygen therapy in adults:

When to start:

Give oxygen if hypoxemic- measure oxygen saturation by pulse oximeter then titrates

- SpO2 <90% (hemodynamically stable patient)
- SpO2 <94% (pts with hemodynamically unstable)
- SpO2 <92-95% (pregnant women)

Note: The use of the prone position in non-intubated patients and conscious patients who are hypoxaemic are proved to be much beneficial.

Target:

- SpO2 ≥90% in non-pregnant adults and SpO2 ≥94% in pregnant patients.

Step 1: Start oxygen 2-3 L/min with nasal cannula. (up to 5L/min)

- After starting oxygen, recheck the oxygen saturations after 5 minutes. If the saturation is still <90%, increase the oxygen up to 5L/min with nasal cannula.
- After 15 min of oxygen treatment with 5L/min, if RD is still increasing or SPO2 < 90% in non-pregnant or 94% in pregnant woman, go to Step:2.

Step 2: Give oxygen 6-10 L/min with face mask. (up to 10L/min)

- Recheck the oxygen saturations after 5 minutes and increase the oxygen from 6L/min to 10/min as required.
- After 15 min of oxygen treatment with 10L/min, if RD is still increasing or SPO2 < 90% in non-pregnant or 94% in pregnant woman, go to Step:3.

Step 3: Give oxygen 10-15L/min with facemask with reservoir. (Make sure reservoir MUST be full with Oxygen)

- Recheck the oxygen saturations after 5 minutes and increase the oxygen from 10L/min to 15L/min as required.
- If oxygen saturation is not up to the target.

If SpO2 remains <90% while on 15L/min, try adding a nasal cannula at 5L/min to the reservoir mask at 15L/min. (Arrange to transfer to higher level hospital for ICU care.)

Procedure: Check oxygen saturation every 2 hours and step up or step down according to the chart.

- Step up if the patient is not improving from previous measurement.
- Titrate oxygen therapy up and down to reach targets by means of a nasal cannula, simple face mask or face mask with reservoir bag, as appropriate.
- Step down if the patient reaches the target SpO2 >90% in 2 consecutive measurements
- Monitor SpO2 for 5 minutes after stepping down.

***** Try prone position to improve oxygenation in all severe COVID patients.

*** Nasal cannula should not be reused.

*** Face masks and reservoir bags must be heat disinfected between each patient use if they are used for more than one patient.

When Oxygen Therapy start if no pulse oximeter?

- If can't measure the oxygen saturation, it is essential to observe clinical features.

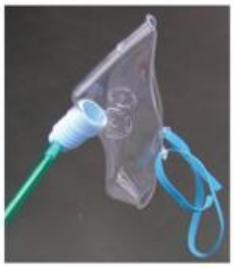
- RR > 30/min
- Shortness of breathe, Dyspnea
- Cyanosis
- Develop mental confusion

Increasing oxygen concentra-tion ↓	Oxygen Flow	Method
	1L	Nasal cannula or prongs
	2L	Nasal cannula or prongs
	3L	Nasal cannula or prongs
	4L	Nasal cannula or prongs
	5L	**Nasal cannula or prongs**
	>6 L	Face mask
	10-15 L	Face mask with reservoir*

Nasal Prongs

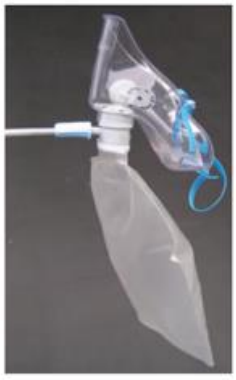
Nasal Prongs များသည်အသုံးပြုရလွယ်ကူ၍ လူနာအတွက် သက်သောင့်သက်သာရှိစေသည်။ Oxygen flow rate ကို 1L/min မှ 5L/min အထိပေးနိုင်သည်။ ခြောက်သွေ့မှုနှင့်အောက်စီဂျင်တိုးသည့် ဖိအားကြောင့် > 4L/min ထက်ပိုပေးနိုင်ရန် ခက်ခဲသည်။

Simple Face Mask



Simple face masks များသည် oxygen concentration ကို 40-60% အထိ ပေးနိုင်သည်။ အောက်စီဂျင်ပေးနှုန်း 5 နှင့် 10L/min အကြားလိုသလို အတိုးလျှော့လုပ်နိုင်သည်။ < 5L/min အောက်ပေးရန်အတွက်မူ မသုံးသင့်ပါ။ <5L/min အောက်ကို Simple face mask နှင့်ပေးလျှင် ရှူထုတ်လိုက်သော ကာဗွန်ဒိုင်အောက်ဆိုဒ်များ mask အတွင်းစုနေကာ ၎င်းကာဗွန်ဒိုင်အောက်ဆိုဒ်များကို ပြန်ရှူမိနိုင်သောကြောင့်ဖြစ်သည်။

Face Mask with Reservior Mask (Non-Rebreathing Mask)



High concentration reservoir masks များတွင် reservoir bag အတွင်း၌လေကို 600-1000 mL ထိ ထိန်းသိမ်းထားနိုင်၍ ပိုမိုမြင့်မားသော oxygen concentration ကိုပေးနိုင်သည်။

Non-rebreather mask ဖြင့် အောက်စီဂျင်ကို 10-15 L/min ထိပေးနိုင်သည်။ O2 ရှူနေချိန်တွင် reservoir bag ကိုဖြည့်ပေးထားရမည်။

Mask သည် လူနာ၏မျက်နှာနှင့်ကိုက်ညီမှုရှိစေရန် စစ်ဆေးပါ။

Mask ၏နှာခေါင်းနှင့် ပါးစပ်ပတ်လည်ထိတွေ့သော နေရာကိုထိကပ်လုံခြုံပါစေ

Metal noise piece ကို နှာတံရိုးပေါ်တွင် ပုံစံကျအောင်လုပ်ပါ။

Mask စနစ်တကျတပ်ထားသောပုံစံအတိုင်းဆက်ရှိနေစေရန် အရေးကြီးကြောင်း လူနာကိုပြောပြပါ။

Mask ကောင်းကောင်း အလုပ်လုပ်ခြင်းနှင့် bag သည် လေပြည့်ဝနေစေခြင်းတို့ကို စစ်ဆေးပါ။

Non-rebreathe mask များသည် လူနာရှူထုတ်လိုက်သော CO2 များကို တစ်ဖက်ပွင့် အဆို့ရှင်များဖြင့် အပြင်ကို ထုတ်ပေးသောကြောင့် လူနာအား CO2 များ ပြန်လည် ရှူသွင်းမိခြင်းမှ ကာကွယ်ပေးပါသည်။

O2 flow rate 10-15L/min ပေးပါက non-rebreathe mask များသည် O2 concentration ကို 80% ခန့် (60-90%) ပို့လွတ်ပေးနိုင်သည်။

ပို့လွတ်လိုက်သော O2 concentration ပမာဏသည် mask သည် လူနာ၏ မျက်နှာပေါ်တွင် နေရာတကျရှိမှုနှင့် လူနာ၏ အသက်ရှူသွင်းသည့် ပုံစံပေါ်မူတည်ပြီး ပြောင်းလဲနိုင်ပါ

သည်။ Mask ဖြင့် လူနာကို ရှူသွင်း၍ မတပ်ဆင်မီ reservior bag ကို O2 ပြည့်အောင် ဖြည့်ပါ။

The reservior bag mask ကို အသုံးပြုသည့်အခါ O2 ပေးသည့်နှုန်းကို အနည်းဆုံး 10L/min ပေးရပါမည်။

လူနာသည် အသက်ရှူရခက်နေခြင်း၊ ခက်ခဲစွာ၊ လျင်မြန်စွာ ရှူသွင်း နေရခြင်းတို့ရှိပါက O2 flow rate ကို လုံလောက်မှုရှိစေရန်၊ ထိရောက်မှုရှိစေရန် ချိန်ပေးရပါမည်။

ဤကဲ့သို့ လိုအပ်သလို ချိန်ညှိပေးခြင်း မပြုလုပ်ပါက လေအိတ် bag သည် ပြားချပ်သွားပြီး လူနာ၏ အောက်စီဂျင် ရရှိမှုကို ထိခိုက်စေနိုင်ပါသည်။

ထို့ကြောင့် လုံလောက်ထိရောက်မှုရှိစေရန် လူနာ အသက်ရှူသည့်အခါတိုင်း reservior bag ကို ၎င်း၏ 60% ထက် ပိုပြားမသွားစေရန် ဂရုစိုက်ရပါမည်။

Instruction with Non-rebreather mask use

- Oxygen flow must be at least 10L/min and the reservoir bag should fill up in between breaths.
- Check the mask fits well to the patient's face
- Tighten the elastic strap
- Shape the metal nose piece to their nasal bridge
- Explain to patient the importance of keeping it on
- Check that the mask is working and the bag is fully inflated.
- In a small number of patients with severe respiratory distress, a non-rebreather mask will not deliver an adequate flow of oxygen. Suspect this is the case if the reservoir bag is emptying completely despite 15L being delivered. In this situation try adding a nasal cannula with 5L (as below) and ensure that the mask is not too tight on the patient's face.

General principles of Oxygen therapy in children:

When to start:

- Children presenting with emergency signs (obstructed or absent breathing, severe respiratory distress, central cyanosis, signs of shock, coma or seriously reduced level of consciousness, seizures, signs of severe dehydration) with or without respiratory distress should receive oxygen therapy if their SpO2 is < 94%. These children should receive oxygen initially by nasal prongs at a standard flow rate.
- Any child with an SpO2 < 90% should receive oxygen.
- SpO2 range is lower at higher altitudes, it may be appropriate to give oxygen only at an SpO2 of ≤ 87% to children living at altitudes > 2500 m, if oxygen supplies are limited.

Danger signs indicating urgent and immediate treatment / referral include:

- oxygen saturation of < 90% in room air
- cyanosis
- nasal flaring
- inability to drink or feed (when this is due to respiratory distress)
- grunting with every breath and
- depressed mental state (i.e. drowsy, impaired consciousness, lethargic)

Non-specific signs of hypoxia

- severe lower chest walls indrawing,
- respiratory rate of ≥ 70/min or
- head nodding (i.e. a nodding movement of the head, synchronous with the respiration and indicating severe respiratory distress).

*Even the best observations of clinical signs commonly result in misdiagnosis of hypoxaemia in children. Pulse oximetry is the most accurate non-invasive method for detecting hypoxaemia. It is used to measure the % of oxygenated Hb in arterial blood (SpO2).

Target:

- Children with emergency signs (obstructed or absent breathing, severe respiratory distress, central cyanosis, shock, coma or convulsions) should receive oxygen therapy during resuscitation to target SpO2 ≥94%; otherwise, the target SpO2 is ≥92%.

Procedure:

Nasal prongs are the preferred method of delivering oxygen to infants and children < 5 years of age with hypoxaemia who require oxygen therapy.

<u>Practical considerations:</u>

- The distal prong should fit well into the nostril (premature infants: 1 mm; infants weighing up to 10 kg: 2 mm).
- The prongs should be secured with a piece of tape on the cheeks near the nose.
- Care should be taken to keep the nostrils clear of mucus to avoid blockage.

<u>Starting flow and titration parameters</u>

- 0.5–1 L/min for neonates;
- 1–2 L/min for infants;

- 2–4 L/min for older children or through an appropriately sized face mask (> 4 L/min) to reach an SpO2 of ≥ 94%.
- If severe hypoxaemia persists despite maximal flow rates: start oxygen with face mask with reservoir bag.

Once oxygen therapy has been initiated, the child must be checked within 15– 30 min to observe whether the treatment is working.

Measurement of Oxygen Saturation

Pulse Oxymetry

Pulse oximetry is the most accurate non-invasive method for detecting hypoxaemia. It is used to measure the percentage of oxygenated haemoglobin in arterial blood (SpO2).

Sensor probe, which is attached to the patient's finger, toe or earlobe. The oximeter displays the SpO2 with an audible signal for each pulse beat, a pulse rate and, in most models, a graphical display of the blood flow past the probe. Cost-effective

Blood Gas Analysis

Very accurate method for detecting hypoxaemia. It is used to measure the partial pressure of oxygen (PaO2) and carbon dioxide in blood and also blood pH and the concentrations of the main electrolytes.

Disadvantages:

Very expensive.

Inaccurate measurements can occur poorly taken sample and inadequate storage, maintenance, QI

Invasive and uncomfortable, as it requires taking blood.

Not suitable for most hospitals with limited resources.

Pulse Oximetry

A pulse oximeter measures oxygen saturation of haemoglobin in the blood. Pulse oximetry is the best method available for detecting and monitoring hypoxaemia.

Pulse oximetry correctly identified hypoxaemia in 20–30% more children than with signs alone.

use of pulse oximetry can also reduce unnecessary oxygen administration.

Pulse oximetry should therefore be performed on all patients admitted to an inpatient ward with respiratory illness, emergency or priority signs or any sign of hypoxaemia.

Effect of pulse oximetry reading

- Blood pressure generally needs to be >80 SBP
- Disturbance of vascular flow from any cause
- Elevation with respect to the heart
- Compression by the probe
- Discoloration of nail
- Bright light interferes the probe
- Heart Rate extremes <30 or >200
- Cold
- Fear (Endogenous catecholamines)
- Medications

Positioning of the patient (Prone Position)

- ကုတင်ခေါင်းရင်းကို မြှင့်၍ နောက်တွင် ခေါင်းအုံးများခံပြီး လူနာကို ထိုင်ခိုင်းပါ။ SpO2 ပြန်ခေါ်ပါ။
- မှောက်လျက်နေခြင်းသည် အဆုတ်တွင်း အောက်စီဂျင် ဝင်ရောက်မှုကို အားကောင်းစေသည်။
- လူနာကို မှောက်လျက် အနေအထားဖြင့် ၎င်းတို့ နေနိုင်သလောက် ကြာကြာနေခိုင်းပါ။ (အိပ်ချိန်တွင်လည်း မှောက်လျက် အိပ်နိုင်သည်။ မှောက်လျက် နေစဉ် အိပ်ခန်းတွင် လူနာသက်တောင့်သက်သာရှိစေရန် ကုတင်နှင့် ဖိမိနေသော နေရာများ၌ စောင်းခေါက်၊ ခေါင်းအုံး စသည်ကို ခံထားပါ
- SpO2 ကို ပုံမှန်စစ်ပါ။

Awake Prone position

Nasal canula, simple and non-rebreather (reserviour bag masks) စသည်တို့ဖြင့် အောက်စီဂျင်ရှူနေစဉ်တွင်လည်း မှောက်လျက်အနေအထားဖြင့်နေနိုင်သည်။ မှောက်လျက်အနေအထားနေစဉ်တွင်

- ဦးခေါင်းအတွက် ခေါင်းအုံးပျော့တစ်လုံး
- ရင်ဘတ်အောက်အတွက် ခေါင်းအုံးအမြင့်တစ်လုံး
- ခါးအောက်အတွက် ခေါင်းအုံးအမြင့်တစ်လုံး
- ခြေသလုံးအောက်အတွက်ခေါင်းအုံးတစ်လုံးလိုအပ်သည်
- ဝမ်းဗိုက်ပိုင်းသည်ဖိမနေစေဘဲလွတ်လပ်စွာအသက်ရှူနိုင်ရန်ထားရမည်။ဝသောလူနာများအတွက်ခေါင်းအုံးများပို လိုနိုင်မည်။

Head Position

- အောက်စီဂျင်ရှူနေသော mask ကိုမဖြုတ်ပါနှင့်။ မှောက်လျက်နေခြင်းဖြင့် အောက်စီဂျင်ရရှိမှုပိုမိုကောင်းမွန်လာစေရန် နာရီအနည်းငယ်အချိန်ကြာတတ်သည်။ ဦးခေါင်းကိုညာဘက်သို့ဖြစ်စေ၊ ဘယ်ဘက်သို့ဖြစ်စေ လူနာအဆင်ပြေသလို စောင်းလျက်နေနိုင်သည်။
- လူနာသည် ဘေးတစောင်းအိပ်လျက် lateral position ဖြင့်လည်း နေနိုင်သည်။
- ကြာချိန် တစ်ခါမှောက်အိပ်လျှင် ၄ နာရီ ကြာအိပ်ရမည်။ ၄ နာရီကြာမှောက်အိပ်ပြီးလျှင် ထမင်းစားရေသောက်ခြင်း၊ နောက်ဖေးသွားခြင်းတို့အတွက် အချိန် ၁ နာရီ အနားပေးရမည်။

World Health Organization
Myanmar

အများပြည်သူအတွက်

Covid19 ကူးစက်ခံရပါက အိမ်တွင် ပြုစုစောင့်ရှောက်ခြင်း သင်ရဲ့ အောက်စီဂျင်ပမာဏကို စစ်ဆေးတိုင်းတာခြင်း

အောက်စီမီတာ (Oximeter) ကို သင့်ရဲ့ခန္ဓာကိုယ်က အောက်ဆီဂျင် ဘယ်လောက် ကောင်းကောင်းရလဲဆိုတာ စစ်ဆေးဖို့သုံးပါတယ်။ သင့်တွင် Covid19 လက္ခဏာများရှိပြီး သင့်ရဲ့အောက်စီဂျင် ပြည့်ဝမှု (အောက်စီဂျင်ပမာဏ) နည်းပါက သင့်တွင် ပြင်းထန်သော Covid19 ရောဂါဖြစ်နိုင်ပါတယ်။

အောက်ပါအချက်များဟာ ပြင်းထန်သော (သို့) အလယ်အလတ်ရှိသော Covid19 ရောဂါလက္ခဏာရှိသူများနှင့် အိမ်မှာဆေားကုသမှု ခံယူနေသူများအတွက်ဖြစ်ပါတယ်။

သင့်ရဲ့ကျန်းမာရေးစောင့်ရှောက်မှုပေးသူ (ဆရာဝန်)က အောက်စီမီတာ (Oximeter) သုံးရန် အကြံပေးခဲ့လျှင် အောက်စီမီတာကိုသုံးပြီး သင့်ရဲ့ အောက်စီဂျင်ပမာဏကို ဘယ်လိုမှတ်တမ်းတင်မလဲ။

၁ သင့်ရဲ့ လက်ကို နွေးထွေးအောင်လုပ်ပါ။

၂ အောက်စီမီတာ (Oximeter) ကို ငြိမ်အောင် ထိန်းထားပါ။

၃ အောက်စီမီတာ (Oximeter) မတ်မီ အနည်းဆုံး ၅ မိနစ် အနားယူပါ။

၄ အောက်စီမီတာ (Oximeter) ကို ဖွင့်ပါ၊ လက်ချောင်းကို တင်းတင်းကျပ်ကျပ်ထားရန် အောက်စီမီတာ၏ ပါးစပ်ကြားတွင် သင်၏ လက်ခလယ် (သို့) လက်ညိုးကို ထည့်ပါ။ လက်သည်း ဆိုးဆေးနှင့် လက်သည်းတုများကို ဖယ်ရှားထားပါ။

၅ ရရှိသည့်ရလဒ်သည် အနီအောက် ရှေ့နိုင်သည်။ ရလဒ်သည် အနည်းဆုံး ၅ စက္ကန့် အထိ တည်ငြိမ်သည့် အခြေရအောင် အောက်စီမီတာ (Oximeter) နှင့် သင့်ရဲ့ လက်ကို တစ်မိနစ်မျှ ငြိမ်ငြိမ်ထားပြီး တိုင်းတာပါ။ ထို့နောက် အမြင့်ဆုံးရလဒ်ကို မှတ်တမ်းတင်ပါ။

၆ သင်သည် အောက်စီမီတာ (Oximeter) ရလဒ်ကို သေချာမှန်ကန်အောင် မှတ်တမ်းတင်ပါ။ သွေးတွင်း အောက်ဆီဂျင်ပါဝင်မှုကို SpO2 (သို့) ၂ (ရာခိုင်နှုန်း) ခြင့်စေါ်ပြသည်။ အောက်စီမီတာ (Oximeter) များသည် အများအားဖြင့် အောက်ပါ အကြိမ်ရေနှုန်း နှစ်မျိုးကို စေါ်ပြလေ့ရှိသည်။

- သင်၏ သွေးခုန်နှုန်း (သို့) နှလုံးခုန်နှုန်းကို (PR, HR, pulse, bpm (သို့) နှလုံးပုံ ❤) သင်္ကေတဖြင့် မကြာခဏ ပြလေ့ရှိပါတယ်။
- သင့်ရဲ့ အောက်ဆီဂျင်ပြည့်ဝမှုကို SpO2 (သို့) ရာခိုင်နှုန်း (٪) ဟု ပြလေ့ရှိပါတယ်။

သင့်ရဲ့ ကျန်းမာရေးစောင့်ရှောက်မှုပေးသူ (ဆရာဝန်)၏ အကြံပေးမှုကို တိတိကျကျ လိုက်နာပါ။ သင့်ရဲ့ မှတ်တမ်းတင်ထားသော အောက်စီဂျင် ပမာဏကို အခြေခံ၍ အောက်ပါအဆင့်များအတိုင်း အကြံပေးလိမ့်မည်။

အကယ်၍ သင်ရဲ့ အောက်စီဂျင်ပမာဏ ဟာ ၉၀٪ အောက်ဖြစ်ပါက အမြန်ဆုံး ဆေးရုံ တက်ရောက် ကုသမှု ခံယူပါ။

အကယ်၍ သင်ရဲ့ အောက်စီဂျင် ပမာဏဟာ ၉၀٪ (သို့) ၉၀٪ နှင့် အထက် ဖြစ်သော်လည်း ၉၄٪ အောက် ဖြစ်ပါက သင့်ရဲ့ ကျန်းမာရေးစောင့်ရှောက်မှု ပေးသူ (ဆရာဝန်)နှင့် တိုင်ပင် ဆွေးနွေးပါ (သို့) ဆေးရုံ တက်ရောက်ကုသမှု ခံယူပါ။

သင်ရဲ့ အောက်စီဂျင် ပမာဏက ၉၄٪ အထက် ဖြစ်ပါက တစ်နေ့လျှင် ၃ ကြိမ် သင်ရဲ့ အောက်စီဂျင် ပမာဏကို တိုင်းတာပါ။

သင်ရဲ့ အောက်စီဂျင် ပမာဏဟာ ဘယ်လောက်ပဲ ရှိပါစေ သင့်တွင် အသက်ရှူရခက်ခဲခြင်း၊ အသက်ရှူကြပ်ခြင်း၊ အိပ်ရာမှ မထနိုင်ခြင်း၊ (သို့) မိမိကိုယ်ကို ဂရုမစိုက်နိုင်ခြင်း၊ ရင်ဘတ်အောင့်ခြင်း၊ (သို့) စိတ်ရှုပ်ထွေးလာခြင်း၊ ပါးစပ်မူးခြင်း၊ (သို့) အိပ်ငိုက်ခြင်း၊ မှိန်းခြင်းတို့ ဖြစ်လာလျှင် ကျန်းမာရေးစောင့်ရှောက်မှုပေးသူ (ဆရာဝန်) ထံမှ အမြန်ဆုံး အကူအညီ ရယူပါ။


Pillow or rolled towel to support head in most comfortable position
Pillow under chest
Gully between pillows to allow bag to be fully inflated


1
Begin by lying in prone position on a flat bed for 30 minutes to 2 hours
2
Switch to lying on your right side for 30 mins to 2 hours
3
Switch to 30 minutes to 2 hours of sitting up (30-60 degrees)
4
Switch to lying on your left side for 30 minutes to 2 hours
5
Switch to semi-proning position for 30 minutes to 2 hours
6
Return to proning position for 30 minutes to 2 hours. Repeat cycle...

World Health Organization
Myanmar

COVID19 ရောဂါ ပြင်းထန်စွာ ခံစားရပြီးနောက် ပီမီကိုယ်ကို ပြန်လည်ထူထောင်ခြင်း

အသက်ရှူကြပ်ခြင်း၊ မောခြင်းကို သက်သာစေသည့် အနေအထားများ

ဆေးရုံတက်ပြီး ကုသနေစဉ်အတွင်း မောခြင်း၊ အသက်ရှူကြပ်ခြင်းကို များသောအားဖြင့် ခံစားရလေ့ရှိပါတယ်။ အောက်ပါ အနေအထားများက သင့်ကို သက်သာစေရန် ကူညီပေးနိုင်ပါတယ်။

ခေါင်းကိုမြှင့်ထားပြီး ဘေးစောင်း လဲလျောင်းပါ။

သင်၏ ခေါင်းနှင့်လည်ပင်းကို ခေါင်းအုံးများပေါ်တင်၍ ဘေးစောင်းပြီး လဲလျောင်းပါ။ သင်၏ ဒူးကို အနည်းငယ် ကွေးထားပါ။

ထိုင်နေစဉ် ရှေ့သို့ကိုင်းပြီး စားပွဲပေါ်တွင် ခေါင်းကို လဲလျောင်းပါ။

ထိုင်ခုံပေါ်တွင်ထိုင်ပြီး ခါးကို ရှေ့သို့ကိုင်းကာ စားပွဲတစ်ခုပေါ်တွင် သင်၏ ခေါင်းနှင့်လည်ပင်းကို ခေါင်းအုံးများပေါ်တွင် တင်ကာ အနားယူပါ။ သင်၏ လက်များကို စားပွဲပေါ်တွင်တင်ထားပါ။ ခေါင်းအုံး (သို့) ထိုင်ခုံမပါဘဲ သင့် လက်များကို သင့် ပေါင်ပေါ်သို့ တင်ထားပြီး အနားယူရန် သင် ကြိုးစား ကြည့်နိုင်ပါတယ်။

ရှေ့သို့ကိုင်းပြီး မတ်တပ်ရပ်ခြင်း

မတ်တပ်ရပ်နေစဉ် ပြတင်းပေါက် (သို့) အခြားတည်ငြိမ်သော မျက်နှာပြင် တစ်ခုခုပေါ်ကို ရှေ့သို့ ကိုင်း၍မှီထားပါ။

နောက်ကျောမှီပြီး မတ်တပ်ရပ်ခြင်း

သင်၏ နောက်ကျောကို နံရံတွင်မှီ၍ လက် နှစ်လက်ကို သင်၏ နံဘေးတွင် ချထားပါ။ သင်၏ ခြေထောက်များကို နံရံနှင့် ခြေတစ်ပြားစာ အကွာအဝေးတွင် ထားပြီး အနည်းငယ် ခြားထားပါ။

အကယ်၍ သင်သည် အထက်ပါ အနေအထားများကို အသုံးပြုပြီး မသက်သာဘဲ ပြင်းထန်စွာ အသက်ရှူကြပ်ပြီး မောပန်းလာပါက နီးစပ်ရာကျန်းမာရေးဌာနသို့ အမြန်ဆုံးသွားရောက် ကုသမှုခံယူပါ။

World Health Organization
Myanmar

COVID19 ရောဂါ ပြင်းထန်စွာ ခံစားရပြီးနောက် မိမိကိုယ်ကို ပြန်လည်ထူထောင်ခြင်း

အသက်ရှူ ကြပ်ခြင်း၊ မောခြင်းကို သက်သာစေရန် နည်းလမ်းများ

ဆေးရုံတက်ပြီး ကုသနေစဉ်အတွင်း မောခြင်း၊ အသက်ရှူကြပ်ခြင်းကို များသောအားဖြင့် ခံစားရလေ့ရှိပါတယ်။ အောက်ပါနည်းလမ်းများက သင့်ကို သက်သာစေရန် ကူညီပေးနိုင်ပါတယ်။

လေကျင့်ထိန်းချုပ်ထားသော အသက်ရှူခြင်းက သင့်အား သက်သာစေရန် ကူညီပေးပါတယ်။

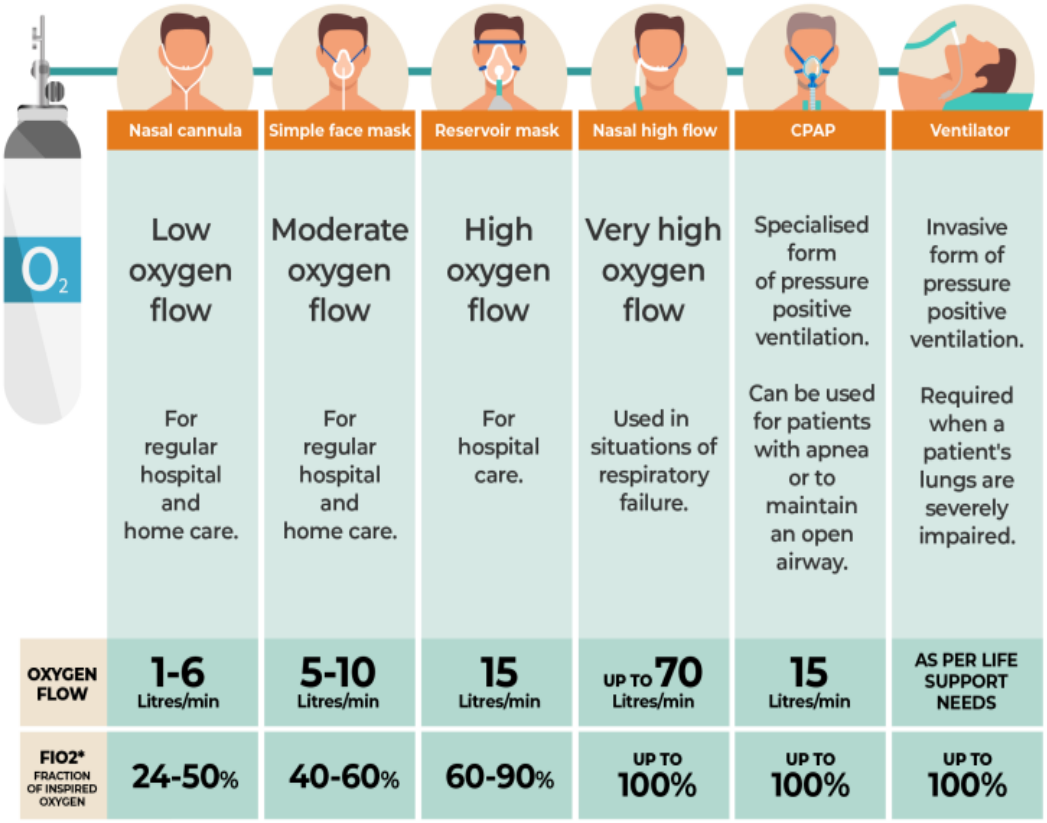
- သက်သောင့်သက်သာထိုင်ပါ။
- သင်၏လက်တစ်ဘက်ကို ရင်ဘတ်ပေါ် တင်ပြီး နှင့်အခြားလက်တစ်ဘက်ကို သင်၏ ဝမ်းဗိုက် ပေါ်တွင် တင်ထားပါ။
- နှာခေါင်း (သို့) ပါးစပ် (နှာခေါင်းနှင့်ရှူသွင်းလို့မရပါက) မှတစ်ဆင့် ဖြည်းဖြည်းချင်းရှူသွင်းပါ၊ ထို့နောက် ပါးစပ်မှတစ်ဆင့် ရှူထုတ်ပါ။
- သင်ရှူ သွင်းလိုက်သောအခါ ဝမ်းဗိုက်ပေါ်ရှိ သင်၏လက်သည် ရင်ဘတ်ပေါ်ရှိလက်ထက် ပို၍ မြင့်လာသည်ကို သင် ခံစားရလိမ့်မည်။
- တတ်နိုင်သမျှ အားအနည်းငယ် စိုက်ထုတ်ခြင်းဖြင့် အသက်ရှူခြင်းကို နှေးလာစေပြီး သက်တောင့်သက်တာနှင့် ချောမွေ့စွာ အသက်ရှူနိုင်ရန် ကြိုးစားပါ။

ပိုမိုအားစိုက်ထုတ်ရန်လိုသည့်လှုပ်ရှားမှုများပြုလုပ်သည့်အခါ ဖြည်းဖြည်းနှင့် နက်ရှိုင်းစွာ(ရှည်လျားစွာ) အသက်ရှူ ခြင်းဟာ အသုံးဝင်ကြောင်း တွေ့ရပါတယ်။

- ၎င်းကိုလုပ်ဆောင်ရန် ပိုမိုလွယ်ကူစေရန် သေးငယ်သော အစိတ်အပိုင်းများ အဖြစ် ပိုင်းခြား လုပ်ဆောင်ပါ။
- သင့် လှုပ်ရှားမှု အတွက် "အားထုတ်မှု" မပြုလုပ်မီ အသက်ရှူသွင်းပါ - ဥပမာ အပေါ်သို့ တက်ရန်ခြေလှမ်း မစမီ။
- သင် "အားထုတ်မှု" ပြုလုပ်နေစဉ် - ဥပမာ အပေါ်သို့ တက်လှမ်းနေစဉ် အသက်ရှူထုတ်ပါ။
- နှာခေါင်းမှ အသက်ရှူသွင်းပြီး ပါးစပ်မှ ရှူထုတ်ခြင်းသည် အထောက်အကူ ပြုကြောင်း သင် တွေ့ရှိနိုင်ပါတယ်။

အကယ်၍ သင်သည် အထက်ပါနည်းလမ်းများကို အသုံးပြုပြီး မသက်သာဘဲ ပြင်းထန်စွာ အသက်ရှူကြပ်ပြီး မောပန်းလာပါက နီးစပ်ရာကျန်းမာရေးဌာနသို့ အမြန်ဆုံးသွားရောက် ကုသမှုခံယူပါ။

Types of Oxygen therapy



Source: How is medical oxygen, vital for COVID-19 patients, produced? by By Mohammed Hussein and Alia Chughtai, 11 May 2021

	Oxygen Cylinder	Oxygen Concentrator	Oxygen Plant	Liquid oxygen
Description	A refillable cylindrical storage vessel used to store and transport oxygen in compressed gas form. Cylinders are refilled at a gas generating plant and thus require transportation to and from the plant.	A self-contained, electrically powered medical device designed to concentrate oxygen from ambient air, using PSA technology.	An onsite oxygen generating system using PSA technology, which supplies high-pressure oxygen throughout a facility via a central pipeline system, or via cylinders refilled by the plant.	Bulk liquid oxygen generated off-site and stored in a large tank and supplied throughout a health facility via a central pipeline system. Tank requires refilling by liquid oxygen supplier.
Clinical application and/or use case	Can be used for all oxygen needs, including high-pressure supply and in facilities where power supply is intermittent or unreliable. Also used for ambulatory service or patient transport. Used as a backup for other systems.	Used to deliver oxygen at the bedside or within close proximity to patient areas.	Can be used for all oxygen needs, including high-pressure supply.	Can be used for all oxygen needs, including high-pressure supply and in facilities where power supply is intermittent or unreliable.
Appropriate level of health system	All level.	All level.	District hospital level.	Regional, specialized hospital, specialized outpatient clinics.
Electricity requirements	No.	Yes.	Yes.	No.
Costs	Moderate; cylinder, regulator, flowmeter, installation, training.	High; concentrator, spares, installation, training.	Very high; plant and pipeline distribution system, installation, training.	Can be very high; tank, pipeline installation, training.

	Oxygen Cylinder	Oxygen Concentrator	Oxygen Plant	Liquid oxygen
Ongoing operating costs	Moderate ; cylinder deposit and leasing fees, refill costs, transportation from refilling station to health facility.	Low; electricity and maintenance (spare parts and labour).	Low/moderate; electricity and maintenance (spare parts and labour). May require additional staff to operate/manage if not operated by third party.	High (can be very high if tank is leased); refill costs, maintenance.
Maintenance requirement	Little maintenance required by trained technicians.	Moderate maintenance required by trained technicians.	Significant maintenance of system and piping required by highly trained technician and engineers, can be provided as part of contract.	Significant maintenance of system and piping required by highly trained technician and engineers, can be provided as part of contract.
User care	Moderate; regular checks of fittings and connections, regular checks of oxygen levels, cleaning exterior.	Moderate; cleaning of filters and device exterior.	Minimal; at terminal unit only.	Minimal; at terminal unit only.
Merits	No power source needed.	Continuous oxygen supply (if power available) at low running cost.	Can be cost-effective for large facilities and can get continuous oxygen supply.	99% oxygen obtained. High oxygen output for small space requirement.
Drawbacks	•Requires transport/supply chain. •Exhaustible supply. •Highly reliant upon supplier. •Risk of gas leakage. •Risk of unwanted relocation.	•Requires uninterrupted power. •Requires backup cylinder supply. •Requires maintenance. •Low pressure output, usually not suitable for CPAP or ventilators.	•High capital investments. •Requires uninterrupted power. •Needs adequate infrastructure. •High maintenance for piping. •Requires backup cylinder supply. •Risk of gas leakage from piping system.	Requires transport/supply chain. Exhaustible supply. High maintenance for piping. High total cost. Needs adequate infrastructure. Requires backup cylinder supply. Risk of gas leakage from piping system.

Oxygen cylinder sizes						
Size	C	**D**	**E**	F	G	**J**
Height (in)	14	**18**	**31**	34	49	**57**
Capacity (litres)	170	**340**	**680**	1360	3400	**6800**

	How long will a tank of this size last:			How many tanks required for 24 hours of oxygen administration:		
Rate of oxygen administration for 1 patient	O_2 tank **D** 340L	O_2 tank **E** 680L	O_2 tank **J** 6800L	Number of size **D** tanks required	Number of size **E** tanks required	Number of size **J** tanks required
2 litres/min	2 hr 50 min	5 hr 40 min	56 hr	8 ½ tanks	4 tanks	Half tank
5 litres/min	1 hr 8 min	2 hr 16 min	23 hr	21 tanks	10 tanks	1 tank
8 litres/min	42 min	1 hr 24 min	14 hr	34 tanks	17 tanks	2 tanks
10 litres/min	34 min	1 hr 8 min	11 hr	42 tanks	21 tanks	2.2 tanks

Estimation of oxygen time available while using oxygen cylinder

OXYGEN AVAILABLE TIME TABLE										
Cylinder Size : 40 L										
Tank Pressure (psi)	Flow rate (L/min)									
	1 L/min	2 L/min	3 L/min	4 L/min	5 L/min	6 L/min	7 L/min	8 L/min	9 L/min	10 L/min
2000 psi	3:03:33	1:13:46	1:01:11	18:53	15:06	12:35	10:47	9:26	8:23	7:33
1800 psi	2:18:40	1:09:20	22:13	16:40	13:20	11:06	9:31	8:20	7:24	6:40
1500 psi	2:05:20	1:02:40	17:46	13:20	10:40	8:53	7:37	6:40	5:55	5:20
1400 psi	2:00:53	1:00:26	16:17	12:13	9:46	8:08	6:59	6:06	5:25	4:53
1200 psi	1:16:00	20:00	13:20	10:00	8:00	6:40	5:42	5:00	4:26	4:00
1000 psi	1:07:06	15:33	10:22	7:46	6:13	5:11	4:26	3:53	3:27	3:06
800 psi	22:13	11:06	7:24	5:33	4:26	3:42	3:10	2:46	2:28	2:13
600 psi	13:20	6:40	4:26	3:20	2:40	2:13	1:54	1:40	1:28	1:20
Note: The available time is [(day) : hour : minutes] format										
Note: This chart shows approximate time available for the use of oxygen cylinder but it has some variation on the real situation. So, you have to check on the flow meter, if the PSI value arrive to 400 psi, you have to prepare another oxygen cylinder.										

OXYGEN AVAILABLE TIME TABLE										
Cylinder Size : 20 L										
Tank Pressure (psi)	Flow rate (L/min)									
	1 L/min	2 L/min	3 L/min	4 L/min	5 L/min	6 L/min	7 L/min	8 L/min	9 L/min	10 L/min
2000 psi	1:13:46	18:53	12:35	9:26	7:33	6:17	5:23	4:43	4:11	3:46
1800 psi	1:09:20	16:40	11:06	8:20	6:40	5:33	4:45	4:10	3:42	3:20
1500 psi	1:02:40	13:20	8:53	6:40	5:20	4:26	3:48	3:20	2:57	2:40
1400 psi	1:00:26	12:13	8:08	6:06	4:53	4:04	3:29	3:03	2:42	2:26
1200 psi	20:00	10:00	6:40	5:00	4:00	3:20	2:51	2:30	2:13	2:00
1000 psi	15:33	7:46	5:11	3:53	3:06	2:35	2:13	1:56	1:43	1:33
800 psi	11:06	5:33	3:42	2:46	2:13	1:51	1:35	1:23	1:14	1:06
600 psi	6:40	3:20	2:13	1:40	1:20	1:06	0:57	0:50	0:44	0:40
Note: The available time is [(day) : hour : minutes] format										
Note: This chart shows approximate time available for the use of oxygen cylinder but it has some variation on the real situation. So, you have to check on the flow meter, if the PSI value arrive to 400 psi, you have to prepare another oxygen cylinder.										

OXYGEN AVAILABLE TIME TABLE										
Cylinder Size : 15 L										
Tank Pressure (psi)	Flow rate (L/min)									
	1 L/min	2 L/min	3 L/min	4 L/min	5 L/min	6 L/min	7 L/min	8 L/min	9 L/min	10 L/min
2000 psi	1:04:20	14:10	9:26	7:05	5:40	4:43	4:02	3:32	3:08	2:50
1800 psi	1:01:00	12:30	8:20	6:15	5:00	4:10	3:34	3:07	2:46	2:30
1500 psi	20:00	10:00	6:40	5:00	4:00	3:20	2:51	2:30	2:13	2:00
1400 psi	18:20	9:10	6:06	4:35	3:40	3:03	2:37	2:17	2:02	1:50
1200 psi	15:00	7:30	5:00	3:45	3:00	2:30	2:08	1:52	1:40	1:30
1000 psi	11:40	5:50	3:53	2:55	2:20	1:56	1:40	1:27	1:17	1:10
800 psi	8:20	4:10	2:46	2:05	1:40	1:23	1:11	1:02	0:55	0:50
600 psi	5:00	2:30	1:40	1:15	1:00	0:50	0:42	0:37	0:33	0:30
Note: The available time is [(day) : hour : minutes] format										
Note: This chart shows approximate time available for the use of oxygen cylinder but it has some variation on the real situation. So, you have to check on the flow meter, if the PSI value arrive to 400 psi, you have to prepare another oxygen cylinder.										

OXYGEN AVAILABLE TIME TABLE										
Cylinder Size : 10 L										
Tank Pressure (psi)	Flow rate (L/min)									
	1 L/min	2 L/min	3 L/min	4 L/min	5 L/min	6 L/min	7 L/min	8 L/min	9 L/min	10 L/min
2000 psi	18:53	9:26	6:17	4:43	3:46	3:08	2:41	2:21	2:05	1:53
1800 psi	16:40	8:20	5:33	4:10	3:20	2:46	2:22	2:05	1:51	1:40
1500 psi	13:20	6:40	4:26	3:20	2:40	2:13	1:54	1:40	1:28	1:20
1400 psi	12:13	6:06	4:04	3:03	2:26	2:02	1:44	1:31	1:21	1:13
1200 psi	10:00	5:00	3:20	2:30	2:00	1:40	1:25	1:15	1:06	1:00
1000 psi	7:46	3:53	2:35	1:56	1:33	1:17	1:06	0:58	0:51	0:46
800 psi	5:33	2:46	1:51	1:23	1:06	0:55	0:47	0:41	0:37	0:33
600 psi	3:20	1:40	1:06	0:50	0:40	0:33	0:28	0:25	0:22	0:20
Note: The available time is [hour : minutes] format										
Note: This chart shows approximate time available for the use of oxygen cylinder but it has some variation on the real situation. So, you have to check on the flow meter, if the PSI value arrive to 400 psi, you have to prepare another oxygen cylinder.										

Vital Sign Monitoring Chart for COVID patients (2 / 4/ 6/ 8 Hourly)

Name Age DO Admission

Date	Time	Temp	Pulse	BP	O_2 Flow L/min	SpO_2 %	RR	O2 flow to be adapted? Indicate new flow if needed

DENGUE

- Dengue fever is an **arbovirus** transmitted to humans by the bite of a mosquito **(Aedes).** Transmission by transfusion of **contaminated blood** and **transplacental** transmission to the fetus have also been reported.
- **Four different serotypes** of dengue have been described. Infection with one serotype provides a **lifelong immunity** to that specific serotype, but only **partial, short-term immunity** to other serotypes. There is no specific antiviral treatment.
- **Dengue is a mainly urban disease**, present in tropical and subtropical regions, in particular in Asia, Central and South America and the Caribbean. Outbreaks have been described in Eastern Africa.
- Primary infection may be **asymptomatic** or present as mild dengue fever. Subsequent infections increase the risk of severe dengue.

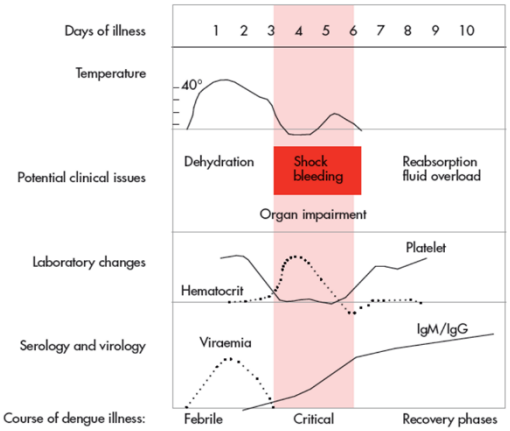
SIGNS AND SYMPTOMS

Incubation period (4 to 10 days)

The illness occurs in 3 phases:

1. **Febrile phase:** high fever (39 to 40 °C) lasting 2 to 7 days, often accompanied by generalized aches, a maculopapular rash, and mild Haemorrhagic manifestations.
2. **Critical phase (between the 3rd and 7th day):** decrease in temperature. The majority, of patients will have dengue without warning signs and proceed to the recovery phase. Certain patients will develop dengue with warning sign(s) or severe dengue.
3. **Recovery phase:** patient improves, vital signs normalize, gastrointestinal symptoms subside, and appetite returns. At times, bradycardia, and generalized pruritus.

Figure 2.1 The course of dengue illness*



* Source: adapted from Yip (2) by chapter authors.

The **Hess test** or **Rumpel-Leede test**

- assess capillary fragility - also called Tourniquet test.
- pressure is applied to the forearm with a blood pressure cuff inflated to between systolic and diastolic blood pressure for 10 minutes.
- after removing the cuff, the number of petechiae in 5 cm diameter circle of the area under pressure is counted.

15 or more petechiae indicate capillary fragility, which occurs due to poor platelet function, bleeding diathesis or thrombocytopenia, and can be seen in cases of scurvy, and Dengue fever.

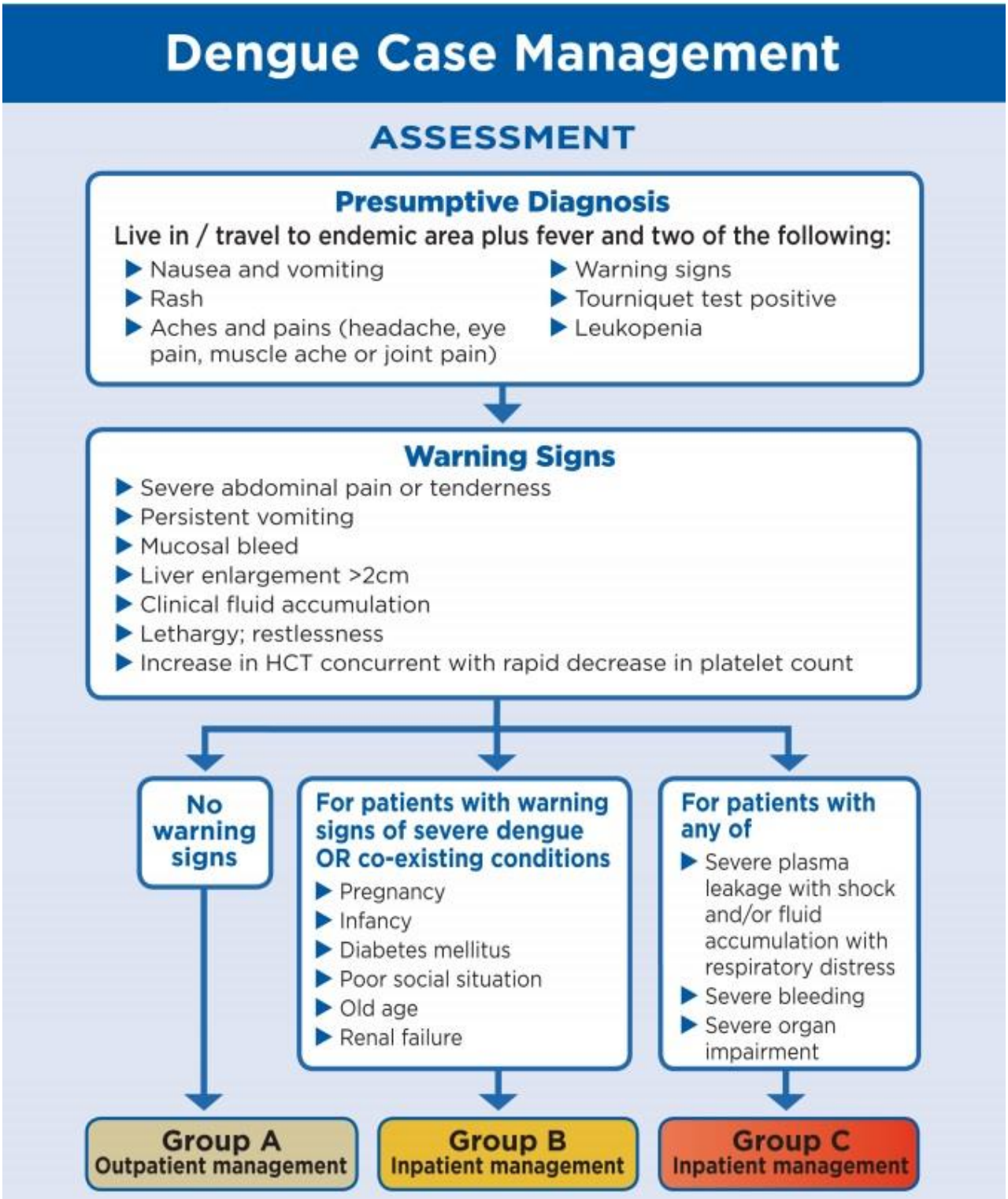


Figure: Dengue case management (WHO)

Symptoms according to severity (adapted from the WHO)

Dengue without warning signs	Dengue with warning signs	Severe dengue
Fever + two of the following symptoms: • Nausea, vomiting • Rash resembling measles • Generalized aches (headache, retro-orbital pain, myalgias, arthralgias) • Benign mucocutaneous bleeding (petechiae, positive tourniquet test 1 • epistaxis, gingival bleeding • Leucopenia	Presence of **at least one** of these symptoms: • Abdominal pain • Persistent vomiting • Fluid accumulation (ascites, pleural effusion) • Mucosal bleeding • Hepatomegaly (> 2 cm) • Agitation or lethargy • Increasing haematocrit and rapidly **dropping platelet count.**	• Severe plasma leakage with: • Fluid accumulation (ascites, pleural effusion) + respiratory distress Compensated shock: weak and rapid pulse, hypotension, cold extremities, capillary refill time > 3 seconds Decompensated shock: heart rate and blood pressure un-recordable • **Severe mucocutaneous bleeding** • **Multi-organ failure** e.g.: hepatic or cardiac failure, alter level of consciousness, and coma.

INVESTIGATIONS

Diagnostic tests

• **- NS1, IgG, IgM**

CASE MANAGEMENT OF DENGUE (WHO, CDC)

Dengue Management DO's and DON'Ts

DON'T use corticosteroids. They are not indicated and can increase the risk of Gl bleeding, hyperglycemia, and immunosuppression.

DON'T give platelet transfusions for a low platelet count. Platelet transfusions do not decrease the risk of severe bleeding and may instead lead to fluid overload and prolonged hospitalization.

DON'T give half normal (0.45%) saline. Half normal saline should not be given, even as a maintenance fluid, because it leaks into third spaces and may lead to worsening of ascites and pleural effusions.

DON'T assume that IV fluids are necessary. First check if the patient can take fluids orally. Use only the minimum amount of IV fluid to keep the patient well-perfused. Decrease IV fluid rate as hemodynamic status improves or urine output increases.

DO tell outpatients when to return. Teach them about warning signs and their timing, and the critical period that follows defervescence.

DO recognize the critical period. The critical period begins with defervescence and lasts for 24-48 hours. During this period, some patients may rapidly deteriorate.

DO closely monitor fluid intake and output, vital signs, and hematocrit levels. Ins and outs should be measured at least every shift and vitals at least every 4 hours. Hematocrits should be measured every 6-12 hours at minimum during the critical period.

DO recognize and treat early shock. Early shock (also known as compensated or normotensive shock) is characterized by narrowing pulse pressure (systolic minus diastolic BP approaching 20 mmHg), increasing heart rate, and delayed capillary refill or cool extremities.

DO administer colloids (such as albumin) for refractory shock. Patients who do not respond to 2-3 boluses of isotonic saline should be given colloids instead of more saline.

DO give PRBCs or whole blood for clinically significant bleeding. If hematocrit is dropping with unstable vital signs or significant bleeding is apparent, immediately transfuse blood.

Group.A

Outpatient Management

During the febrile phase (may last 2-7 days) and subsequent critical phase (1-2 days), your clinic should

• Follow CBCS
• Watch for dehydration
• Watch for warning signs, including decreasing platelet count and increasing hematocrit
• Watch for defervescence (indicating beginning of critical phase)

Advise patient or their family to do the following

Control the fever

- Give acetaminophen every 6 hours (maximum 4 doses per day). Do not give ibuprofen, aspirin, or aspirin-containing drugs.
- Sponge patient's skin with tepid water when temperature is high.

Prevent dehydration which occurs when a person loses too much fluid (from high fever, vomiting, or poor oral intake). Give plenty of fluids (not only water) and watch for signs of dehydration. Bring patient to clinic or emergency room if any of the following signs develop:

- Decrease in urination (check number of wet diapers of trips to the bathroom)
- Few or no tears when child cries
- Dry mouth, tongue or lips
- Sunken eyes
- Listlessness, agitation, or confusion
- Fast heartbeat (>100/min)
- Cold or clammy fingers and toes
- Sunken fontanel in a infant

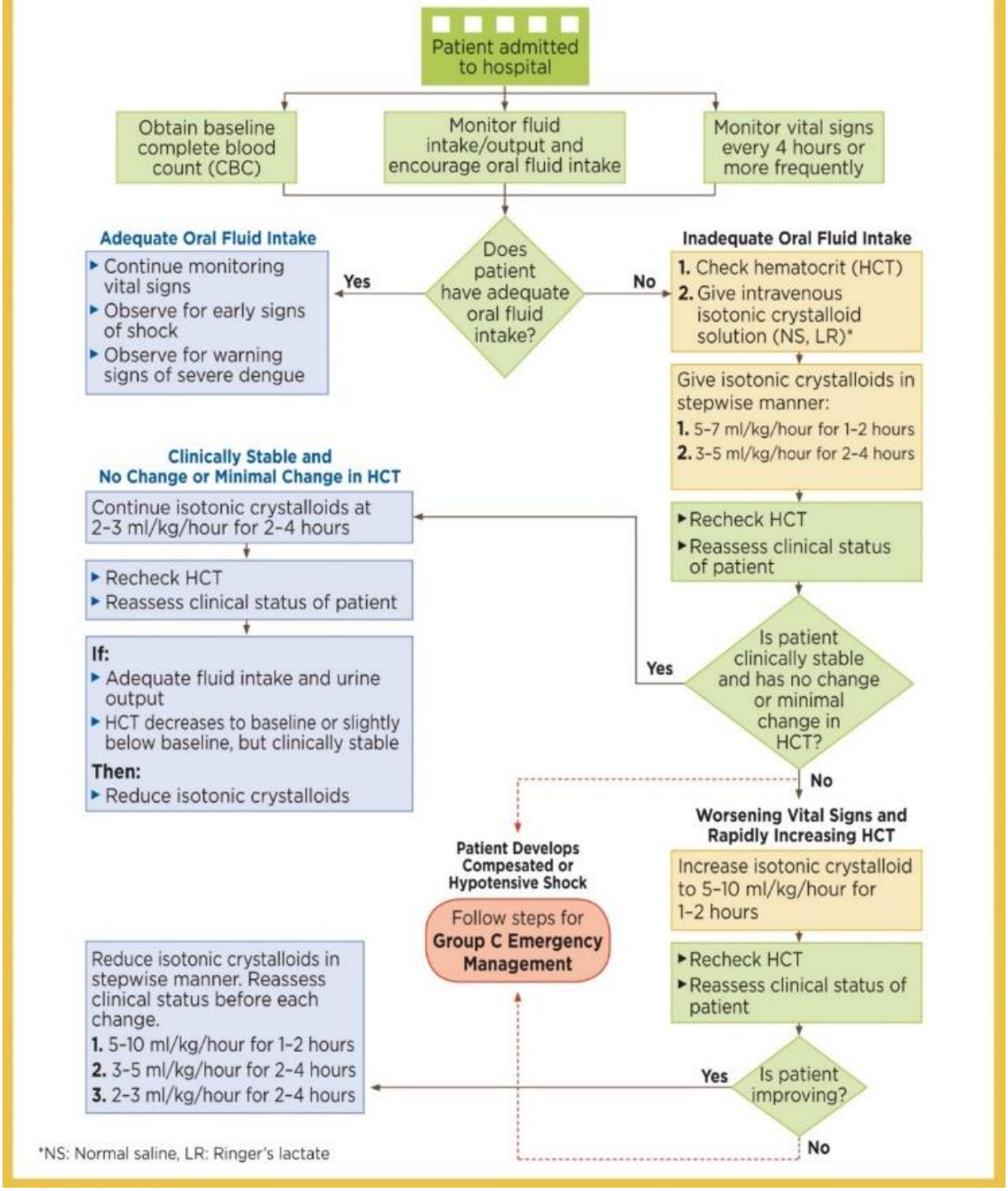
Prevent spread of dengue within your house

- Place patient under bed net or have patient use insect repellent while febrile to avoid infecting mosquitoes that can infect others within 2 weeks.
- Kill all mosquitoes in house.
- Empty containers that carry ater on patio.
- Put screens on windows and doors to prevent mosquitoes from coming into house.

Watch for warning signs as temperature declines 3 to 8 days after symptoms began. Return IMMEDIATELY to clinic or emergency department if any of the following warning signs appear:

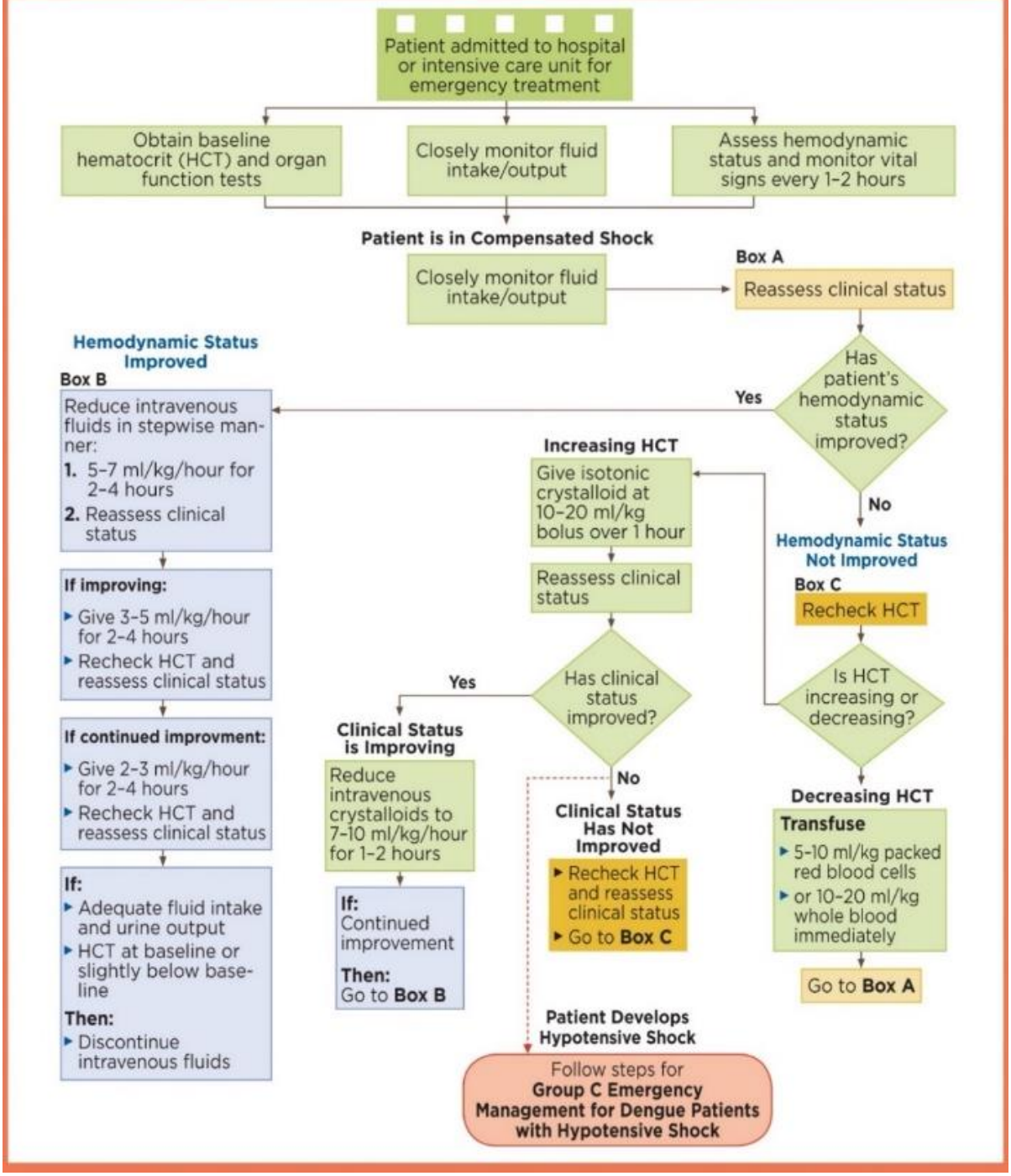
- Severe abdominal pain or persistent vomiting
- Red spots/patches on skin
- Bleeding from nose or gums
- Vomiting blood
- Black, tarry stools
- Drowsiness or irritability
- Pale, cold, or clammy skin
- Difficulty breathing

Group B — Inpatient Management for Dengue Patients with Warning Signs

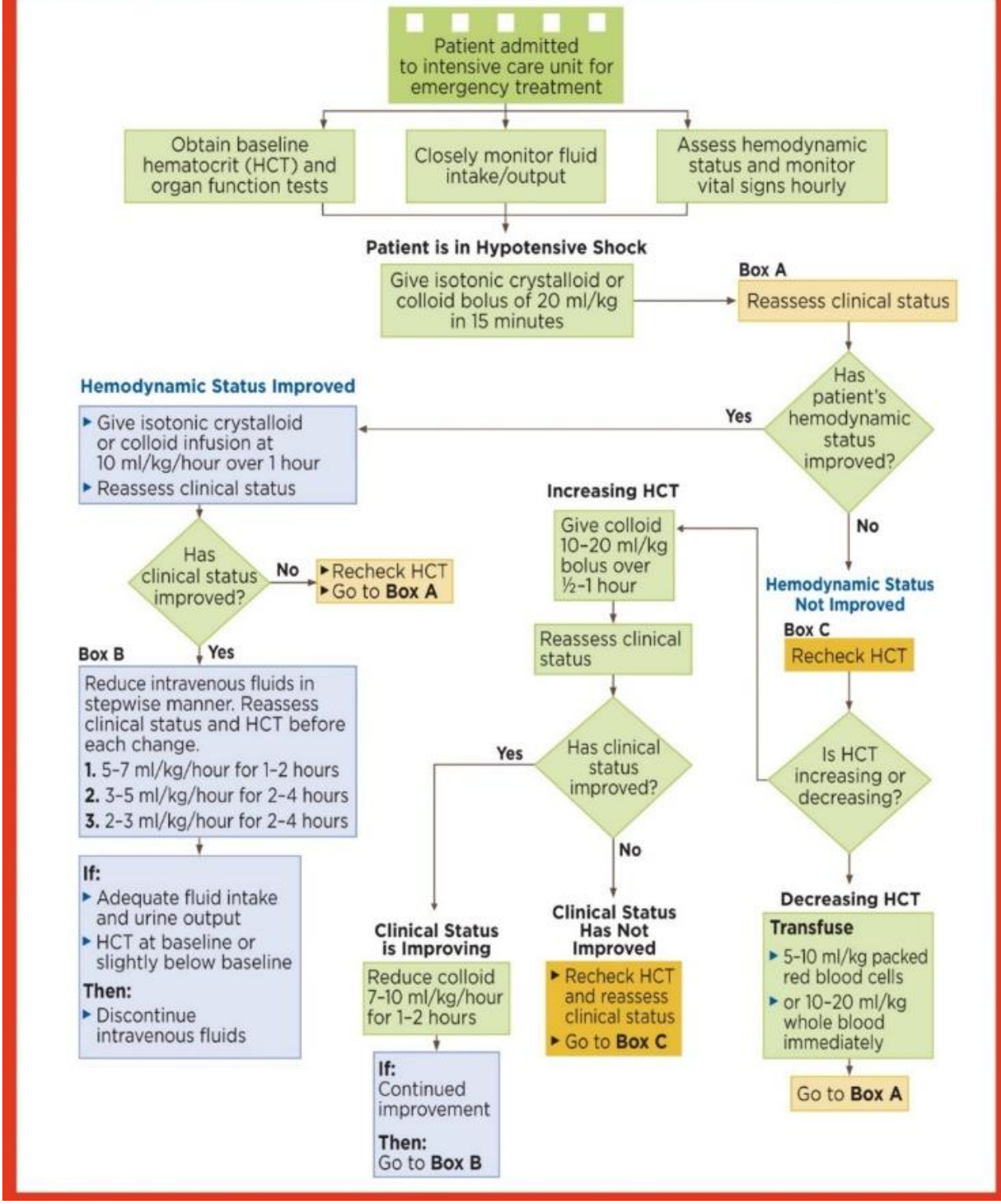


Group C — Emergency Management for Dengue Patients with

Compensated Shock



Group C — Emergency Management for Dengue Patients with Hypotensive Shock



Normal Vital Signs

Age	Estimated Weight	Normal Heart Rate Range	Average HR	Normal Respiratory Rate Range	Hypotension Level (Systolic BP)
1 month	4 kg	110-180	145	40-60	<70
6 months	8 kg	110-170	135	25-40	<70
12 months	10 kg	110-170	135	22-30	<72
2 years	12 kg	90-150	120	22-30	<74
3 years	14 kg	75-135	120	22-30	<76
4 years	16 kg	75-135	110	22-24	<78
5 years	18 kg	65-135	110	20-24	<80
6 years	20 kg	60-130	100	20-24	<82
8 years	26 kg	60-130	100	18-24	<86
10 years	32 kg	60-110	85	16-22	<90
12 years	42 kg	60-110	85	16-22	<90
14 years	50 kg	60-110	85	14-22	<90
≥15 years		60-100	80	12-18	<90

Hemodynamic Assessment

Hemodynamic Parameters	Stable Circulation	Compensated Shock	Hypotensive Shock
Conscious level	Clear and lucid	Clear and lucid	Restless, combative
Capillary refill	Brisk (≤2 sec)	Prolonged (>2 sec)	Very prolonged, mottled skin
Extremities	Warm and pink	Cool peripheries	Cold, clammy
Peripheral pulse volume	Good volume	Weak and thready	Feeble or absent
Heart rate	Normal heart rate for age	Tachycardia for age	Severe tachycardia or bradycardia in late shock
Blood pressure	▶ Normal blood pressure for age ▶ Normal pulse pressure for age	▶ Normal systolic pressure, but rising diastolic pressure ▶ Narrowing pulse pressure ▶ Postural hypotension	▶ Narrow pulse pressure (≤ 20 mmHg) ▶ Hypotension ▶ Unrecordable blood pressure
Respiratory rate	Normal respiratory rate for age	Tachypnea	Hyperpnea or Kussmaul's breathing (metabolic acidosis)
Urine output	Normal	Reducing trend	Oliguria or anuria

ENCEPHALITIS

- Acute inflammation of the brain commonly caused by a viral infection (e.g., herpes simplex).
- Sometimes a complication of other infections such as rabies, measles, syphilis or toxoplasmosis.
- Japanese encephalitis is the most important and common encephalitis in **South-East Asia**
- Transmission to humans is through the bite of a mosquito, which generally breeds in flooded rice fields.
- caused by a flavivirus found in **birds and pigs.**
- **30%** of cases will result in death. For those who survive, 30% will have serious neurological problems.
- lifelong immunity after infection

SIGNS AND SYMPTOMS

The **majority,** of infections do not cause any symptoms.

- Headache and fever might be the only symptoms for 1-6 days.
- Other signs can be:
  - **Photophobia (fear of strong light)**
  - Weakness
  - Neck stiffness
  - Convulsions.
- can progress to **paralysis, seizures, coma and death**.
- Neurological problems after infection (sequelae): hemiparesis, deafness, mental retardation and emotional lability (changes in emotion that are not predictable).

DIAGNOSIS

- **Lumbar puncture** – to detect antibodies in CSF
- **Blood glucose**, malaria smear (to differentiate from cerebral malaria).
- **Do NOT perform** a lumbar puncture if there are signs of raised intracranial pressure or risk of bleeding:

TREATMENT

Antiviral treatment:

If available treat with acyclovir – ideally IV acyclovir but it is very expensive. Other options include PO **valacyclovir** (a pro-drug of acyclovir which acts faster than acyclovir) or PO **acyclovir**.

Symptomatic treatment:

- Pain relief.
- For seizures.
- comatose patient care if the patient is in coma
- Physiotherapy: massage, move the patient limbs to preserve muscle tone and prevent contraction
- If bacterial meningitis cannot be excluded, treat for bacterial meningitis until a definitive diagnosis can be made.

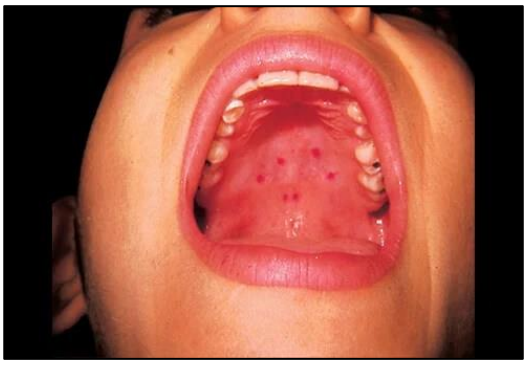
PREVENTION

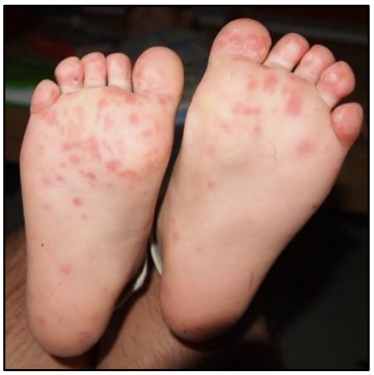
- Mosquito (vector) control is not a solution in many areas, as there are too many breeding sites (irrigated rice fields) in our area.
- Personal protection (e.g., using repellents and/or mosquito nets) could prevent transmission of the virus.
- In outbreaks, one of the measures is to eliminate the pig population.

VACCINE

A Japanese encephalitis vaccine is available

HAND-FOOT-MOUTH DISEASE





HFMD is a common infection caused by **Coxsackievirus A16** or **enterovirus 71.**

Mode of spread

Close personal contact through the air from coughing the faces of infected person.

SIGNS AND SYMPTOMS

- Fever, nausea, vomiting, feeling tired, generalized discomfort, loss of appetite and irritability
- Skin lesions are rash of flat spots and bumps followed by vesicular sores with blisters on palms, soles, buttock, and lips.
- Rarely itchy for children but extremely itchy for adults. HFMD resolves on its own after 7-10 days.

COMPLICATIONS

- Encephalitis.
- Meningitis.
- Paralysis.

PREVENTION

- Avoid direct contact with infected person.
- Keep infected children home from school.
- Hand washing.
- **Vaccine -** EV 71 vaccine in China.

TREATMENT

1. Pain medication: **Paracetamol/Ibuprofen**
2. Topical ointment: ZnO, **petroleum jelly**.
3. **IV fluid** if patient cannot drink and eat.

HIV/AIDS

Natural history of HIV infection

Three phases of HIV infection:

1. **Acute Phase:** Primary infection (1 to 3 months)
2. **Chronic Phase:** Clinical latency (on average 8-10 years, without antiretroviral treatment, in developed countries)
3. **Acquired Immune Deficiency Syndrome (AIDS)** (on average 2-3 years, without antiretroviral treatment, in developed countries)

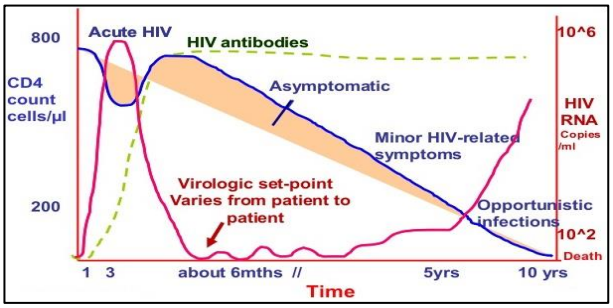


Figure: Natural history of HIV/AIDS

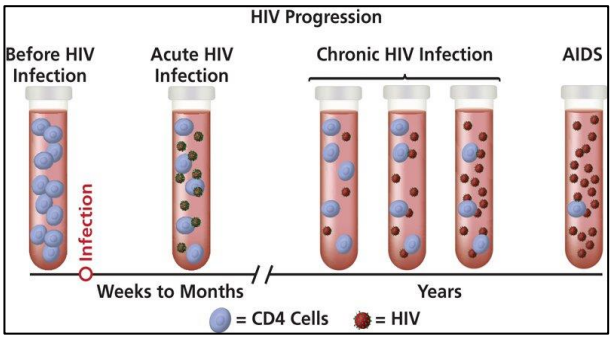


Figure: HIV progression in 3 phases

TRANSMISSION AND PREVENTION

ROUTE OF TRANSMISSION	PREVENTION
Sexual Contact	Abstain from sexual contact OR Be faithful to one uninfected partner OR Use male or female condoms AND Early diagnosis and treatment of sexually transmitted infections (STI). Post exposure prophylaxis (PEP) (medicine you give immediately after the exposure). In the case of rape PEP may reduce the risk of HIV transmission.
Contaminated syringes and needles and others sharps e.g. intravenous drug users, health workers, tattoos	Avoidance of injecting drug use Do not share needles and syringes and always use a new sterilized needle and syringe Do not share cutting implements e.g. tattooing needles, ear piercing needles, razor blades. Universal precautions for health workers If have occupational exposure PEP may reduce the risk of HIV transmission.
Infection by blood and blood products e.g. blood transfusion by HIV contaminated blood	Follow protocol for blood transfusion Screening of donor with a questionnaire to assess risk of HIV infection HIV testing of blood donors before transfusion (should be provided with pre and post-test counselling if available), if not available screen the blood but do not inform the donor of the result.
Mother to child transmission	See Prevention of Mother to Child Transmission (PMTC) guidelines.

Refer treatment regieme for HIV in Medic Curriculum Reference book.

WHO CLINICAL STAGING OF HIV INFECTION

Table WHO clinical staging of HIV infection

Adults and adolescents (>15 years old)	Children (<15 years old)
Clinical Stage I	
1. Asymptomatic 2. Persistent generalized lymphadenopathy	1. Asymptomatic 2. Persistent generalized lymphadenopathy
Clinical Stage II	
1. Moderate unexplained weight loss (<10% of presumed or measured body weight) 2. Recurrent respiratory tract infections (sinusitis, tonsillitis, otitis media, pharyngitis) 3. Herpes zoster 4. Angular cheilitis 5. Recurrent oral ulceration 6. Papular pruritic eruption (PPE) 7. Fungal nail infections 8. Seborrhoeic dermatitis	1. Unexplained persistent hepatosplenomegaly 2. Recurrent or chronic upper respiratory tract infections (otitis media, otorrhoea, sinusitis, tonsillitis) 3. Herpes zoster 4. Lineal gingival erythema 5. Recurrent oral ulceration 6. Papular pruritic eruption 7. Fungal nail infections 8. Extensive wart virus infection 9. Extensive molluscum contagiosum 10. Unexplained persistent parotid enlargement
Clinical Stage III	
1. Unexplained severe weight loss (>10% of presumed or measured body weight) 2. Unexplained chronic diarrhoea for longer than 1 month 3. Unexplained persistent fever (intermittent or constant for longer than 1 month) 4. Persistent oral candidiasis 5. Oral hairy leukoplakia 6. Pulmonary tuberculosis	1. Unexplained moderate malnutrition not adequately responding to standard therapy. 2. Unexplained persistent diarrhoea (14 days or more) 3. Unexplained persistent fever (above 37.5°C, intermittent or constant, for longer than one 1 month) 4. Persistent oral candidiasis (after first six weeks of life) 5. Oral hairy leukoplakia 6. Lymph node tuberculosis; pulmonary tuberculosis 7. Severe recurrent bacterial pneumonia 8. Acute necrotizing ulcerative gingivitis or periodontitis

7. Severe bacterial infections (such as pneumonia, empyema, pyomyositis, bone or joint infection, meningitis, bacteremia) 8. Acute necrotizing ulcerative stomatitis, gingivitis, or periodontitis 9. Unexplained anaemia (<8 g/dl), neutropaenia (<0.5 × 10^9/L) and/or chronic thrombocytopaenia (<50 × 10^9/L)	9. Unexplained anaemia (<8 g/dL), neutropaenia (<0.5 × 10^9/L) or chronic thrombocytopaenia (<50 × 10^9/L) 10. Symptomatic lymphoid interstitial pneumonitis Chronic HIV-associated lung disease, including bronchiectasis.
Clinical Stage IV	
1. HIV wasting syndrome. 2. *Pneumocystis (jirovecii)* pneumonia 3. Recurrent severe bacterial pneumonia 4. Chronic herpes simplex infection (orolabial, genital or anorectal of more than one month in duration or visceral at any site) 5. Oesophageal candidiasis (or candidiasis of trachea, bronchi, or lungs) 6. Extrapulmonary tuberculosis 7. Kaposi sarcoma 8. Cytomegalovirus infection (retinitis or infection of other organs) 9. Central nervous system toxoplasmosis 10. HIV encephalopathy 11. Extrapulmonary cryptococcosis, including meningitis. 12. Disseminated nontuberculous mycobacterial infection. 13. Progressive multifocal leukoencephalopathy 14. Chronic cryptosporidiosis 15. Chronic isosporiasis 16. Disseminated mycosis (extrapulmonary histoplasmosis, coccidioidomycosis) Lymphoma (cerebral or B-cell non-Hodgkin) 17. Symptomatic HIV-associated nephropathy or cardiomyopathy 18. Recurrent septicemia (including nontyphoidal *Salmonella)* 19. Invasive cervical carcinoma 20. Atypical disseminated leishmaniasis	1. Unexplained severe wasting, stunting or severe malnutrition not responding to standard therapy. 2. *Pneumocystis (jirovecii)* pneumonia 3. Recurrent severe bacterial infections (such as empyema, pyomyositis, bone or joint infection, meningitis, but excluding pneumonia) 4. Chronic herpes simplex infection (orolabial or cutaneous of more than 1 month's duration or visceral at any site) 5. Oesophageal candidiasis (or candidiasis of trachea, bronchi, or lungs) 6. Extrapulmonary tuberculosis 7. Kaposi sarcoma 8. Cytomegalovirus infection (retinitis or infection of other organs with onset at age older than one month) 9. Central nervous system toxoplasmosis (after the neonatal period) 10. HIV encephalopathy 11. Extrapulmonary cryptococcosis, including meningitis. 12. Disseminated nontuberculous mycobacterial infection. 13. Progressive multifocal leukoencephalopathy 14. Chronic cryptosporidiosis (with diarrhoea) 15. Chronic isosporiasis 16. Disseminated endemic mycosis (extrapulmonary histoplasmosis, coccidioidomycosis, Penicilliosis) 17. Cerebral or B-cell non-Hodgkin lymphoma HIV-associated nephropathy or cardiomyopathy

For children younger than 5 years, moderate malnutrition is defined as weight-for-height <–2 z-score or mid-upper **arm circumference ≥115 mm to <125 mm.**

For children younger than 5 years of age, severe wasting is defined as weight-for-height <–3 z-score; stunting is defined as length-for-age/height-for-age <–2 z-score; and severe acute malnutrition is either weight for height <–3 z-score or **mid-upper arm circumference <115 mm** or the presence of edema.

TB SCREENING AND DIAGNOSIS

All HIV-positive people should be assessed for risk factors for having or acquiring TB, just as all patients with active TB disease should be offered HIV testing and counselling. The major reasons for this are:

1. HIV-positive people are at higher risk for having or developing active TB.
2. TB is one of the major opportunistic infections causing death in PLHIV.
3. HIV infection influences the clinical progression of TB and its treatment.
4. TB disease influences the clinical progression of HIV/AIDS and its treatment.
5. TB may be an indicative sign of advanced HIV/AIDS disease.

CHRONIC DIARRHOEA

SIGNS AND SYMPTOMS

Diarrhoea lasting >2 weeks, often accompanied by nausea, weight loss, abdominal cramps and dehydration. Diarrhoea is often intermittent, watery and without mucous or blood. In approximately 50% of cases no cause is found.

TREATMENT

Rehydration **(ORS) or IV fluids)**. Make sure the patient is receiving supplementary feeding, and stress the importance of hygiene (hand washing, drinking only boiled water and thoroughly cooking meat and vegetables).

Try to find the cause by stool examination and give specific treatment. If no cause is found:

1. Diarrhoea with blood (dysentery): Treat with **metronidazole**. If there is no response, or when there is fever, add **ciprofloxacin** for at least 7 days (discuss length of treatment with a doctor).
2. Non-bloody diarrhoea: If you suspect worms give **mebendazole or albendazole**. Diarrhoea without blood does not need antibiotics in most cases. In HIV patients consider treating with **cotrimoxazole** for 5 days and/or **metronidazole** for 10 days. If no response after treatment discusses with a doctor.

PROLONGED FEVER

SIGNS AND SYMPTOMS

Fever >37.5°C (lasting > 2 weeks) with no or minimal other symptoms.

CAUSES

There are many different causes of prolonged fever. Children and pregnant women may have different causes from adults. Discuss with the doctor for the complete differential diagnosis (DDx).

- Malaria.
- Bacterial infections.
  - Pneumonia, UTI, pyomyositis, bacteremia (bacteria in blood, but no sepsis).
- TB or atypical mycobacteria.
- Viral infections.
  - Upper respiratory tract infections (URTI)
  - **Cytomegalovirus** (CMV) –CMV is very common. It is spread by close contact, blood, intercourse, and mother to child during delivery. In persons with a normal immune system, CMV infection is asymptomatic. In immunocompromised patients CMV can cause symptoms similar to EBV.
  - Epstein-Barr virus (EBV) – EBV is very common. It is spread by saliva. EBV causes fever, pharyngitis, lymphadenopathy, and fatigue even if the immune system is normal.
- Cancer
  - lymphoma (cancer in the lymph nodes).

TREATMENT

If you find no cause of the fever (**Fever DK = fever do not know**), treat with:

- **Amoxicillin for 7 days:**
  Adult 500mg-1gm TID
  Child 80-100mg/kg/day divided TID (maximum dose 500mg per dose or 1.2 grams per day)
  OR
- **Cotrimoxazole: for 7 days**
  Adult 2 single strength tablets or TMP 160mg/SMX 800mg per day
  Child 6-12mg of TMP/kg/day divided BID (maximum dose 960mg TMP per day)

Discuss with doctor or refer for other investigations if no improvement or condition is worsening.

COUGH AND/OR SHORTNESS OF BREATH

SIGNS AND SYMPTOMS

Persistent or worsening cough, shortness of breath, chest pain, difficulty breathing. Treat according to the symptoms and consider.

a) BACTERIAL PNEUMONIA

SIGNS AND SYMPTOMS

Quick onset, high fever, cough with sputum (may be purulent).

DIAGNOSIS

Clinical diagnosis, CXR if indicated.

TREATMENT

- Admit to IPD:
- **Ceftriaxone (IV): 1-2 gm IV OD** (dose and duration depends on severity and/or culture results).

b) PNEUMOCYSTIS CARINII PNEUMONIA (PCP)

SIGNS AND SYMPTOMS

Fever, fatigue, and weight loss for weeks before developing respiratory symptoms. Followed by dry cough (without sputum), increasing shortness of breath, and minimal or absent chest signs.

DIAGNOSIS

Clinical diagnosis.

TREATMENT

- Admit to IPD: **Cotrimoxazole (PO):**

120mg/kg (sulfamethoxazole/trimethoprim combination dose) 3- 4 divided doses for 21 days

- **Folic Acid (PO):**
  5mg OD (when taking high dose cotrimoxazole as it decreases the level of folic acid in the body)

If severe dyspnoea (usually indicated by hypoxemia (low oxygen saturations) ADD:
Prednisolone (PO): (if severe, use IV hydrocortisone initially)

- Child:
  1mg/kg BID x 5 days, then 1mg/kg OD for 5 days then
  0.5mg/kg OD for 5 days and decrease gradually.
- Adult:
  40mg BID x 5 days, then 40mg OD x 5 days, then decrease slowly

Note: All patients with PCP should start on cotrimoxazole prophylaxis and ART as they are in clinical stage 4.

c) TUBERCULOSIS
SIGNS AND SYMPTOMS
Signs and symptoms are the same as for patients who are not infected with HIV. One or more of: cough of any duration, fever of unknown cause for > 2 weeks, weight loss in the last 3 months, drenching night sweats. Extrapulmonary disease is more common.

DIAGNOSIS
Manage as TB suspect.
Note: In patients who are HIV positive AFB sputum test is often negative even in pulmonary TB.

TREATMENT
Same drugs, protocols, duration, and side effects as for treatment of other TB patients.
Note: All HIV positive patients diagnosed with TB should start **cotrimoxazole** prophylaxis (does not matter what the CD4 count is).

ORAL CANDIDIASIS (THRUSH)

SIGNS AND SYMPTOMS
White patches or spots on tongue, palate, cheek or gums that can be removed manually. May have burning sensation in the mouth on eating.

TREATMENT
Nystatin
Give 1 lozenge to be sucked QID for 7 days or 1ml of oral suspension (100,000 IU) QID for 7 days (total 400,000 IU per day). Oral suspension should be swilled around mouth and then swallowed.
If no improvement**: Fluconazole (PO)**
Adult: 200mg OD x 7 days.
Child: 3mg/kg OD up to 21 days.

OESOPHAGEAL CANDIDIASIS

SIGNS AND SYMPTOMS
Pain and difficulty swallowing food usually associated with oral thrush. This is the major cause of weakness and weight loss in AIDS.

TREATMENT
Fluconazole (PO)

- **Adult**: 200 - 400mg OD x 14-21 days
- **Child:**3mg/kg OD x 21 days

CRYPTOCOCCAL MENINGITIS

SIGNS AND SYMPTOMS
Severe, persistent and untreatable headache, malaise, confusion and convulsions. Symptoms associated with bacterial meningitis are often absent (fever, stiff neck, photophobia, nausea, and vomiting).

DIAGNOSIS
Lumbar Puncture: Send CSF for India ink test and/or fungal culture. Screening of serum Cryptococcal Ag should be done if CD4 count is **< 100 cells mm^3**. If laboratory diagnosis is not possible, discuss with doctor and refer.

Refer treatment of Cryptococcal Meningitis in Medic Curriculum Reference book.

CEREBRAL TOXOPLASMOSIS

DEFINITION
This is an infection of the brain that is caused by reactivation of the parasite Toxoplasma gondii in immunocompromised patients. It causes multiple lesions in the brain. It almost always occurs in patients with a CD4 count < 100 cells/ microliter.

SIGNS AND SYMPTOMS
Headache, sometimes with fever. Focal neurological symptoms e.g., one-sided weakness, paralysis, decreased consciousness, new seizures.

DIAGNOSIS
Serum toxoplasma antibodies IgG and IgM on a brain **CT scan** you can find 'ring enhancing' lesions in the brain. This is only available at some hospitals.

TREATMENT
If suspect toxoplasmosis because of symptoms, first give cotrimoxazole to see if there is a response. The lesions in the brains should resolve within 3 weeks of starting treatment.

- **Cotrimoxazole (PO):**
  Child & Adult: **TMP/SMX** 10mg/50mg/kg/day divided in 2 doses x 6 weeks.

- **Folic Acid (PO):**
  5mg OD (when taking high dose co-trimoxazole as it decreases the level of folic acid in the body).

Note: All patients with toxoplasmosis should start on ART (as they are in clinical stage 4) but only after at least 2 weeks of cotrimoxazole treatment.

PENICILLIUM MARNEFFEI INFECTION (PENICILLIOSIS)

DEFINITION

This is a major cause of HIV associated disease in Thailand.

SIGNS AND SYMPTOMS

Fever, anaemia, weight loss, enlarged lymph nodes and enlarged liver. If the patient has severe disease, they may have generalized papular skin lesions. Severe disease can cause death quickly.

DIAGNOSIS

Blood or skin lesions for fungal culture.
Refer treatment of Penicilliosis in Medic Curriculum Reference book.

PROPHYLAXIS OF OPPORTUNISTIC INFECTIONS

Each infection makes the PLWH weaker, causing a further decrease of the **CD4 count.** This lowers immunity and makes other infections more likely. That is why it is important to try to prevent and treat infections as soon as possible. Fortunately, some opportunistic infections can be prevented by regularly taking certain drugs. This is called **prophylaxis**.

There are two kinds of prophylaxis:

Primary prophylaxis:
Prevents the first occurrence of an infection.

Secondary prophylaxis:
Prevents new infections in someone who has already had one or more infections and recovered.

COTRIMOXAZOLE PROPHYLAXIS

This mainly prevents from ***Pneumocystis jirovecii*** (previously known as ***Pneumocystis Carinii*** Pneumonia or **PCP**) and toxoplasmosis. It is also effective against certain types of bacterial pneumonia and intestinal infections.

Give cotrimoxazole to:

- All HIV-exposed infants at 6 weeks of age.
- All HIV-infected children < 5 years.
- All HIV infected people > 5 years with no signs of active PCP **AND**
  - CD4 count **<350cells/ mm3** OR
  - WHO Clinical Stage 2, 3 or 4.
- HIV infected persons diagnosed with tuberculosis.
- Patients with previous PCP or previously treated toxoplasmosis (=secondary prophylaxis).

If there are signs of active pneumonia, give treatment doses not prophylaxis doses *(see treatment of different opportunistic infections above)*

Dose for cotrimoxazole primary and secondary prophylaxis

Cotrimoxazole (PO)

- **Adult:**
  2 single strength tablets (=960mg) OD.
  (*1 single strength tablet = 480mg = TMP 80mg + SMX 400 mg)
- **Child:**

Weight	Syrup (200/40 mg per 5 ml)	Tablet 400/80
<5kg	2.5 ml	-
5-15 kg	5 ml	½ tablet
15-30kg	10ml	1 tablet
>30kg	-	2 tablets

Note: If there is allergy to cotrimoxazole use Dapsone Adult: 100mg OD; Child: 2mg/kg OD (max 100mg OD). Exclude G6PD deficiency first. In HIV infected pregnant women who need cotrimoxazole prophylaxis use the same dose as other adults.

When to stop cotrimoxazole primary and secondary prophylaxis

- **<2yrs**
  Do not stop prophylaxis.
- **2-5yrs:**
  Stop when on ART for at least 1 year and CD4 count >25% 2 separate times 6 months apart.
- **>5yrs/ Adults:**
  Stop when on ART for at least 1 year and CD4 count >200cells/mm3 2 separate times 6 months apart.

Note: If ART not available prophylaxis is life-long

FLUCONAZOLE PROPHYLAXIS

Fluconazole prophylaxis is used only as a **secondary prophylaxis** if the patient has already had cryptococcal meningitis.

Give fluconazole to:

Patients with proven cryptococcal disease and recovered; prophylaxis given after 10-12 weeks of treatment.

Dose for fluconazole secondary prophylaxis

Fluconazole

- **Adult**: 200mg OD
- **Child 2-5yrs:** 6mg/kg OD (max 200mg)

When to stop fluconazole secondary prophylaxis

- **<2yrs:**
  - Do not stop prophylaxis.
- **2-5yrs:**
  - Stop when on ART for at least 1 year and CD4 count >25% 2 separate times 6 months apart.
- **>5yrs/Adults:**
  - Stop when on ART for at least 1 year and CD4 count >200cells/mm3 2 separate times 6 months apart.

ATLAS OF HIV RELATED CONDITIONS AND OPPORTUNISTIC INFECTIONS

WHO clinical staging in HIV/AIDS Adults

Stage 1 - No symptoms

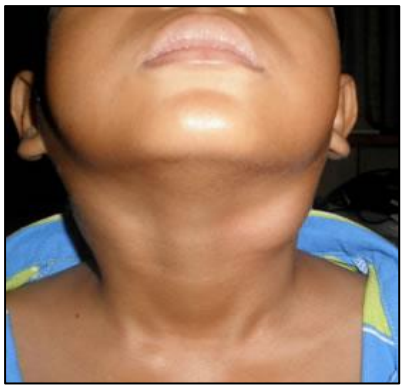


Figure for **Lymphadenopathy [lymph nodes** that you can feel because they are bigger than normal.

Stage 2 - Weight loss [<10%]

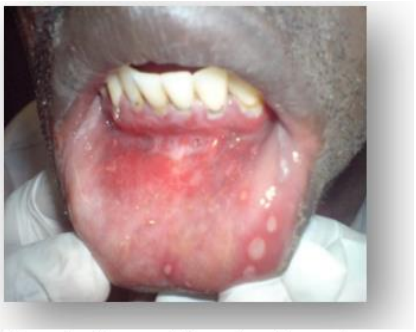


Figure for Recurrent [for a long time or keeps happening] ***oral ulcer***

Figure for Angular ***cheilitis***

Recurrent [for a long time or keeps happening] respiratory infection

- Otitis media – **ear** infection
- Tonsillitis / pharyngitis – **throat** infection
- Sinusitis – **sinus** infection
- Skin problem:

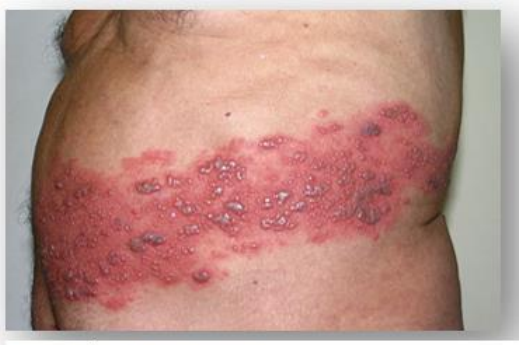


Figure for ***Herpes zoster***

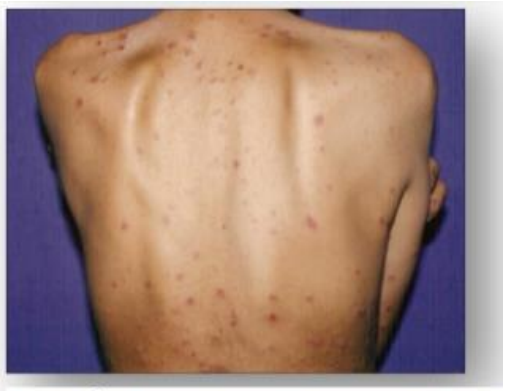


Figure for ***Papular pruritic eruption = itchy rash***

Stage 3

- **Weight loss** >10%
- **Diarrhoea** > 1 month
- **Fever** > 1 month
- **Pulmonary TB**

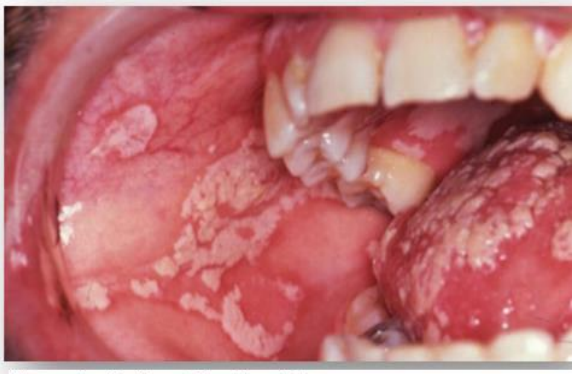


*Figure for **Oral candida [thrush]***

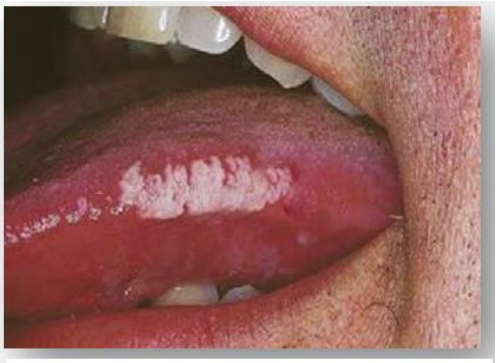


*Figure for **Oral hairy leukoplakia** = white on the side of the tongue*

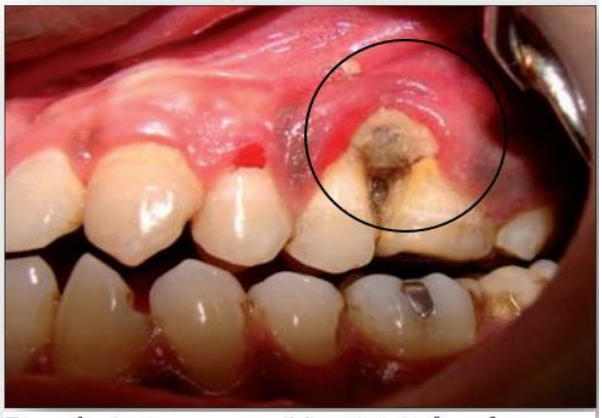


*Figure for Acute severe **necrotizing** gingivitis [gums] or periodontitis [around the teeth]*

Severe bacterial infection of chest [pneumonia or empyema]
- Muscle
- Bone
- Joint
- meningitis

Abnormal CBC with **no other cause**: [for example if they has dengue and low platelets this does not count!]
- Hb <8
- Platelets <50
- Neutrophils <500

Stage 4
- **HIV WASTING SYNDROME** = 10% weight loss AND: Fever > 1 month or diarrhoea > 1 month
- **Extra pulmonary TB**
- **PCP** [pneumocystis lung infection] – dry cough, low oxygen especially when walking, chest sounds normal
- Recurrent [for a long time or keeps happening] **severe pneumonia**
- **Oesophageal candida** [suspect if oral candida and pain on swallowing]
- **Cryptococcal meningitis** – suspect if headache →CSF India Ink test for diagnosis.
- **Toxoplasmosis** – suspect if fever + headache + one-side weakness + fit

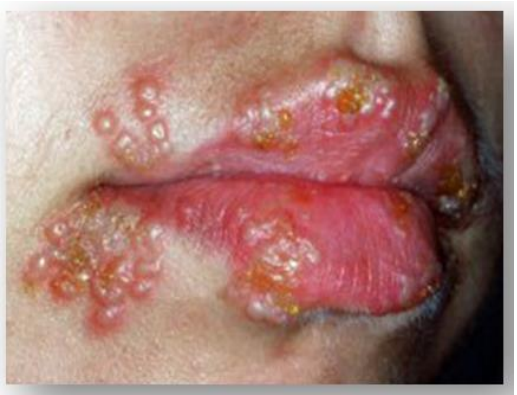
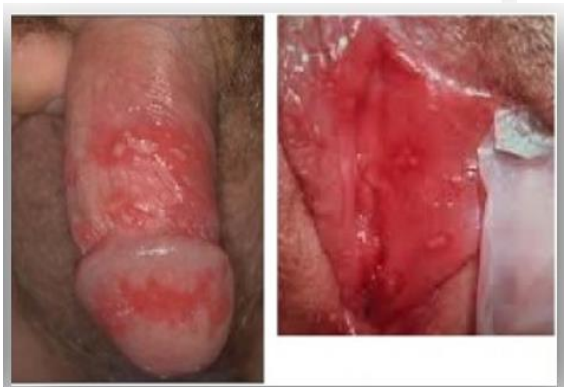
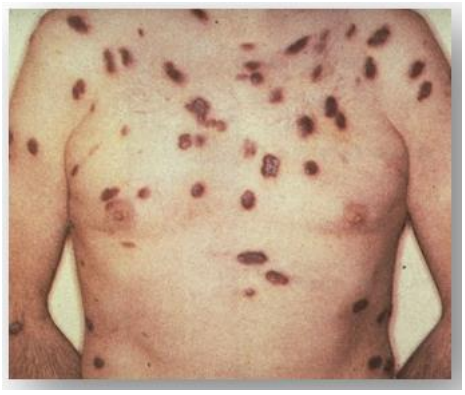
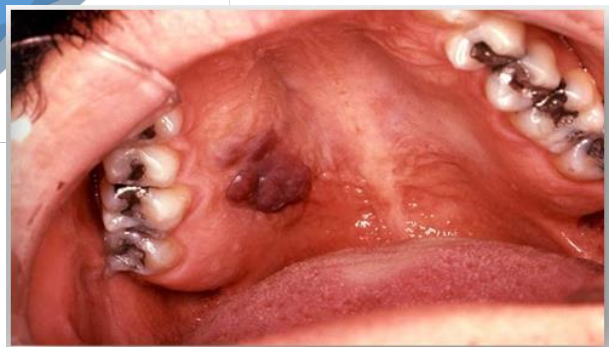


Figure for Chronic herpes simplex (Oral or Genital)







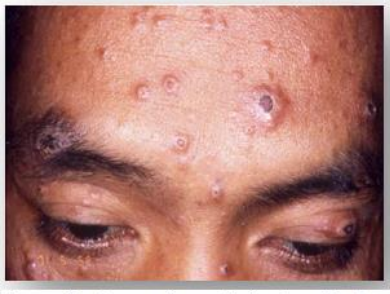


Figure for Severe fungal infection like ***Penicilliosis*** *suspect if rash + lymph nodes + unwell:*

POST EXPOSURE PROPHYLAXIS

GENERAL INFORMATION

DEFINITION

Post Exposure Prophylaxis (PEP) means that after somebody is exposed to body materials that might contain HIV or hepatitis virus, he or she can take prophylactic medicine to try to prevent HIV infection or vaccination to prevent hepatitis B disease. Unfortunately, there is no PEP available for hepatitis C.

Source person e.g. the patient = the person that is the possible source of contamination through potentially infectious blood or body fluids. **Exposed person** e.g. the health care worker with needle prick the person who is potentially at risk of becoming infected with HIV/hepatitis B or C due to contamination with potentially infectious blood or body fluids.

GENERAL TREATMENT

For all exposure to potentially contaminated fluid do immediate first aid and follow the steps below:

1. Immediate first aid

- When there is a wound (e.g. needle prick), do not stop the bleeding, do not squeeze but immediately wash thoroughly with soap and water, and then rinse.
- When the skin is exposed but there is no wound, also wash thoroughly with soap and water, and then rinse.
- When eyes or mouth are exposed (e.g. blood/fluid splash), wash and flush with plenty of water or NSS.

2. Contact the person in-charge of PEP and complete a needle stick/splash injury reporting form

3. Risk assessment

- Together with the PEP focal or other experienced person, follow the steps below and make an assessment of the risk of infection and if PEP is needed.
- Some exposures have more risk of HIV and hepatitis B or C than others. The level of risk will determine the management. Refer to the PEP Guidelines for further information on risk assessment of exposures.

4. Ask if the exposed person has been fully vaccinated against hepatitis B.

5. Obtain consent from the source person before testing them

- Explain to the patient why it is important to test them. Give pre-test counselling. Test the blood ONLY after getting their consent. Confidentiality must be maintained.
- If the patient has already left the clinic, try to contact the patient for the blood test.

6. Pre-test counselling for the exposed person

- During a confidential meeting with the exposed person explain that follow up and testing will be planned. The following points should be discussed:

  For HIV:
- The risk of transmission of HIV after accidental exposure to blood is estimated at 0.3% (3 in 1000).
- The risk is similar in unprotected sex with a HIV positive partner.
- PEP is not 100% effective in preventing HIV infection; it will reduce the risk of acquiring HIV from the exposure but does not eliminate the risk completely.
- The side effects of PEP are usually minor but require monitoring.

  For Hepatitis B:
- The risk of transmission of hepatitis B depends on stage of infection of the source person.

  For Hepatitis C:
- The risk of transmission after exposure to hepatitis C positive blood is approximately 1.8%.

7. If possible and the source person consents do:

1. Rapid HIV test (if positive send for confirmation).
2. Rapid HBsAg test for hepatitis B if positive, send sample for confirmation.
3. Hepatitis C test – need to send for confirmation.
4. Pre and post-test counselling must be done.

8. Take a serum save from the exposed person (blood sample that is not immediately tested).

- It is important to do a blood test before you start PEP. You can only test this blood if you have given pre-test counselling and received consent from the exposed person. This takes a lot of time and is too long to wait before giving PEP as PEP is more effective if given quickly after the event.
- Only after starting PEP (if required), counselling and getting consent test the serum save blood test.

9. If required give specific PEP treatment

- Ideally within 2 hours.
- The HIV/hepatitis test is voluntary. PEP should never be withheld because a serum save test has not been done. If the exposed person does not want to have a HIV/HBsAg test PEP can still be given.

10. If the exposed person consents test the serum save blood for HIV and HBsAg.

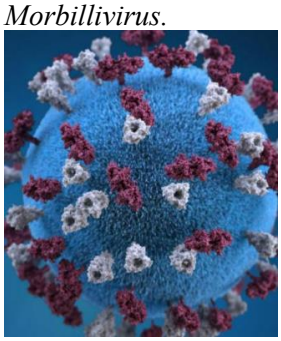
- It is important to test the serum save to know if the exposed person was not already HIV/hepatitis B positive.
- If the exposed person cannot make a decision you can wait for a few days.
- If positive send for confirmation.

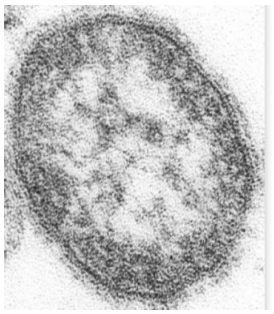
MEASLES

DESCRIPTION

MEASLES EPIDEMIOLOGY

The measles virus is a paramyxovirus, of the genus Morbillivirus.





Measles is an acute childhood infectious highly contagious disease caused by a virus. The virus is transmitted from person to person through coughing or sneezing. The disease is characterized by:

- generalized, reddish (erythematous), blotchy (maculopapular) rash
- history of fever usually above 38˚C (if not measured, then "hot" to touch); and
- at least one of the following – 3C: cough, runny nose (coryza), or red eyes(conjunctivitis).

In addition, children with measles frequently exhibit a dislike of bright light (photophobia), and often have a sore red mouth (stomatisis).
Incubation Period: 8-14 days from exposure to 1st symptoms and 14 days between appearance of rash.

Extent of the problem

- High mortality
- Long term complications

30 million measles cases and over 700 000 measles deaths annually in developing countries. (2001).
Long term problems are blindness (related with vitamin A), SAM and consequences, Chronic Lung diseases.

Measles outbreak (Epidemic)

In 2018, worldwide more than 140,000 people died from measles in all regions, according to WHO and CDC.
In 2018 and 2019, outbreak in Myanmar Yangon and Mandalay region.

Period of communicability of measles

Cases are infectious from slightly before the beginning of the prodromal period, usually 5 days prior to rash onset. They continue to be infectious until 4 days after the onset of the rash. Maximum communicability occurs from onset of prodrome through the first 3–4 days of rash.
That is why, stay away from work or school for at least 4 days from when the measles rash first appears to reduce the risk of spreading the infection.

When are children not contagious with measles?

A person with measles can spread the virus to others for about eight days, ***starting four days before the rash appears and ending when the rash has been present for four days***.

What is the chain of infection for measles?

Measles is a highly contagious virus that lives in the nose and throat mucus of an infected person. It can spread to others through coughing and sneezing. If other people breathe the contaminated air or touch the infected surface, then touch their eyes, noses, or mouths, they can become infected.
Measles virus is rapidly inactivated by heat, sunlight, acidic pH. It has a short survival time (less than 2 hours) in the air or on objects and surfaces.

R-naught for Measles

R_0 is a basic reproductive number. For measles is 12-18. It means that each person with measles would, on average, infect 12-18 other people in a totally susceptible population. $R0$ depending on factors like population density and life expectancy. if R0 is less than 1, the disease will die out in a population, because on average an infectious person will transmit to fewer than one other susceptible

person. On the other hand, if R0 is greater than 1, the disease will spread.

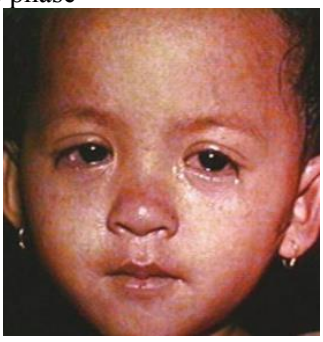
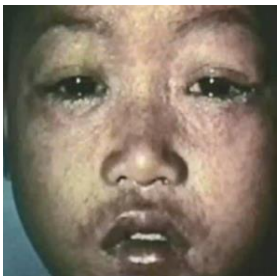
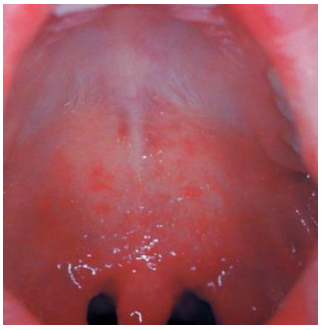
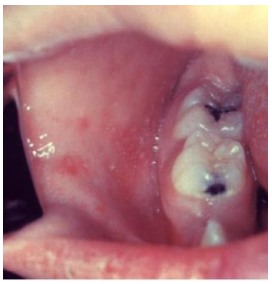
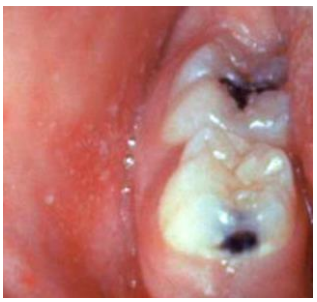
CLINICAL COURSE

Measles can be divided into **four phases**:

1) Incubation phase

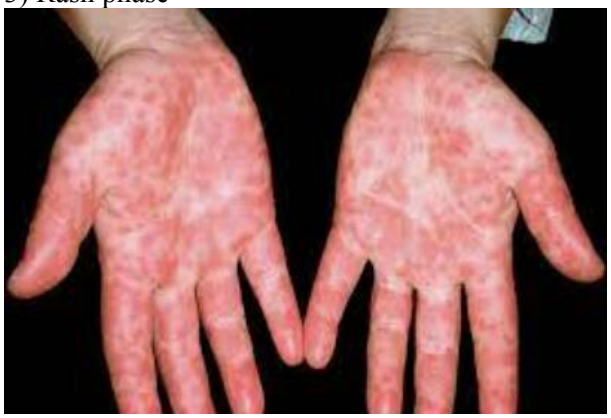
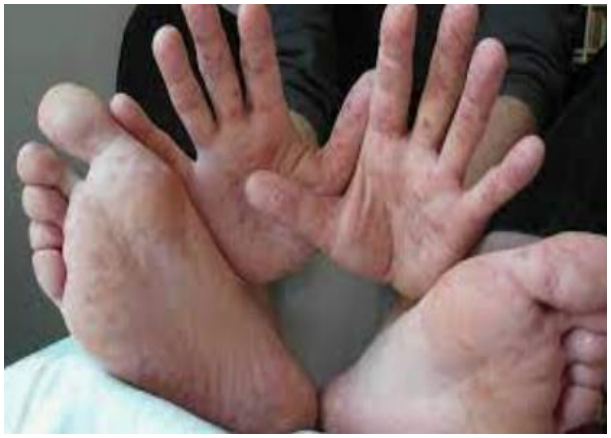
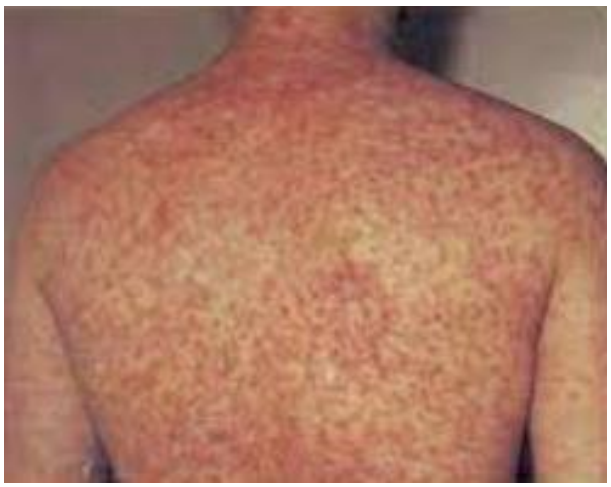
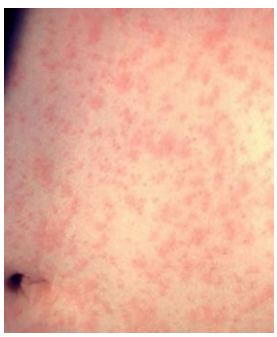
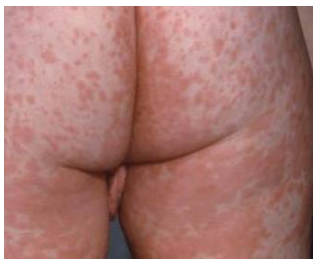
The incubation phase typically lasts 8 to 14 days after exposure to the virus and does not have any symptoms.

2) Prodromal (catarrhal) phase

two- to four-day **prodrome phase** is characterized by fever, malaise, and anorexia, followed by conjunctivitis, coryza, and cough (3 Cs). The severity of conjunctivitis is variable and may also be accompanied by lacrimation or photophobia. If present, ***Koplik spots, considered pathognomonic for measles infection***, typically occurs approximately 48 hours prior to the rashes. (Koplik spots are1 to 3 mm whitish, grayish, or bluish elevations with an erythematous base, typically seen on the buccal mucosa opposite the molar teeth, though they can spread to cover the buccal and labial mucosa as well as the hard and soft palate. Koplik spots may coalesce and generally last 12 to 72 hours. Koplik spots often begin to slough when the exanthem appears.

3) Rash phase

The **rash** is a symptom of inflammation occurring in the skin. As the virus travels in the blood, it infects capillaries in the skin. Immune cells detect the infection and respond by releasing chemicals

such as nitric oxide and histamines, which destroy the viral invaders and call other immune cells into action.

It usually begins as flat red spots that appear on the face at the hairline and spread downward to the neck, trunk, arms, legs, and feet. Small raised bumps may also appear on top of the flat red spots. The rashes of measles arise approximately two to four days after onset of fever; it consists of an erythematous, maculopapular, blanching rash, which classically begins on the face and spreads cephalocaudally and centrifugally to involve the behind the ears, neck, upper trunk, lower trunk, and extremities. Early on, the lesions are blanching; in the later stages, they are not. The rash may include petechiae; in severe cases, it may appear hemorrhagic. In children, the extent of the rash and degree of confluence generally correlate with the severity of the illness. The palms and soles are rarely involved. The cranial to caudal progression of the rash is characteristic of measles but is not pathognomonic

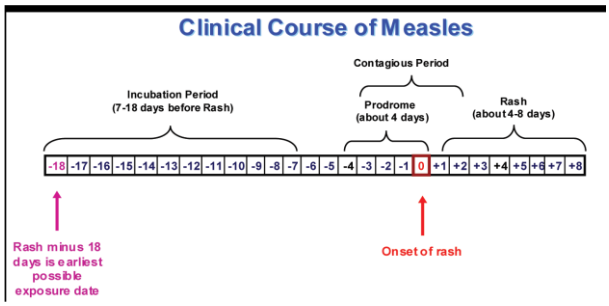
The rash spreads, eventually reaching the hands and feet. The rash lasts for 5 to 6 days, and temporary darker staining then fades. On average, the rash occurs 14 days after exposure to the virus (within a range of 7 to 18 days). If fever is still present after the 3rd day of the rashes, a complication should be suspected.

Other characteristic findings during the rash phase include lymphadenopathy, high fever (peaking two to three days after appearance of rash), pronounced respiratory signs including pharyngitis, and nonpurulent conjunctivitis. Clinical improvement typically ensues within 48 hours of the appearance of the rash. The rash usually lasts six to seven days and fades in the order it appeared

4) Recovery phase.

Cough may persist for one to two weeks after measles. ***The occurrence of fever beyond the third to fourth day of rash suggests a measles-associated complication***. It usually begins as flat red spots that appear on the face at the hairline and spread downward to the neck, trunk, arms, legs, and feet. Small raised bumps may also appear on top of the flat red spots. The spots may become joined together as they spread from the head to the rest of the body.

Clinical Course of Measles



COMPLICATION

Pneumonia

1) Eye complication: corneal ulceration
2) Severe diarrhea
3) Otitis media
4) Encephalitis
5) Croup
6) Stomatitis
7) Feeding difficulties

Measles Immunity: Lifelong immunity. Rare to develop another chance for disease again. Likely wrong diagnosis.

Herd immunity for measles: 93-95% required (WHO)

Immunity against measles in Myanmar

Figure 16: **Immunity against measles - immunity profile by age in 2018***

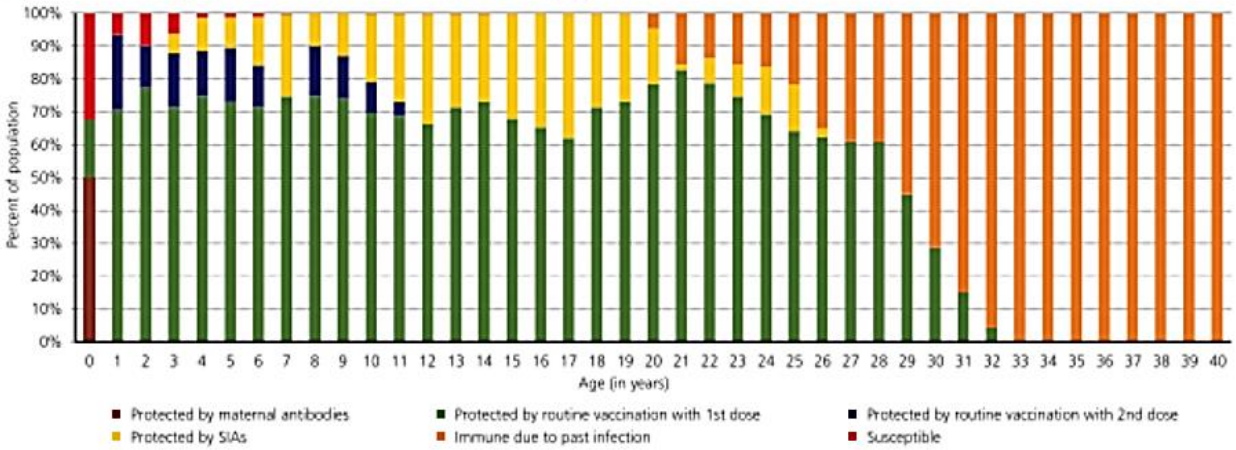


Figure 18: Sub-national risk assessment -measles and rubella

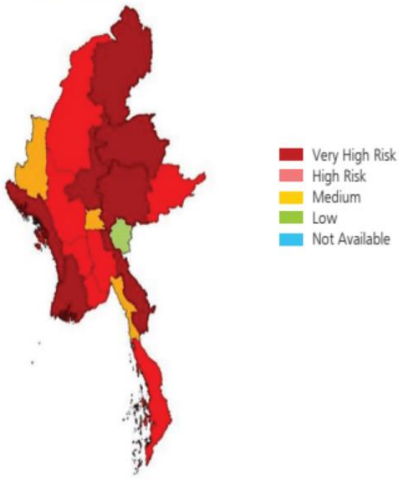
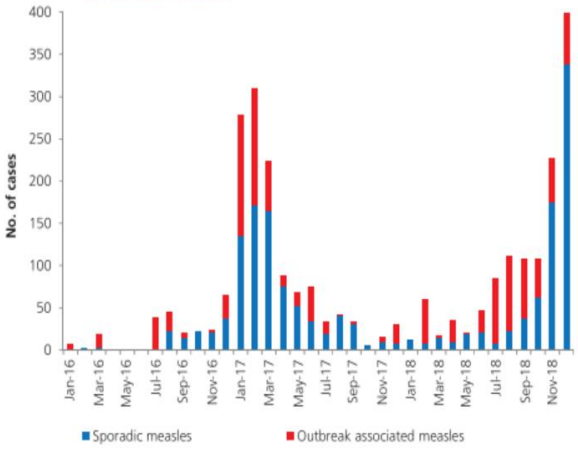


Figure 19: Sporadic and outbreak associated measles cases* by month 2016-2018



*Includes laboratory confirmed and epidemiologically linked cases
Source: SEAR Monthly VPD reports

CONFIRMATION FOR DIAGNOSIS

1. Serum measles IgM antibodies.
   Significant rise in measles IgG antibody between acute and convalescent titers. Serology (anti-measles IgM) is the most common laboratory method used for diagnosis of measles virus infection. The detection of measles virus-specific IgM in serum or oral fluid is diagnostic of acute infection. Anti-measles IgM is generally detectable 3 days after the appearance of the exanthem; it may be undetectable on the day the exanthem appears. IgM is usually undetectable approximately 30 days after the exanthem. Anti-measles IgG is generally undetectable up to 7 days after rash onset but subsequently peaks about 14 days after the exanthem appears.
2. Isolation of measles virus in culture
3. Detection of measles virus RNA by reverse transcription polymerase chain reaction (RT-PCR).

MANAGEMENT

I. Case Assessment & severity

Assess & Classify category of the individual case: LOOK / LISTEN / FEEL

- Severe complicated measles
- Complicated measles
- Uncomplicated measles

The management and treatment for each category is different.

ASK (Symptoms)	LOOK / LISTEN / FEEL (Signs) for
Ability to take feeds or fluids	Nutritional status
Rapid, difficult or noisy breathing (stridor)	Breathing rate, chest indrawing, stridor
Diarrhoea, vomiting or blood in stools	Dehydration
Sore mouth, eyes or ears	Mouth ulcers, sore and discharging ears and eyes, white spots on eyes
Convulsions, sleepiness	Level of consciousness

CLASSIFICATION 1: SEVERE COMPLICATED MEASLES

If even one sign or symptom, consider as "Severe Complicated Measles" and refer to hospital. Next check for DANGER SIGNS (marked by * on the slide).

If one or more is present, the child needs immediate life-saving attention. Complete the assessment and any preliminary treatment (e.g. the first dose of antibiotic, vitamin A, start of rehydration) followed by rapid referral to hospital.

Signs and symptoms of severe complicated measles • Not able to drink or breastfeed*

- Convulsions*
- Lethargic or unconscious*
- Deep or extensive mouth ulcers
- Chest indrawing and rapid breathing
- Stridor in a calm child
- Corneal clouding or ulcers, or vision affected
- Mastoiditis - pain & swelling of the bone behind the ear
- Severe malnutrition
- Severe dehydration

Key: * DANGER SIGNS

If the child with measles has severe malnutrition, either marasmus or kwashiorkor, then the case should always be classified as severe complicated measles.

MGT OF SEVERE COMPLICATED MEASLES (Hospital Care)

Criteria for admission to hospital will vary in different areas and will depend on the availability of hospital beds. Whenever feasible, all children with severe complicated measles should be admitted to hospital. Without admission and proper care, these children are in danger of dying. If admission is not possible, provide the best available therapy on an outpatient basis, with regular reassessment until the child is well. For children with danger signs, treatment must begin at once, before transfer to hospital.

HOSPITAL CARE OF SEVERE COMPLICATED MEASLES

- Safe arrival
- General management principles
- Pneumonia
- Croup
- General care
- Isolation of children
- Safe arrival. Children with severe complicated measles (especially those with danger signs) should be treated in hospital. For the peripheral health worker, the most important action is to ensure the child arrives at the hospital as quickly as possible and in the best possible condition. This means starting urgent treatment before sending the mother and child to hospital (e.g. starting rehydration, giving the first dose of vitamin A or the first dose of antibiotic).
- General management principle must be applied.
- Treat the whole child (and family)
- Treat multiple complications at the same time.
- Anticipate complications
- Act fast to treat eye lesions
- Pneumonia. Antibiotics should be given by intramuscular or intravenous injection. Give oxygen, if available, to all children who are hospitalized with very severe pneumonia (cyanosis, unable to drink). If wheezing is a problem, give salbutamol.
- Croup. Airways intervention (intubation or surgical tracheotomy) may be needed. Nebulized adrenaline may be used as an alternative. If bacterial croup is suspected, give chloramphenicol or ceftriaxone Inj:
- General care: Essential components of general care
- Relieve common symptoms
- Provide nutritional support
- Provide vitamin A
- Advise the mother about the illness
- Isolation of Children
- Measles is a highly infectious disease and spreads rapidly amongst children who have not had the disease and amongst those who have not been immunized against measles.
- Do not leave in the public waiting area children with fever and rash suspected of having measles. If possible, provide a special isolation room for them.
- Isolate children admitted to hospital with measles for at least 4 days after the rash appears. This will limit the spread of the measles virus. Isolation should be as effective as resources permit. Ideally measles patients should be kept in their own ward away from other patients.
- Isolate malnourished and immuno-compromised children with measles during the whole illness, since they may excrete the virus for a long time.
- Immunize with measles vaccine all children from 6 months of age who are admitted to hospital. For children receiving a dose before 9 months, it is essential that a second dose be given as soon after 9 months of age as possible.

Signs and symptoms of complicated measles

Rapid breathing, but NO chest indrawing - 40 or more breaths per minute if aged > 1 year - 50 or more breaths/minute if aged < 1 yearSome dehydration

- Stridor only when the child is upset or crying
- Mouth ulcers not affecting intake of food or fluids
- draining from the eyes
- Acute otitis media - pain in or discharge from the ear, duration less than 14 days

CLASSIFICATION 2: COMPLICATED MEASLES

If there is even one sign or symptom present of the above box, consider as “Complicated Measles”. Complicated cases are treated on an outpatient basis.

- Management of pneumonia
- Management of croup
- Management of ear problems
- Management of Diarrhoea / Dehydration
- Management of Eye problems
- Management of Mouth ulcers

Management of pneumonia

Assessment: A child has pneumonia if there is cough and rapid breathing (40 breaths or more per minute if aged more than one year, or 50 breaths or more per minute if aged less than one year).

Treatment: Give an antibiotic, either ampicillin, amoxicillin, cotrimoxazole or, if these are not available, procaine penicillin for 5 days. The child

should return for reassessment in 2 days, or sooner if the condition worsens.

Management of croup

Assessment: Croup is caused by an infection of the voice box and windpipe, and in children with measles it may be:

Mild croup - noisy in-breathing (stridor) only when the child is crying, a fever, hoarse voice, and a barking or hacking cough.

Severe croup - stridor even when the child is quiet. There is frequently rapid breathing and chest indrawing and the child is distressed by his/her condition.

Bacterial croup- which presents as stridor, high fever and thick green sputum. This type of croup is much less common than "mild" and severe" croup.

Treatment: A child with mild croup and no distress may be managed as an outpatient and reassessed in 2 days, or sooner if the condition worsens. Whenever feasible, all other children with measles-associated croup should be admitted to hospital. Give a soothing cough remedy. Children with bacterial croup should be treated with chloramphenicol

Management of ear problems

Assessment: There are three complications of measles related to the ear.

Acute ear infection (acute otitis media) - fever, earache, discharge from the ear for less than 14 days or a red bulging drum on examination of the ear.

Chronic ear infection (chronic otitis media) - pus discharging from the ear for 14 days or more.

Mastoiditis - fever and a painful swelling of the bone behind the ear.

Treatment For acute ear infection give an antibiotic (cotrimoxazole or ampicillin) for 7 days and if there is a discharge, clean the affected ear(s) at least twice a day with cotton wool or a wick of clean cloth. For **chronic ear infection**, only dry the ear(s) with a clean cloth. Children with **mastoiditis** must be referred to hospital immediately.

Management of Diarrhoea / Dehydration

DEHYDRATION

Assessment and classification

No dehydration Well, alert, drinks normally, tears present, moist mouth and tongue, skin pinch goes back quickly

Some dehydration Two or more of the following signs including: restless or irritable thirsty and drinks eagerly skin pinch goes back slowly sunken eyes,

Severe dehydration Two or more of the following signs including: skin pinch goes back very slowly lethargic or unconscious drinks poorly or not at all sunken eyes.

DIARRHOEA: Diarrhoea is a common complication of measles and causes problems through the resulting dehydration and secondary malnutrition. First assess and classify the degree of dehydration as shown on this slide, and then treat accordingly.

Assessment • Diarrhoea is usually defined as the passing of loose or watery stools on three consecutive occasions.

If there is blood in the stools then the child has dysentery. The commonest cause of dysentery is a bacterial infection (Shigella).

If the diarrhoea lasts for 14 or more days then the child is classified as having persistent diarrhoea. If you see a child with persistent diarrhoea and oral thrush, consider HIV infection as a possible diagnosis.

Treatment • Children with diarrhoea and dehydration should be treated according to WHO guidelines. Children with some dehydration can be managed with oral rehydration (using oral rehydration salts) and proper feeding, while children with severe dehydration require intravenous fluids.

Reassess the child according to the WHO guidelines and adapt the treatment plans accordingly.

Treat dysentery for 5 days with an oral antibiotic recommended for Shigella in your area, usually cotrimoxazole.

Persistent diarrhoea is treated by adjusting the diet. If the child is still breastfeeding, increase the intake of breast milk. If breastfeeding has recently been stopped, consider starting it again. If the child is receiving animal milk products, reduce the usual amount or replace with breast milk or a fermented milk product, such as yoghurt, or replace half the animal milk with nutrient-rich semi-solid food.

Management of Eye problems

VITAMIN A DEFICIENCY AND EYE DAMAGE

Recognition

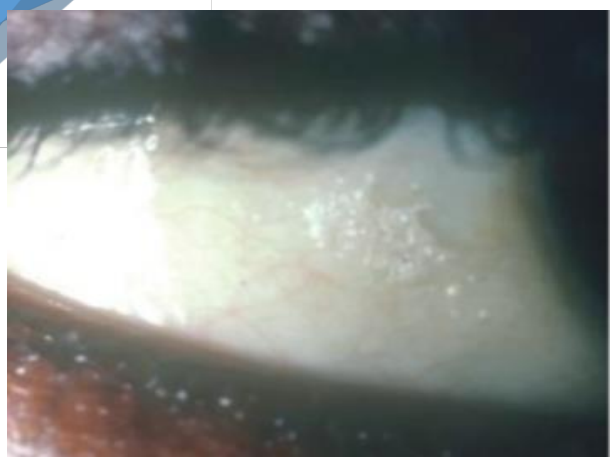
Night blindness -the child has difficulty in seeing in reduced light intensity e.g. at night or in twilight

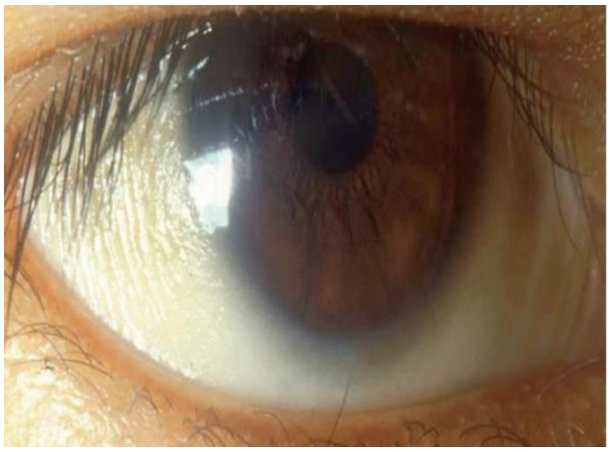
Bitôt spots - foamy white plaques on the conjunctiva

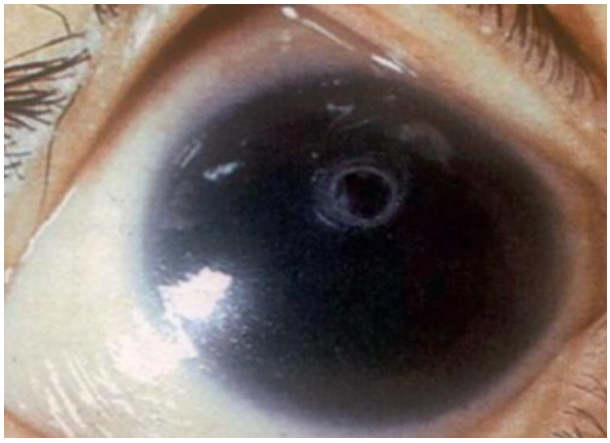
Conjunctival and corneal dryness (xerosis)

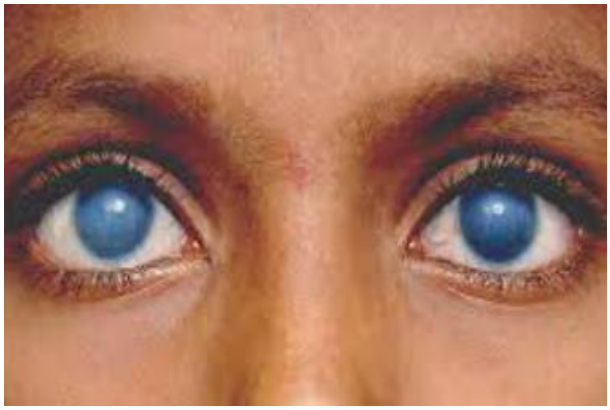
Corneal clouding

Corneal ulceration (as shown in the child pictured on this slide)









Treatment: If there are signs of corneal clouding, refer the child to hospital. If this is not possible then give the child two doses of vitamin A on successive days
give a third dose 2-4 weeks later - use tetracycline eye ointment, three times a day for 7 days apply a protective eye pad; an eye pad over a closed eye promotes healing of the cornea
advise the mother to return in 2 days; if there is no improvement, refer to a specialist eye worker.

EYE INFECTION - conjunctivitis, keratitis and other corneal damage

Assessment:

Conjunctivitis. Inflammation of the conjunctiva is seen in the early stages of measles. The child has red, watery eyes. If there is secondary bacterial infection, the eyelids will be sticky (to the extent that the child may not be able to open the eyes), or pus will collect at the corners of the eyes.

Keratitis. Measles virus in the cornea causes irritation of the eyes and a dislike for bright light (photophobia).

Other corneal damage. Corneal damage with scarring may result in blindness. The causes of corneal damage include: - measles virus infection - vitamin A deficiency - secondary herpes simplex or bacterial infection - a chemical conjunctivitis resulting from harmful eye practices such as application of topical herbal remedies.

Treatment: If there is a clear watery discharge, no specific therapy is needed.

If there is pus discharge in the eyes, clean the eyes with clean water using cotton wool boiled in water and cooled, or a clean cloth.

Apply tetracycline eye ointment three times a day for 7 days.

NEVER use steroid ointment to treat eye disease associated with measles.

Management of Mouth ulcers

Assessment: Mouth ulcers are most frequently due to herpes simplex or Candida infections. The ulcers caused by herpes start off as little blisters on the lips, tongue and on the inside of the cheeks. They soon develop into ulcers. Candida usually presents as whitish plaque-like lesions in the mouth. If mouth hygiene is poor, then additional infections are likely to occur. This may cause difficulty with drinking and feeding and may result in dehydration (from lack of drinking) and make malnutrition worse (from lack of eating). If you see recurrent severe oral thrush, suspect the possibility of HIV infection, whether measles is present.

Treatment

If the child can drink and eat, advise the mother to clean the mouth with clean water (add a pinch of salt to the cup of water, if available) at least 4 times a day.

Apply half-strength (0.25%) gentian violet to the sores in the mouth at least twice a day. Local anaesthetic/antiseptic solutions such as lignocaine and tannic acid, or tannic acid and listerine, if available, are good alternatives.
If the mouth sores result in decreased intake of food or fluids, then admit the child to hospital and feed via a nasogastric tube if possible.

CLASSIFICATION 3: UNCOMPLICATED MEASLES

- A child with measles who is not classified in either of these two categories is classified as having UNCOMPLICATED measles. Uncomplicated cases are managed at home with basic supportive care.
- General management principle must be applied.
- Treat the whole child (and family)
- Treat multiple complications at the same time.
- Anticipate complications
- Act fast to treat eye lesions
- Essential components of management

There are four major essential components of the management of all measles cases. They are summarized on this slide:

- Relieve common symptoms such as fever, cough, blocked nose, conjunctivitis and sore mouth.
- Provide nutritional support and promote breastfeeding.
- Provide vitamin A.
- Inform the mother about the illness and what to expect in the next few days.

Relieve common symptoms
Fever. Advise the mother to:

- give paracetamol if the child is very uncomfortable or feels very hot (a fever of more than 39˚C by thermometer if available)
- take clothes or blankets off the child
- continue breastfeeding; if weaned, continue feeding and ensuring the child drinks plenty
- bring the child back for re-assessment if the fever persists for more than 4 days - this may be an indication of a secondary infection.

Cough. If there is cough but no rapid breathing, advise the mother to give a soothing remedy, such as tea with lemon and honey or a simple cough linctus.
Blocked nose. If the nose is blocked and makes feeding difficult, advise the mother to use a weak solution of salt water (saline) nose drops given using a moistened wick of clean cloth before feeding.
Conjunctivitis. If the child has a clear watery discharge from the eye, advise the mother she need do nothing special. If the eyes are sticky because of pus, advise regular cleaning with cotton swabs and apply tetracycline eye ointment three times a day. The cotton swab should be boiled in water and allowed to cool before use.
Sore mouth. Rinse the mouth with clean water (preferably with a pinch of salt) as often as possible, but at least four times a day. Advise frequent sips of clean water.

Provide nutritional support and promote breastfeeding. The nutritional status of children with measles may be affected as a result of the disease itself, associated diarrhoea and vomiting, or refusal to take feeds because of mouth ulcers or poor appetite. Assess the nutritional status by looking at the child, and by weighing the child and plotting the weight on a growth chart. Any dehydration confuses the classification of nutritional status, since it is associated with significant weight loss. If weight indicators are being used for nutritional classification, rehydrate the child before classification.
Encourage breastfeeding. If the child is already weaned, encourage the intake of food and fluids (some mothers incorrectly withhold food and fluids from sick children). It is best to feed sick children with small amounts of food given more frequently than usual. Avoid bulky cereal, porridge or starchy food as they are not easy for a sick child to eat. Instead give milk or gruel. The energy content of food may be increased by adding a teaspoonful of vegetable oil and a teaspoonful of sugar to the milk, cereal or gruel. A child needs 80-120 kcal per kg of body weight per day by whatever means.
Provide vitamin A. Vitamin A is recommended for children with measles in the following situations:

- in areas where measles case fatality is probably more than 1 %
- in areas of known vitamin A deficiency
- in all cases of severe complicated measles.
- Give the first dose of vitamin A to the child immediately on diagnosis.
- Give a second dose the following day. The reason for the second dose is to make sure that the body stores are built up again, even if the child has diarrhoea and is very ill. Inform the mother about the importance of vitamin A and provide her with the second dose for giving at home.

Give her the exact number of capsules to avoid accidental overdosing.

Age	Immediately on diagnosis	Next day	2-4 weeks later (if eye signs)	Immediately on diagnosis
Infants less than 6 months old	50 000 IU	50 000 IU	50 000 IU	50 000 IU
Infants aged 6-11 months	100 000 IU	100 000 IU	100 000 IU	100 000 IU
Children aged 12 months and over	200 000 IU	200 000 IU	200 000 IU	200 000 IU

Note that if the child has any eye signs indicating vitamin A deficiency (Mgt of eye problems, page), then a third dose must be given at least 2 weeks after the second dose. This should be given when the child comes for a check-up at the clinic.

Inform mother about the measles & complications

- Tell mother about measles 7 complications
- Advise her to have any other children immunized immediately.
- Advise her to bring the child back if the child's condition worsens or he/she refuses to eat or drink.

Tell the mother about measles and that, even after recovery, the child is at increased risk of developing other infections and malnutrition.

Advise the mother that the child should attend a clinic regularly for health checks and growth monitoring. The first follow-up visit should be about 14 days after the measles illness starts and thereafter at least once a month for a minimum period of six months.

Advise the mother to bring any other unimmunized children for immunization at once. Immunizing susceptible children within 72 hours of exposure may prevent the disease from occurring in contacts.

Reason for come back immediately: Advise the mother to bring the child back immediately if the child's condition worsens.

- Convulsions or drowsiness
- Rapid or difficult breathing or chest indrawing
- Refusal to eat or drink
- Diarrhoea, vomiting or blood in stools
- Earache
- Painful eyes or blurred vision
- Sore mouth
- Fever persisting for more than 4 days

A child who has been diagnosed as having measles but who has no complications should be brought back to the clinic after 14 days for follow-up.

Tell all care takers that immunization is the life-saving measures. Take this opportunity whenever available. For instance, children of immunizable age attending outpatient clinics or admitted to hospital for other conditions should be immunized with all appropriate antigens (including measles vaccine) immediately if there is no documentation of immunization on the immunization card or road-to-health card. The immunization status of all children discharged from hospital should be checked and appropriate vaccines administered. Do not forget to ask whether the mother needs a dose of tetanus toxoid.

General & Supportive Measures

1. Notify to authority
2. Only need for admission if
   - The child is < 6 months
   - Immune compromised children
   - Children with SAM
   - Children with complications.
3. Keep in isolation ward. All persons who has contact in hospital should wear mask, gloves and grown.
4. Nutritional support & Breastfeeding & Keep hydration (Drink plenty of water)

Medical Treatment

1. All children must give vitamin A orally as a single daily dose X 2 days.
   - If < 6 months: 50,000 units.
   - If 6 – 12 mths: 100,000 units
   - If > 1year: 200,000 units
2. If febrile: sponging and paracetamol 10-15 mg/kg/dose 6 hourly
3. If the child develop pneumonia, If the child is sick
   - Inj: Ampicillin IV 25-50 mg/kg/dose X 6 hourly X 5-7 days PLUS Inj: Gentamicin IV 7.5 mg/kg once a day X 5 days.
   - If the child has respiratory distress or oxygen saturation is < 90%, oxygen via nasal cannula 1-2 L/min
   - If the child is not sick: Amoxicillin 30mg/kg/dose po 8 hourly X 5 days.
4. If the child has conjunctivitis: Chloramphenicol eye ointment 1% qid X 5 days.
5. If the child has diarrhea: ORS solution 50 ml/ each loose stool.
6. If the child has skin itchiness, apply Calamine lotion and antihistamines drug orally (Chlorpheniramine, Diphenhydramine, Cetirizine). Take a cool bath or use cool

compresses to ease itching. Don't scratch just touch with clean hands.
7. If blisters form in your mouth, try to eat cold, bland foods while avoiding hot, spicy, or acidic foods.

DIFFERENTIAL DIAGNOSIS (FEVER WITH RASHES)

1. Rubella
2. DHF
3. Meningococcemia
4. Chickenpox
5. Other viral rashes (i.e chikungunya)

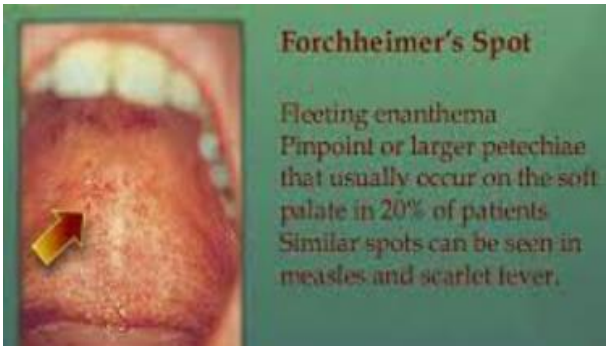
Enanthem: Or enanthema, is a rash inside the body. An example: the spots in measles (Koplik's spots) inside the mouth that look like a tiny grain of white sand surrounded by a red ring. By contrast, a rash on the outside of the body is called an **exanthem**.

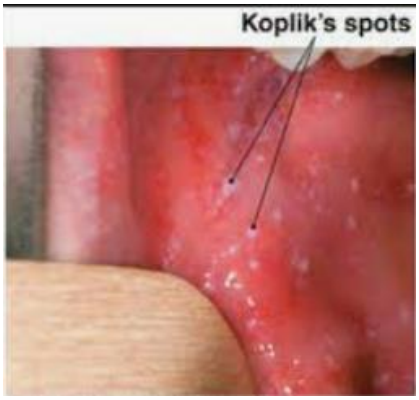
Measles and Rubella

Measles and Rubella are two different viral diseases. Generally, Rubella causes milder infections than measles but results in severe birth defects. It is important to note that Rubella is not the same as measles. Though both diseases share the same characteristics including the red rash, they are distinct.

Forchheimer spots: rose coloured spots on the soft palate that may coalesce into a red blush and extend over the fauces

Koplik spots: clustered white lesions on the buccal mucosa. They are pathognomonic for measles.





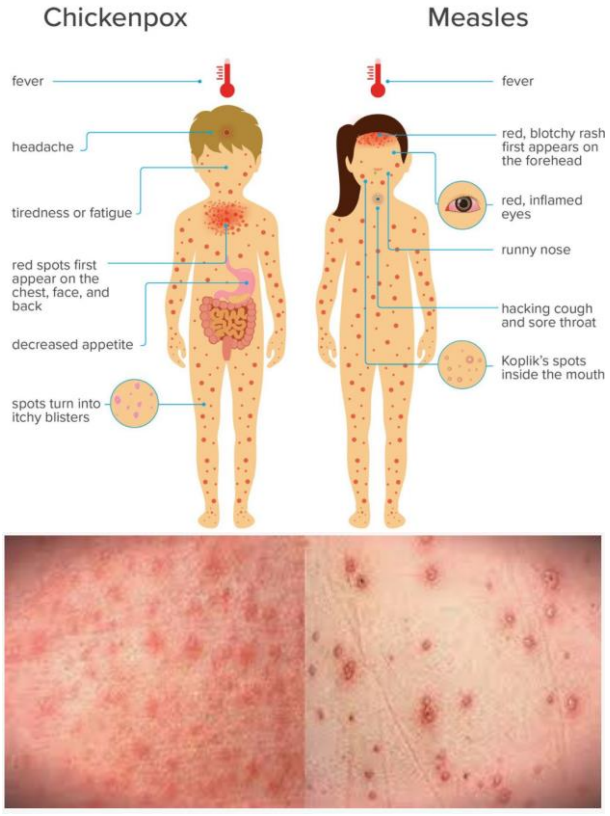
Chickenpox Vs Measles

Chickenpox and measles are both infectious diseases that are caused by viruses. They're caused by two different viruses. Chickenpox is caused by the varicella-zoster virus. Measles, also called rubeola, is caused by the measles virus.

The chickenpox rash starts with raised red bumps or papules. These bumps turn into itchy fluid-filled blisters, or vesicles, that will eventually rupture and leak before scabbing over.

The measles rash appears as flat red spots, although raised bumps may sometimes be present. If bumps appear, they do not have fluid in them. The spots of the measles rash may begin to run together as the rash spreads.

Both diseases used to be common childhood infections, but now are preventable through vaccination.



	Chickenpox	Measles
incubation period	10 to 21 days	10 to 14 days
contagious period	up to two days until rash develops and then until spots scab over	four days before rash develops and then four days afterward
rash	yes: itchy red rash that eventually forms blisters	yes: non-itchy flat rash
fever	yes	yes
runny nose	no	yes
sore throat	no	yes
cough	no	yes
conjunctivitus	no	yes
lesions in mouth	yes: blisters can form in the mouth	yes: Koplik's spots can be found in the mouth before the rash appears
vaccine available?	yes	yes
Complication	Only in the risk groups.	Ear infections, bronchitis, pneumonia, and encephalitis.

Measles	Rubella
It is highly contagious	It is not as contagious as measles
Symptoms can last up to ten days	Symptoms can last up to five days
Presence of the prodromal stage	Absence of the prodromal stage
Period of incubation is 1 to 2 weeks	Period of incubation is 2 to 3 weeks
Lymph nodes are not always swollen	Swollen lymph nodes
Typically, a high fever of >40°C	Typically, low fever of < 38.3°C
Rashes in measles are blotchy with red spots. Koplik spot is the pathognomonic feature.	Rashes in Rubella are spots that fade fast. Forchheimer spot is NOT the pathognomonic feature of rubella.

Measles Vs DHF

Rash in dengue fever is a maculopapular or macular confluent rash over the face, thorax, and flexor surfaces, with islands of skin sparing. The rash typically begins on day 3 and persists 2-3 days. Rashes look like measles. However, epidemiology is differ and other clinical features are difference.

PREVENTION FOR MEASLES

Strategy for reducing measles mortality

- Immunization: A number of live, attenuated Measles vaccines are available, either as single-antigen vaccines or in combination with either Rubella or Mumps and Rubella vaccines. Myanmar uses MR Vaccine containing live attenuated measles vaccine and Rubella vaccine in routine EPI and the recommended age for measles vaccination is from 9 to 11 months (i.e., after completion of 9 months to before the first birthday). Since February 2008, second dose of measles vaccine is being provided to children 18 to 24 months of age through routine EPI.
- Surveillance (Read "Measles surveillance, MoHS)
- Proper Case Management

Suspected measles case notification and investigation

Each and every clinically suspected measles cases identified by any source need to be immediately notified to the Township Public Halth Officer (TPHO)/ Township Health Officer (THO).Once a case of clinically suspected measles is reported by a health care worker, health unit or any other source, the TPHO/ THO or any other designated official at the township, RHC or Sub RHC as appropriate must personally see the case to ascertain if the case meets the measles case definition. The date of notification is the date the information of the measles case is sent tothe person who will investigate the suspected case.

Upon verification that the case meets the measles case definition, theTPHO/ THO or her/his designate initiates the case investigation. Attempt should be made to ensure case investigation within 48 hours of notification for all suspected measles cases.

POLIOMYELITIS

DESCRIPTION

Poliomyelitis, is a disabling and life-threatening disease caused by the poliovirus. The virus spreads from person to person and can infect a person's spinal cord, causing paralysis (can't move parts of the body)

Most children with polio have no symptoms at all. The other types of polio are:

- **Abortive.** This is a mild illness that doesn't last a long time.
- **Nonparalytic.** This is also a milder illness that doesn't last a long time.
- **Paralytic.** This illness can cause severe symptoms and long-term problems.

POLIOMYELITIS EPIDEMIOLOGY

Mode of Transmission: Person-to-person spread of poliovirus occurs via the fecal-oral or oral-oral routes. The fecal-oral route is the most important transmission pathway in settings with suboptimal hygiene and sanitation.

There are three poliovirus serotypes (type1, type 2, and type 3); immunity to one serotype does not produce significant immunity to the other serotypes. Poliovirus is rapidly inactivated by heat, formaldehyde, chlorine, and ultraviolet light.

Poliovirus infection occurred throughout the world. Vaccination resulted in reduced circulation of wild poliovirus.

Poliovirus infection typically peaks in the summer months in temperate climates. There is no seasonal pattern in tropical climates.

Polio (poliomyelitis) mainly affects children under 5 years of age.

1 in 200 infections leads to irreversible paralysis. Among those paralysed, 5% to 10% die when their breathing muscles become immobilized.

Cases due to wild poliovirus have decreased by over 99% since 1988, from an estimated 350 000 cases then, to 33 reported cases in 2018.

As long as a single child remains infected, children in all countries are at risk of contracting polio.

According to the CDC global eradication programme only 4 countries classified as polio endemic (where indigenous polio transmission has never been interrupted) remain (Nigeria, India, Pakistan and Afghanistan)

PATHOGENESIS

The virus enters through the mouth and multiplies in the oropharynx and gastrointestinal tract. The virus is usually present in nasopharyngeal secretions for 1 to 2 weeks and can be shed in stools for several weeks after infection, even in individuals with minor symptoms or no illness. During intestinal replication, the virus invades local lymphoid tissue and may enter the bloodstream, and then infect cells of the central nervous system. Poliovirus-induced destruction of motor neurons of the anterior horn of the spinal cord and brain stem cells results in distinctive paralysis.

Period of communicability of measles

- Transmission possible as long as virus is excreted.
- Individuals infected with the poliovirus are most infectious from 7-10 days before and after the onset of symptoms.
- Poliovirus may be shed in the stool for a period of 3-6 weeks.
- Long term carriage does not occur.

Clinical course

The incubation period for nonparalytic poliomyelitis is 3 to 6 days. For the onset of paralysis in paralytic poliomyelitis, the incubation period is usually 7 to 21 days. The risk of severe disease and death following primary infection with poliovirus increases with increasing age.

Polio usually causes the same mild, flu-like signs and symptoms typical of other viral illnesses. Signs and symptoms, which can last up to 10 days, include:

- Fever
- Sore throat
- Headache
- Vomiting
- Fatigue
- Back / neck pain or stiffness
- Pain or stiffness in the arms or legs
- Muscle weakness or tenderness.

Approximately 70% of all polio infections in children are asymptomatic. Infected individuals without symptoms shed the virus in nasopharyngeal secretions and stool for several days or weeks and can transmit the virus to others.

Approximately 24% of polio infections in children consist of a minor, nonspecific illness without clinical or laboratory evidence of central nervous system invasion. This clinical presentation is known as abortive poliomyelitis, and is characterized by a low fever, sore throat, and complete recovery in less than a week.

Nonparalytic aseptic meningitis occurs in 1% to 5% of polio infections in children. The clinical presentation includes stiffness of the neck, back, or legs, usually following several days of a prodrome like that of minor illness. Increased or abnormal sensations (e.g., pain in the limbs, back, or neck), headache, and vomiting can also occur. Typically, symptoms last 2 to 10 days and are followed by complete recovery.

Less than 1% of all polio infections in children result in flaccid paralysis. Initial minor illness that lasts several days, a symptom-free period of 1 to 3 days, followed by the major illness with paralysis, fever and muscle pain. Paralysis usually progresses within 2 to 3 days. Among adolescents and adults, the minor illness is often absent and they suffer more severe pain and paralysis. Paralysis is typically asymmetrical, more severe proximally, and associated with absent or reduced deep tendon reflexes and intact sensation. Patients usually do not experience changes in cognition.

Paralysis is often permanent, although total or partial recovery can occur through compensation by muscles not affected. Weakness or paralysis present 12 months after onset, which occurs in two-thirds of patients with paralysis, is usually permanent.

Case fatality ratio: Paralytic polio is generally 2% to 5% among children and up to 15% to 30% among adolescents and adults. It increases to 25% to 75% with bulbar involvement.

COMPLICATION

Paralytic polio can lead to temporary or permanent muscle paralysis, disability, bone deformities and death.

CONFIRMATION FOR DIAGNOSIS

Culture: Poliovirus can be detected in specimens from the throat, feces (stool), and occasionally cerebrospinal fluid (CSF) by isolating the virus in cell culture or by detecting the virus by polymerase chain reaction (PCR).

Virus isolation in culture is the most sensitive method to diagnose poliovirus infection. Poliovirus is most likely to be isolated from stool specimens. It may also be isolated from pharyngeal swabs.

To increase the probability of isolating poliovirus, collect at *least two stool specimens 24 hours apart from patients* with suspected poliomyelitis. These should be collected as early in the course of disease as possible (ideally within 14 days after onset).

Real-time reverse transcription PCR is used to differentiate possible wild strains from vaccine-like strains using virus isolated in culture.

Serology: may be helpful in supporting the diagnosis of paralytic poliomyelitis, particularly if a patient is known or suspected to not be vaccinated. An acute serum specimen should be obtained as early in the course of disease as possible, and a convalescent specimen should be obtained at least 3 weeks later.

MANAGEMENT

General & Supportive Measures

1. Notify to authority
2. Isolate patient to prevent faecal-oral spread. Isolate for 10 days.
3. Paralysis form: Keep in IPD, bed rest, Treat the pain, prevent sores, Physiotherapy to prevent wasting of muscles and stiffness.
4. Note: Do NOT give any IM injections to a patient with suspected poliomyelitis, it will make the (paralysis) polio worse.

Specific Treatment: Nil. Only symptomatic treatment. Most need physiotherapy.

DIFFERENTIAL DIAGNOSIS

Need to differentiate with other Acute Flaccid Paralysis (AFP)

- Guillain-Barré syndrome *(Most commonly, infection with campylobacter, often found in undercooked poultry. Other infections: Influenza virus, Cytomegalovirus, Hepatitis A, B, C and E, Zika virus, HIV)*
- Traumatic neuritis
- Transverse myelitis *(Acute transverse myelitis is acute inflammation of gray and white matter in one or more adjacent spinal cord segments, usually thoracic. Causes include multiple sclerosis, neuromyelitis optica, infections, autoimmune or postinfectious inflammation, vasculitis, and certain drugs.)*

PREVENTION FOR POLIO

There is no cure for polio, it can only be prevented. The most effective way to prevent polio is vaccination.

- Immunization:
- Surveillance

Suspected polio case notification and investigation

In 2007, AFP surveillance system could be able to detect 10 wild poliovirus cases in Maungdaw and one in Buthidaung townships of Rakhine State with the last positive polio case detected on 15 May 2007 in Myanmar.

Recommended Case Definitions

- **Suspected case:** any case of acute-onset flaccid paralysis (AFP), including Guillain-Barré syndrome, in a person under 15 years of age for any reason other than severe trauma, or paralytic illness in a person of any age in which polio is suspected. The classification "suspected case" is temporary. It should be reclassified as "probable" or "discarded" within 48 hours of notification.
- **Probable case:** a case in which AFP is found, and no other cause for the paralysis can be identified immediately. The classification of "probable case" is also temporary; within 10 weeks of onset the case should be reclassified as "confirmed", "compatible", "vaccine-associated" or "discarded."
- **Confirmed case:** a case with acute paralytic illness, with or without residual paralysis, and isolation of wild poliovirus from the stools of either the case or its contacts.
- **Polio-compatible case:** a case in which one adequate stool specimen was not collected from a probable case within 2 weeks of the onset of paralysis, and there is either an acute paralytic illness with polio-compatible residual paralysis at 60 days, or death takes place within 60 days, or the case is lost to follow-up.
- **Discarded (Not Poliomyelitis) case:** a case with acute paralytic illness for which one adequate stool specimen was obtained within 2 weeks after onset of paralysis and was negative for poliovirus.

RABIES

DEFINITION

Rabies is a virus and infects animals (e.g., dogs, cats, bats). It is transmitted to animals and humans by close contact with saliva from infected animals (bite, scratch, licks on broken skin, and mucous membranes). After symptoms start, both animals

and humans will die. If the infection is treated soon after transmission and before the symptoms start, rabies can be prevented by post exposure vaccination.

SIGNS AND SYMPTOMS

Time between exposure to rabies and symptoms is 1-3 months but can be a few years.

- Itching, pain, or numbness at the site of the bite (starting 20-90 days after the bite – although can be longer or shorter).
- Fever chills, weakness, headache.
- **Furious rabies** signs of hyperactivity, agitation, muscle spasm, fear of water (hydrophobia) or.
- **Paralytic rabies**: paralysis spreading from the bitten area.
- In both furious and paralytic rabies partial paralysis progresses to complete paralysis followed by coma and death in all cases, usually due to respiratory failure. Without intensive care, death occurs during the first seven days of illness.

DIAGNOSIS

This is a clinical diagnosis. Think of rabies if there is a history of an animal bite or contact with broken skin, plus neurological features.

TREATMENT

There is no effective treatment for rabies available to a person who is showing signs and symptoms of a rabies infection. In this case, treatment is symptomatic and palliative (e.g., relieve pain with painkillers or diazepam).

Symptomatic disease can be prevented by:

1. Local wound care.

- Wash and flush a wound or point of contact:
  - For skin: use soap, lots of running water, apply ethanol, or povidone iodine.
  - For mucous membranes e.g., eyes/mouth: rinse with clean water or NSS
- If the wound is a bite: excise the necrotic tissue. Suturing (closing the wound) should be avoided if possible or should be re-assessed at 48-72 hours. Rabies immunoglobulin must be applied before any suturing.
- Anti-tetanus treatment and antibiotics should be administered to control infections other than rabies.

2. Post-exposure prophylaxis (PEP) treatment for rabies

- Treatment includes vaccine +/- anti-rabies immunoglobulin (RIG).
- If already received pre-exposure vaccination (3 vaccines), then only need to give post-exposure vaccine.
- If no previous pre-exposure vaccination, need to consider rabies vaccine and immunoglobulin.

If the rabies vaccine or immunoglobulin are not available at your clinic refer to hospital. Below is a recommendation for treatment if available but check your local protocol.
Pregnancy or infancy are **NEVER** contraindications to rabies post-exposure treatment.

See Table: Categories of exposure for rabies treatment from WHO 2018

Anti-rabies vaccine should be given for any patients in Category II and III exposures as soon as possible. Immunosuppressed patients e.g., HIV, malnutrition should be evaluated case by case. They should receive the preexposure vaccination course. If they are exposed to rabies RIG is recommended even if already vaccinated. This immunoglobulin can be given within 7 days of potential exposure to the rabies virus.

Start rabies treatment immediately. **Do not delay** by dog observation when rabies is suspected.

How to administer rabies vaccination

- Give vaccine intramuscular (IM) or intradermal (ID).

See below how to give dose, but you can also use the product information (comes with the vial) for dosing.

For Intramuscular (IM): Use one whole vial of the vaccine. **Do not inject into the buttock region**. Use the shoulder muscles (deltoid). For children < 2 years old, give the vaccine in the anterolateral thigh.

For intradermal (ID - into the skin): Use 0.1 ml into the deltoid. Intra dermal injections reduce the volume of vaccine required and vaccine cost by 60% to 80%. For children < 2 years old, give the vaccine in the anterolateral thigh.

Vaccine schedule

FOR POST-EXPOSURE PROPHYLAXIS (PEP) TREATMENT: (vaccination after animal bite)

If no previous vaccine (e.g., No PrEP), can use any of the following regimens:

- 2-sites ID on days 0, 3, 7.

OR

- 1-site IM on days 0, 3, 7, 14, 28.

OR

- 2-sites IM on day 0 and 1-site IM on days 7 and 21.

- *Remember to use RIG if the exposure is category III and no PrEP

Table: Categories of exposure for rabies treatment from WHO 2018

Category I: Touching, feeding of animals or licks on intact skin:	**no PEP treatment**
Category II: Minor scratches or abrasions without bleeding, or licks on broken skin and nibbling of uncovered skin:	**Rabies vaccine immediately.**
Category III: Single or multiple transdermal (through the whole skin) bites, scratches or contamination of mucous membrane with saliva (i.e., licks):	**Rabies vaccine immediately. Give RIG if there is no previous rabies vaccination. RIG not needed if already had vaccination**

If have previous vaccine (finished rabies PrEP or had rabies PEP >3mo before):

- 1-site ID on days 0, 3.

  OR
- 4-sites ID on day 0.

  OR
- 1-site IM on days 0, 3

NOTE

- Staff who gives the vaccine must be trained to give intradermal injections.
- Keep proper conditions for vaccine storage.
- Decide the duration of maximal vaccine storage after use (discuss with Safety team).
- Make sure you have the 1 mL syringe and short hypodermic needles to give the intradermal vaccine.

How to administer Rabies Immunoglobulin (RIG):

Infiltrate with RIG into the depth of the wound and around the wound. As much as anatomically feasible should be infiltrated around the wound. Any remainder should be injected at an intramuscular site distant from that of vaccine inoculation e.g., into the anterior thigh.

Volume of RIG: 20IU/kg for Human RIG or 40 IU/kg of Equine (horse) RIG. The total recommended dose should not be exceeded. If the calculated dose is insufficient to infiltrate all wounds, sterile NSS may be used to dilute it 2 to 3-fold so that the immunoglobulin gets to all areas.

PREVENTION AND VACCINATION

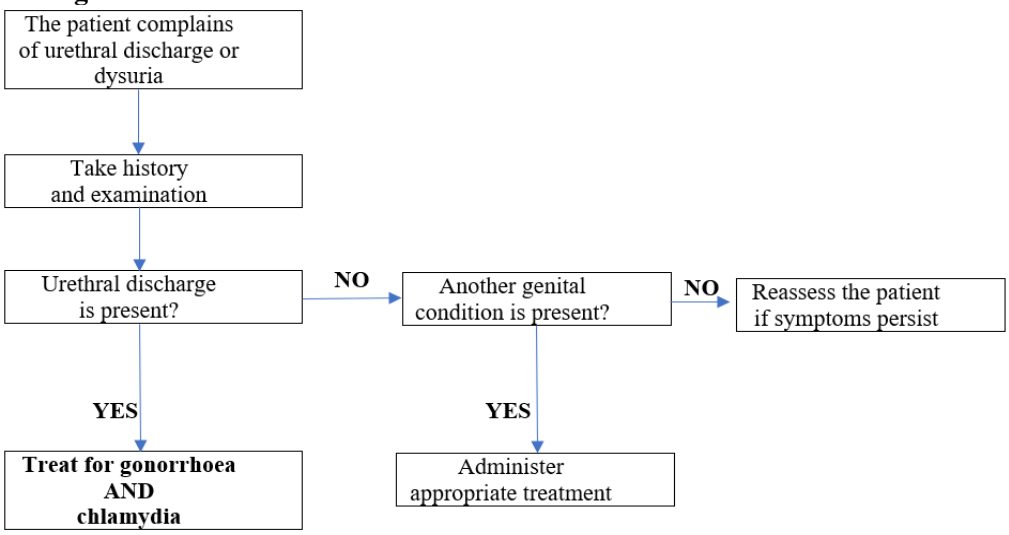
Prevent exposure to infected animals. Pre-exposure rabies vaccination should be considered for professionals (e.g., veterinarians, animal handlers or wildlife officers) who have a constant risk of exposure to rabies. Rabies can be prevented by post exposure vaccination within days of exposure.

GENITAL INFECTION

URETHRAL DISCHARGE

- almost exclusively in men
- caused by Neisseria gonorrhoeae (gonorrhoea) and Chlamydia trachomatis (chlamydia).
- **In males,** the urethra should be milked gently if no discharge is visible. Furthermore, specifically check for urethral discharge in patients complaining of painful or difficult urination (dysuria).

Management



TREATMENT OF THE PATIENT

- **In women:** same treatment as **cervicitis.**
- **In men:**

- If microscopy of a urethral smear has been performed: in the absence of gonococci, treat for chlamydia alone; in the presence of gonococci, treat for **chlamydia AND gonorrhoea.**
- When no laboratory is available, treat for chlamydia AND gonorrhoea as below:

TREATMENT FOR CHLAMYDIA

- **Azithromycin** PO: 1 g single dose (OR) **Doxycycline** PO: 100 mg 2 times daily for 7 days

TREATMENT FOR GONORRHOEA

- **Ceftriaxone** IM: 250 mg single dose (OR) if **ceftriaxone** is not available,
- **Cefixime** PO: 400 mg single dose Or **Spectinomycin** IM: 2 g single dose.

If urethral discharge persists or reappears after 7 days: – Verify that the patient has received an effective treatment (i.e., one of the combinations above).

- Gonococcal resistance is a possibility if another treatment (e.g., **Co-trimoxazole** or **kanamycin**) has been administered: re-treat for gonorrhoea as above (chlamydia is rarely resistant).
- If an effective antibiotic therapy has been given, consider trichomoniasis (**tinidazole** or **metronidazole** PO, **2g** single dose); also consider re-infection.

Treatment of the partner

The sexual partner receives the same treatment as the patient, whether or not symptoms are present.

ABNORMAL VAGINAL DISCHARGE

- discharge that differs from usual with respect to colour/odour/ consistency (e.g., discoloured, or purulent or malodorous)
- often associated with vulvar pruritus or pain with intercourse (dyspareunia), or painful or difficult urination (dysuria) or lower abdominal pain. Routinely check for abnormal vaginal discharge in women presenting with these symptoms.
- Abnormal vaginal discharge may be a sign of infection of the vagina (vaginitis) and/or the cervix (cervicitis) or upper genital tract infection.
- Abnormal discharge must be clinically confirmed: inspection of the vulva, speculum exam checking for cervical/ vaginal inflammation or discharge.
- Abdominal and bimanual pelvic examinations should be performed routinely in all women presenting with vaginal discharge to rule out upper genital tract infection (lower abdominal pain and cervical motion tenderness).

The **principal causative organisms** are:

- **In vaginitis:** Gardnerella vaginalis and other bacteria (bacterial vaginosis), Trichomonas vaginalis (trichomoniasis) and Candida albicans (candidiasis).
- In **cervicitis:** Neisseria gonorrhoeae (gonorrhoea) and Chlamydia trachomatis (chlamydia).

- In upper genital tract infections (Pelvic Inflammatory Disease): Bacteria infections of the uterus (endometritis) and/or the fallopian tubes (salpingitis), which may be complicated by peritonitis, pelvic abscess or septicemia. UGTI may be sexually transmitted or arise after childbirth or abortion.

See Figure: Management of Abnormal Vaginal Discharge

Laboratory

Tests usually available in the field can only identify causes of vaginitis, and thus are of limited usefulness. Microscopic examination of a fresh wet smear may show mobile T. vaginalis, yeast cells and hyphae in candidiasis, and "clue cells" in bacterial vaginosis. – Identification of N. gonorrhoeae by Gram-stained smear is not sensitive in women and is not recommended.

TREATMENT

Cervicitis Treat for both **chlamydia AND gonorrhoea**.

NON-PREGNANT WOMEN

- **Azithromycin** PO: **1 g single dose** (OR) **Doxycycline** PO: 100 mg 2 times daily for 7 days

AND

- **Ceftriaxone** IM: 250 mg single dose (OR)if not available, **Cefixime** PO: 400 mg single dose (OR) **Spectinomycin** IM: 2 g single dose

PREGNANT WOMEN

- **Azithromycin** PO: 1 g single dose (OR) **Erythromycin** PO: 1 g 2 times daily or 500 mg 4 times daily for 7 days**.**

(AND)

- **Ceftriaxone** IM: 250 mg single dose **(**OR) if not available, **Cefixime** PO: 400 mg single dose.

Bacterial vaginosis and trichomoniasis

- **Tinidazole** PO: 2 g single dose **(OR) Metronidazole** PO: 2 g single dose
- **In the case of treatment failure**
- **Tinidazole** PO: 500 mg 2 times daily for 5 days **(OR) Metronidazole** PO: 400 to 500 mg 2 times daily for 7 days.

Vulvovaginal candidiasis

- **Clotrimazole (500 mg vaginal tab):** 1 tablet inserted deep into the vagina at bedtime, single dose **(OR),** if not available,
- **Clotrimazole (100 mg vaginal tab):** one tablet inserted deep into the vagina at bedtime for 6 days **(OR)**
- **Nystatin (100,000 IU vaginal tab):** one tablet inserted deep into the vagina at bedtime for 14 days.

If the patient has extensive vulvar involvement, **miconazole 2% cream** (one application to the vulva 2 times daily for 7 days) may be used in combination with the intravaginal treatment above. Miconazole cream may complement, but does not replace, treatment with **clotrimazole.**

Treatment of partner

- When the patient is treated for vaginitis or cervicitis, the partner receives the same treatment as the patient, whether or not symptoms are present.
- In the case of vulvovaginal candidiasis, the partner is treated only if symptomatic (itching and redness of the glans/ prepuce): miconazole 2% cream, one application 2 times daily for 7 days.

GENITAL ULCER

- single or multiple vesicular, ulcerative, or erosive lesions of the genital tract, with or without inguinal lymphadenopathy, should lead to consideration of sexually transmitted infection.
- The principal causative organisms are ***Treponema pallidum (syphilis), Haemophilus ducreyi*** (chancroid) and Herpes simplex (genital herpes).
- Chlamydia trachomatis (lymphogranuloma venereum) and Calymmatobacterium granulomatis (donovanosis) are less frequent.

See Figure: Management of genital ulcer

Laboratory

Laboratory testing available in the field is of little value: e.g., in syphilis, a negative RPR or VDRL result does not exclude primary syphilis in early stage, and a positive test may reflect previous infection in a successfully treated patient.

TREATMENT

GENITAL HERPES

- **Local treatment:** clean the area with soap and water.
- **Antiviral treatment:** acyclovir PO In patients with a first episode, treatment may reduce the duration of symptom when given within 5 days after the onset of symptoms: 400 mg 3 times daily for 7 days.
- **In patients with recurrence,** give the same dose for 5 days, but treatment is only effective if initiated during the prodromal phase or within 24 hours after the onset of symptoms.

Figure: Management of Abnormal Vaginal Discharge

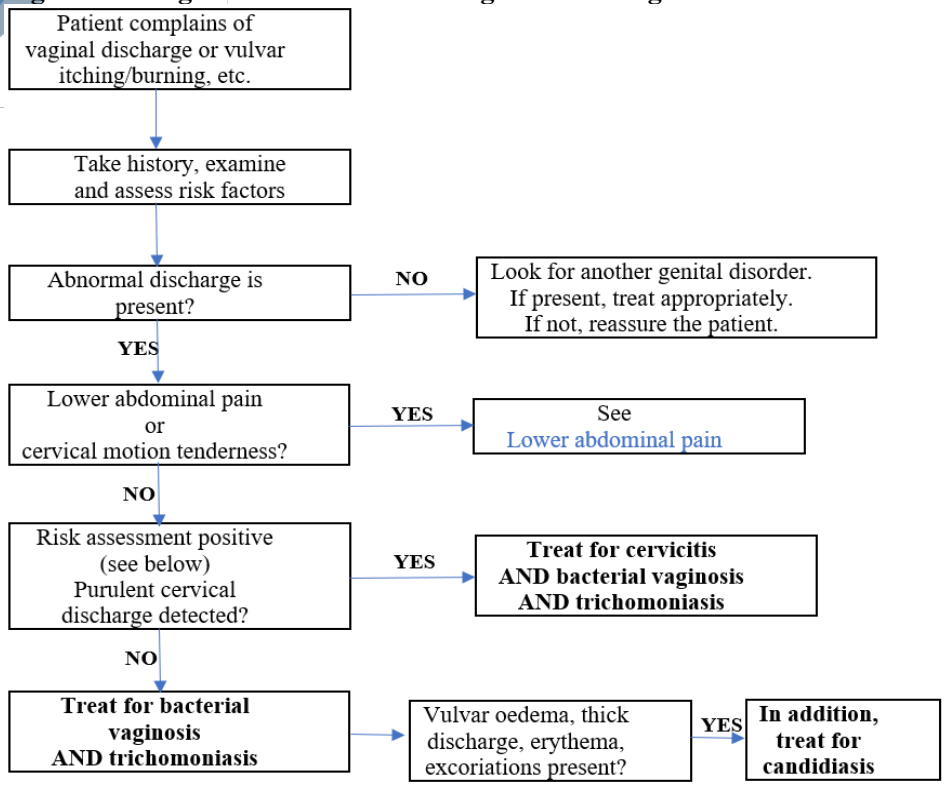
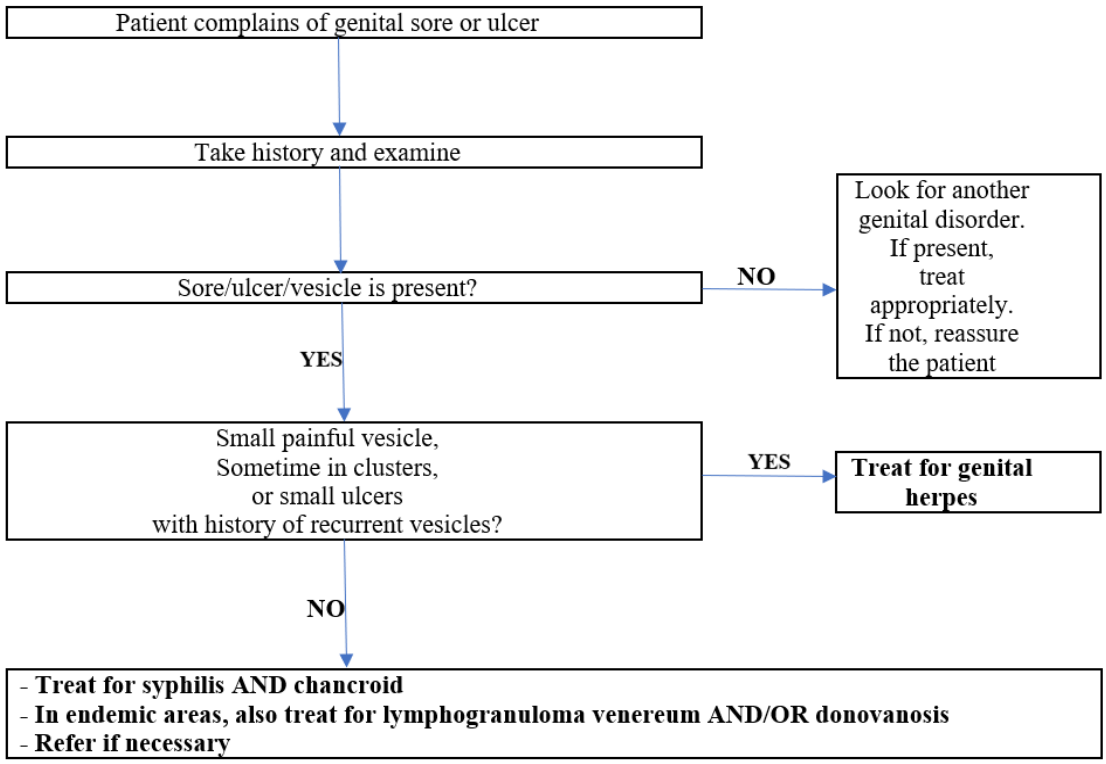


Figure: Management of genital ulcer



SYPHILIS

Benzathine benzylpenicillin IM: **2.4 MUI** per injection (half the dose in each buttock). Administer a single dose for early syphilis (less than 2 years); one injection per week for 3 weeks for late syphilis (more than 2 years) or if the duration of infection is unknown.

Or, **for penicillin-allergic patients:**

- **Azithromycin** PO: 2 g single dose.

  (OR)

- **Erythromycin** PO: **1g** two times daily or 500 mg 4 times daily for 14 days.

  (OR)

- **Doxycycline** PO: 100 mg 2 times daily for 14 days.

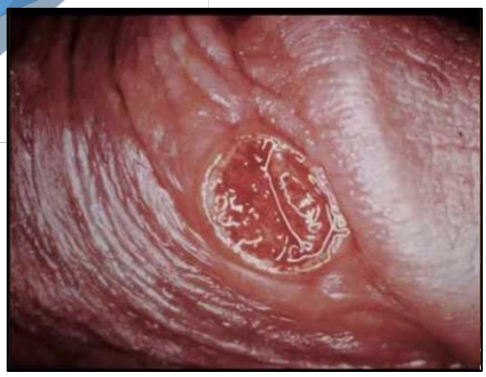


Figure: Syphilitic Ulcer

CHANCROID

Caused by the bacteria (Haemophilus ducreyi).

- **Azithromycin** PO: 1 g single dose.

  (OR)
- **Ceftriaxone IM:** 250 mg single dose.

  (OR)
- **Ciprofloxacin** PO: 500 mg 2 times daily for 3 days.

  (OR)
- **Erythromycin** PO: 1 g 2 times daily or 500 mg 4 times daily for 7 days.

Fluctuant lymph nodes may be aspirated through healthy skin as required. Do not incise and drain lymph nodes.

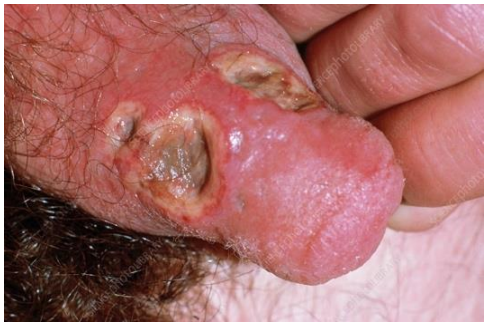


Figure: Chancroid

LYMPHOGRANULOMA VENEREUM

LGV IS A TYPE OF CHLAMYDIA Gram-negative BACTERIA THAT ATTACK THE LYMPH NODES.

Incubation period: 3-30 days.

- **Erythromycin** PO: 1 g 2 times daily or 500 mg 4 times daily for 21 days.

  (OR)
- **Doxycycline** PO: 100 mg 2 times daily for 21 days.
- Fluctuant lymph nodes may be aspirated through healthy skin as required. Do not incise and drain lymph nodes.

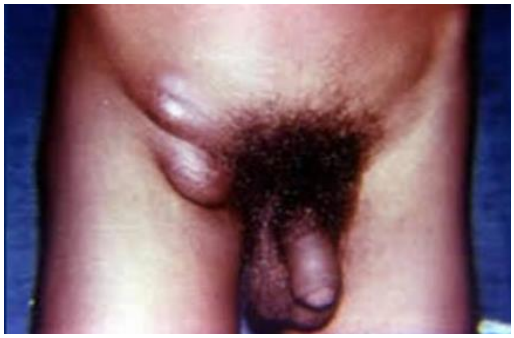


Figure: Lymphogranuloma Venereum

DONOVANOSIS (GRANULOMA INGUINALE)

It is a genital ulcerative disease caused by gram-negative bacteria Klebsiella granulomatis (Calymmatobacterium granulomatis).

Treatment is given until the complete disappearance of the lesions (usually, several weeks; otherwise, risk of recurrence):

- **Azithromycin** PO: **1g** on D1 then 500 mg once daily x 20 days

  (OR)
- **Erythromycin** PO: **1g** 2 times daily or 500 mg 4 times daily x 21days

  (OR)
- **Doxycycline** PO: 100 mg 2 times daily x 21 days

In HIV infected patients, add **gentamicin** IM: 6 mg/kg once daily until the infection is cured.

Treatment of partner

The sexual partner receives the same treatment as the patient, whether or not symptoms are present, except in the case of genital herpes (the partner is treated only if symptomatic).

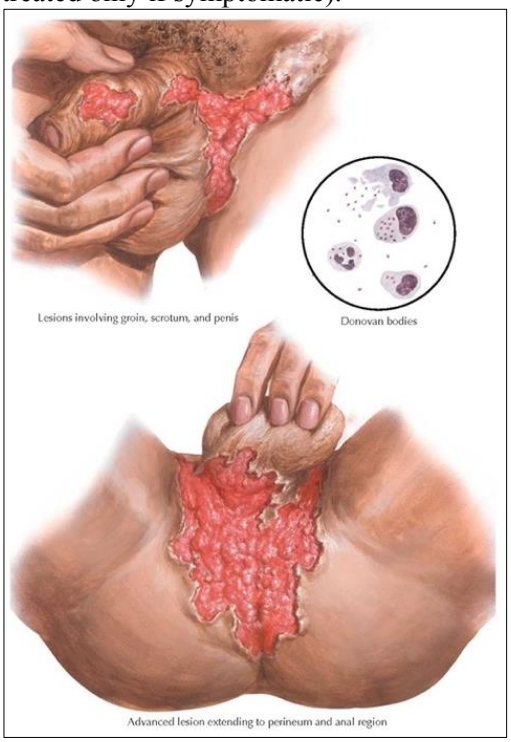


Figure: Granuloma Inguinale

GENITAL ULCER AND WARTS IN WOMEN

Genital ulcer: is a lesion on the surface of the mucosa or skin in the genital area.
Genital wart: is a raised portion of skin which can be flat or elongated.
Both **ulcers** and **warts** are caused by sexually transmitted infections **(STIs).**

SIGNS AND SYMPTOMS

- Anal/ genital sores or ulcers
- For herpes primary infection: fever, painful vesicles on the genitals
- Swelling of inguinal lymph nodes
- Single or multiple warts in anal/genital area.

DIAGNOSIS AND TREATMENT

Diagnosis and treatment depend on the type of lesion (sore, ulcer, warts)

Type of lesion	Treat for	First choice regime	Second choice regime
Genital ulcers (open sore or lesion)	Syphilis	**Benzathine penicillin** IM 2.4 MIU STAT1 **Note**: If the duration of infection is unknown, take it is as late syphilis (>2 years) and give one injection per week for 3 weeks	**Procaine penicillin** IM 1.2 MIU OD x 10 days OR ***Doxycycline** PO 100mg BID x 14 days If pregnant: **erythromycin**
	AND	**PLUS**	**PLUS**
	Chancroid	**Ciprofloxacin** PO 500mg BID x 3 days (OR **Erythromycin** PO 500mg QID x 7 Days OR **Azithromycin** PO 1g STAT)	**Ceftriaxone** IM 250mg stat
Genital ulcers2 (small, painful blisters)	Herpes	Wash with soap and water Apply **gentian violet** x 5 days **Paracetamol** 1g QID x 5 days **Acyclovir** 200mg 5 times/day x 7 days (give within 5 days of first attack, but within 24hrs of symptoms if recurrent attack)	
Genital papule (separate, With dimple in center)	Molluscum Contagiosum	Wash with soap and water Will disappear in about 8 weeks	
Genital warts (in groups, like cauliflower)	Condyloma Acuminata	Wash with soap and water **Paracetamol** PO 1g QID x 3 days External warts <3 cm: **Podophyllotoxin3** 0.5% solution – apply with cotton bud twice daily for 3 consecutive days/week up to 4 weeks	
		Vaginal warts: Same as external wart <3cm but solution must be applied by medical person only External warts >3 cm and cervical, intraurethral, rectal or oral warts: May need surgical removal or cryotherapy	

PREVENTION

Educate patients about sexually transmitted diseases, promote/provide condom use, promote single sexual partnerships. Treat the patient and the partner.

BACTERIAL SKIN INFECTIONS

IMPETIGO

This is a bacterial infection of the skin caused by Staphylococcus aureus. It spreads easily amongst children. Transmission is by direct contact. Often starts around a bite or a scratch. Rash can increase over days to weeks. The lesions are red, round, flattish, with golden coloured crust that are usually 0.5 to 3cm in size. They are sometimes wet. Treat also any other associated skin disease (scabies, ringworm, eczema etc.).

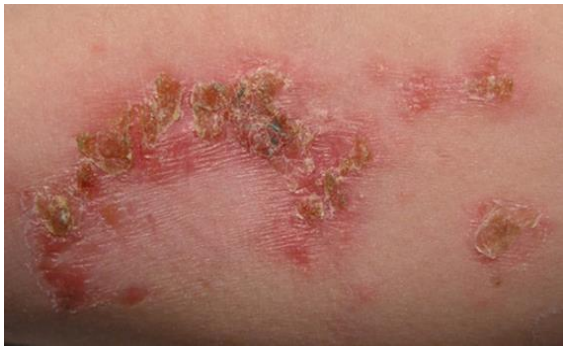


Figure Impetigo

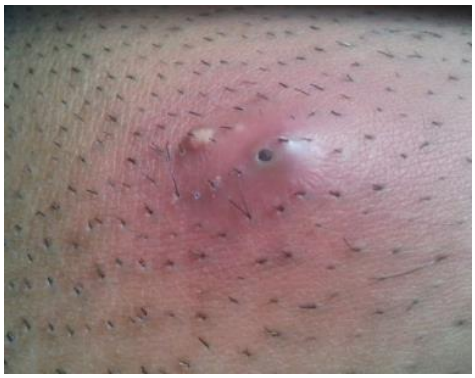
SIGNS AND SYMPTOMS

Non bullous impetigo (classic form): flaccid vesicle on erythematous skin which becomes pustular and forms a yellowish crust. Different stages of the infection may be present simultaneously.

COMPLICATIONS

- Abscess, pyodermitis, cellulitis, lymphangitis, osteomyelitis, septicemia.
- Acute glomerulonephritis

ABSCESS



This is a collection of pus in the soft tissues, most commonly due to Staphylococcus aureus. There is a red, painful, hot, localized swelling. There may be fever and enlarged lymph nodes. Antibiotics cannot reach the abscess cavity very well, so the treatment is to cut open the abscess to allow the pus to drain out (incision and drainage).

Some abscesses are not hot and not painful ('cold' abscess). If you find this, think of TB.

TREATMENT

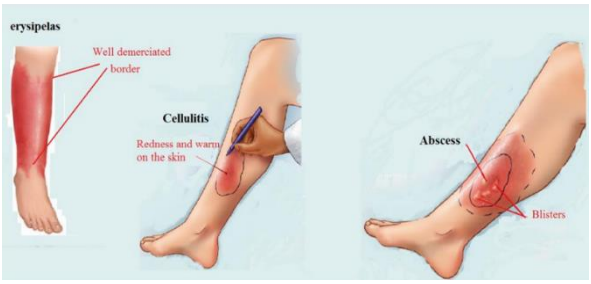
Indurated stage

Amoxicillin PO
Children: 30 mg/kg 3 times daily
Adults: 1 g 3 times daily
+ Metronidazole PO
Children: 10 to 15 mg/kg 3 times daily
OR
Amoxicillin/clavulanic acid (co-amoxiclav) PO
(The dose expressed in Amoxicillin)
Children < 40 kg: 50 mg/kg 2 times daily
Children ≥ 40 kg and adults: 1 tablet of 875/125 mg, 3 times daily

Suppurative stage

Surgical drainage.

CELLULITIS AND ERYSIPELAS



Acute skin infections, most often due to **Group A beta-haemolytic streptococcus**, and at times **Staphylococcus aureus** (including methicillin resistant S. aureus–MRSA).
Recurrence is common in adults.

SIGNS AND SYMPTOMS

Skin erythema, oedema with well demarcated margins, warmth, pain, usually on the lower limbs and at times the face.
Often with fever, lymphadenopathy and lymphangitis.
Look for a portal of entry (bite, ulcer, wound, intertrigo, eczema, fungal infection, etc.).
Rare systemic complications: septicaemia, acute glomerulonephritis.

TREATMENT

- Immobilization and elevation of the limb (higher than the heart).
- Cool and wet dressing.
- Do not cut open.
- Give ibuprofen for pain and inflammation
- Give antibiotics:

Mild cases

Amoxicillin/clavulanic acid (co-amoxiclav) PO for 7 to 10 days.
(The dose is expressed in amoxicillin)
Children < 40 kg: 25 mg/kg 2 times daily
Children ≥ 40 kg and adults: 1 tablet of 875/125 mg 2 times daily

Severe cases: high fever, patient unwell.

- Admit to IPD, do blood culture
- Start intravenous antibiotics:

Cloxacillin IV infusion over 60 minutes 5
Children 1 month to 12 years: 12.5 to 25 mg/kg every 6 hours
Children over 12 years and adults: 1 g every 6 hours

If there is clinical improvement after 48 hours (afebrile and erythema and oedema have improved) switch to Amoxicillin/clavulanic acid PO at the doses indicated above to complete 7 to 10 days of treatment.

FUNGAL SKIN INFECTIONS

CANDIDA

Fungal infection of the skin or mucous membranes, sometimes also called 'thrush'. Mostly seen in patients with previous use of antibiotics, diabetes mellitus, decreased immunity, or pregnancy. Common types of infection are oral candidiasis and vaginal candidiasis. Oral candidiasis is common in neonates or elderly but unusual for other ages. If find oral candidiasis in other age groups then consider immunosuppression e.g., HIV, cancer.

SIGNS AND SYMPTOMS

- Oral Candidiasis: removable white spots in the mouth, painful and difficult swallowing.
- Vaginal Candidiasis

TREATMENT

Oral Thrush

- Nystatin 400,000 IU/day – give 1 lozenge to be sucked QID for 7 days or 1ml of oral suspension (100,000 IU) QID for 7 days. Oral suspension should be swilled around oral cavity and swallowed.

RINGWORM

Fungal infection of the skin.

SIGNS AND SYMPTOMS

- Round dry lesions that grow slowly (taking weeks to months).
- Dry white scales on the edges with a clearing in the center, they are very itchy, not painful
- No fever.
- Sometimes there are pustules.
- On the scalp it may be associated with localized loss of hair.

TREATMENT

Local treatment:

- 2 times per day clean with soap and water, dry and apply ketoconazole 2% cream BID for 2 weeks or longer if necessary.
- Other topical antifungals can also be used, such as clotrimazole, miconazole, or **Whitfield** ointment.

Scalp ringworm:

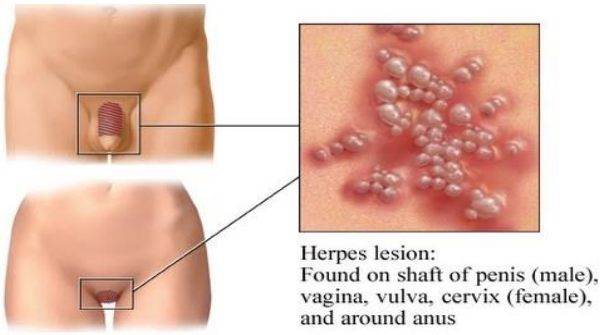
- If on head shave head or cut hair short
- Treat secondary infection first
- If scalp ringworm: need to also give oral antifungals
  e.g., griseofulvin PO for 6 weeks (can give up to 12 weeks) Child <12yrs: 10-20mg/kg per day (max 500mg per day) Children >12yrs/Adults: 500mg OD (1g OD if severe infection) Contraindicated in pregnant women

Note: men should not make their wives pregnant within 6 months of the griseofulvin treatment, women should wait until 1 month after treatment before getting pregnant.
Note: For adults over 35 years, consider checking baseline liver function tests before treatment, and again at 4 weeks if available.
If there is no improvement, make sure it is not leprosy.

VIRAL SKIN INFECTIONS

HERPES SIMPLEX

Recurrent infection of skin and mucous membranes due to infection with Herpes Simplex Virus. After the first infection, the virus stays in the body and can recur if the person has another illness, is stressed, or exposed to cold or sunlight. The infection always happens in the same place. Common places: lips, mouth, eyes, and genital area. Herpes is spread by direct contact with lesions. Herpes lesions heal by themselves in approximately 10 days, but they will often recur.



Herpes lesion:
Found on shaft of penis (male), vagina, vulva, cervix (female), and around anus

SIGNS AND SYMPTOMS

- Group of small vesicles filled with clear fluid on the skin or the mucosa (mouth or genital area).
- Often the vesicles have broken and become crusted when the patient comes to the clinic.

- Very painful, may have tingling and itching before the lesions appear.
- In the mouth: Pain and difficulty eating. Ulcers in the mouth and on the lips. Often the gums are swollen.

Complications
Infections in the eyes can be severe causing keratitis and blindness.
If a pregnant woman has a genital lesion, it can be very dangerous for the newborn baby because the baby can become infected during delivery.

TREATMENT

Mild/moderate infections:
- No antiviral treatment is needed, and supportive care is enough

Severe cases with necrotic lesions or extensive lesions or in the face spreading to the eye:
- Oral acyclovir, if available, 200mg 5 times per day for minimum 5 days, given in the first 48 hours of symptoms starting

On the skin
Clean lesions with savlon (antiseptic cream) and let dry.
Apply GV (can be used on mucous membranes)

In the mouth:
Wash the mouth with warm salty water.
GV, if secondary infection, treat with amoxicillin.

In the eyes:
Wash the eyes with cool boiled water.
Apply ointment to the eye e.g. TEO to keep moist.
Refer to doctor for consultation.

On the genitals
Wash with soap and water. Give paracetamol for pain. Condoms help prevent the spread of herpes.
Men or women who have difficulty passing urine need oral acyclovir.
Acyclovir is not known to be harmful in pregnancy.
Active genital herpes at delivery should have caesarean section.

VARICELLA ZOSTER/CHICKENPOX

This is a very common disease caused by the Varicella Zoster virus, and spreads easily. Other persons in the family or in the neighborhood might have the same symptoms.

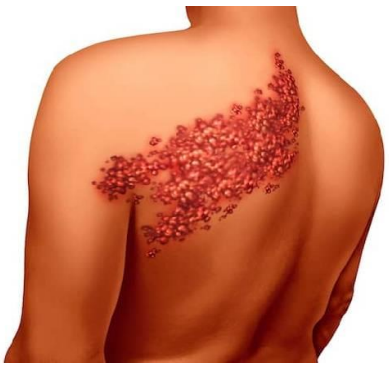
SIGNS AND SYMPTOMS

- Slight fever, headache, feeling unwell.
- Itchy, round spots of different sizes with clear liquid inside, some may be crusty.
- Whole body: more on the trunk and less on the arms and legs.

TREATMENT

- Clean with water and soap.
- Cut the fingernails, to reduce damage from scratching.
- Apply GV only on infected spots. Secondary infections: antibiotic treatment.
- Treat the fever with paracetamol.
- Only in cases of severe itching, give PO chlorpheniramine 1-3 days.
- If lesions in the eye treat with an ointment such as Terramycine Eye Ointment.

HERPES ZOSTER (SHINGLES)



A rash caused by the reactivation of the chickenpox virus. It occurs to people that have previously had chickenpox. After you recover from chickenpox, some of the virus (varicella zoster) stays in the body in an inactivated form in the spinal cord. Sometimes the virus becomes active again and causes shingles. It may happen at any age, but frequently in patients with low immunity. More common in adults than children.

SIGNS AND SYMPTOMS

- Often fever and chills a few days before the rash develops. Feeling unwell.
- Moderate to severe pain at the site where the rash will develop. Pain may come before you can see the rash.
- 4 or 5 days later the vesicles appear on a red base (similar to herpes simplex but over a larger area).
- The vesicles become pustules, then crusts.
- The rash is distinctive because it appears in the area of the affected nerve (dermatome), therefore it is usually only on one side of the body, very often on the chest but it can be found anywhere on the skin or mucosa (depending on the affected nerve).

TREATMENT

- Treat lesions as for Herpes Simplex.
- Apply cold compresses.
- **Follow pain protocol.**
- Consider amitriptyline if pain is not relieved by painkillers as it is very effective against nerve pain.

- If eye is affected or severe disease discuss with the doctor and consider referral. Acyclovir can help if available, but only if given in the first 48 hours after eruption of lesions.

Mild/moderate infections:
- No antiviral treatment is needed, and supportive care is enough

Severe cases with necrotic lesions or extensive lesions or in the face spreading to the eye:
- Oral acyclovir, if available, 200mg 5 times per day for minimum 5 days, given in the first 48 hours after eruption of lesions.

Note: The patient is infectious to people who have not had chicken pox. This is especially important for contact with pregnant women – advise them to stay away from pregnant women who have never had chickenpox.

PARASITIC SKIN INFECTIONS

SCABIES

Scabies is a parasitic infection of the skin. It is common in this region and spreads easily. Transmission is by close direct contact. The mite invades into the skin causing an inflammatory reaction.

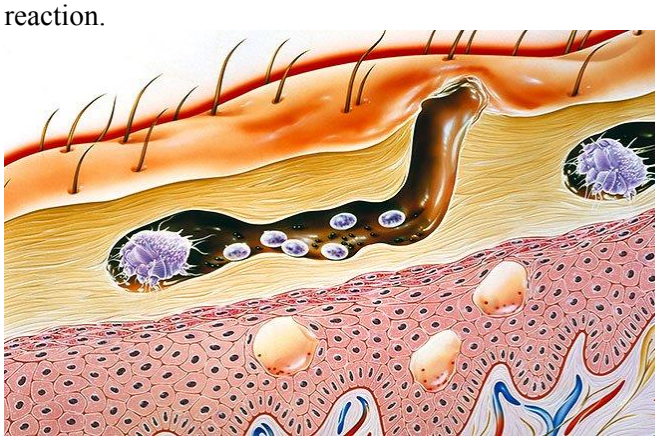


Figure 1 The mite invading into the skin.

SIGNS AND SYMPTOMS

- Itching (especially at night).
- Small sores, scratch marks and burrows (tunnels under the skin) can be found between the fingers and toes, around the wrists, axilla or groin and other places.
- The back and face are not affected.

Other members in the family may have it too. If suspect in child examine the mother, especially her hands. Scabies lasts for weeks to months. The sores can become infected: If there are any sign of infection treat with antibiotics first and then the scabies.

Note: There is a severe form called **Norwegian scabies**, which is thick, scaly, red plaques which can look like psoriasis, 50% occur without itching.

TREATMENT

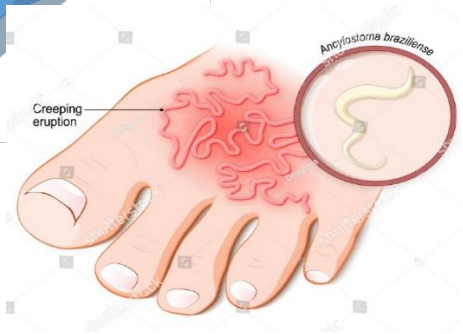
- Treat secondary infection first.
- Wash the whole body with water and soap
- Treat all people in the family and close contacts at the same time.
- Ideally use permethrin as have to apply for less time, only need to apply once, and does not need diluted in children.

Medication
- 5% Permethrin lotion for child >2m and adults (does not need dilution)
- One application, apply to whole body except face/mucous membranes, Allow, to dry and then put on clean clothes. Do not wash for at least 8 hours. (It may be easier to apply permethrin in the evening to avoid washing.)
- 25% Benzyl benzoate Use if <2m or permethrin not available (needs diluted)
  1. Child < 2 yrs – 1 part 25% lotion + 3 parts water apply for 12 hrs. (or if <6 months for 6 hrs.) then rinse
  2. Child 2-12 yrs – 1 part 25% lotion + 1-part water, apply for 24 hours then rinse off
  3. Child >12 yrs/adults – undiluted 25% lotion, apply for 24 hours then rinse off
- REPEAT application after 24hrs
- Cut fingernails and apply lotion under the nails.
- Wash the clothes and bedding for the whole family with boiled water and soap and then dry in the sun. If cannot wash expose to the sun for 3 days, ideally in a completely closed bag
- Educate patients that the itching may continue for several weeks. This is a reaction to the dead parasite. Calamine lotion may be needed.
- For severe cases (Norwegian scabies) refer to hospital as the patient needs isolation

If no response after treatment makes, sure that the treatment has been applied properly and that all members of the family have been treated.

CUTANEOUS LARVA MIGRANS (HOOKWORM INFECTION)

The disease is caused by the larvae of animal hookworms. Eggs are found in dog or cat faeces on the ground. Humans walking bare foot or lying on the sand can become infected by larval invasion through intact skin. The larvae travel under the skin leaving a red irregular tract, most often on the feet.



SIGNS AND SYMPTOMS

- Very itchy red tracks on the skin. The larvae travel a few millimeters each day.
- Foot and ankle are the most common sites.
- The larvae can survive for weeks before they die.

DIAGNOSIS

Hookworm eggs may be found in stool examination.

TREATMENT

Albendazole Adult/Child >6m: 400mg STAT. (Note: if >6m but <10kg give 200mg STAT).

PREVENTION

Wearing shoes or sandals.

LARVA CURRENS (STRONGYLOIDES INFECTION)

The disease is caused by migrating Strongyloides stercoralis larvae. The worm enters the body by making a hole in the skin and then moves around the body causing a rash.

SIGNS AND SYMPTOMS

Acute Strongyloides

- The area around where the worm entered the body may have redness and itching and last for up to a few weeks.
- May also get pulmonary symptoms (dry cough, dyspnoea, wheeze) if the worm travels to the lungs.
- Once larvae get to the intestine, they can cause GI symptoms e.g., bloating, abdominal/epigastric pain, vomiting, diarrhoea.

Chronic Strongyloides

- Intestinal larvae may re-infect their host (auto-infection) by penetrating through the intestinal wall or from the skin around the anus.
- Chronic infections lead to recurrent pulmonary and GI symptoms.
- When the worm moves around the body it causes itchy red tracks on the skin between the neck and knees that last for several hours to days. The worm/rash moves 5-10cm per hour and the rash comes and goes. This rash is called larva currens.

DIAGNOSIS

Larvae may be detected in a stool examination.

TREATMENT

Ivermectin is the ideal treatment but is not available. Instead use Albendazole Adult/Child >6m: 400mg OD for 3 days.
(Note: if >6m but <10kg give 200mg OD).

PREVENTION

Wearing shoes or sandals.

NON-INFECTIVE SKIN RASH

URTICARIA (ALLERGIC RASH)

Allergic skin reaction. Often it is impossible to find the cause of the allergy, but common causes are:

- Medication: If the patient is under a new treatment (e.g., quinine, amoxicillin, co-trimoxazole.)
- Insect bites, cat hair, worms, coloring in drinks, contact with plants/metals, food.

SIGNS AND SYMPTOMS

A raised, edematous, red rash that changes quickly in size and shape (within minutes) on the whole body. Swellings are transient (they persist only for minutes - maximum 24 hours). Very itchy.

TREATMENT

- Cool down with water.
- Remove the cause: stop new medication, stop contact with plants, metals, foods etc.
- Cut fingernails to prevent scratching which can lead to infection.
- If severe itching: give chlorpheniramine until itching stops.
- In case of oedema of the face or difficulty breathing/wheeze, treat as anaphylactic shock.

ECZEMA

Non-specific inflammatory skin reaction to special factors.

SIGNS AND SYMPTOMS

- Red, scaly/dry, itchy lesions
- Anywhere on the body, usually on both sides of the body (especially at the front of the elbows and behind the knees where the joint bends (flexure areas).
- It may be localized or widespread, dry, or wet but usually long lasting.
- The dry lesions are very itchy and there is serous (like water) exudation, there may be vesicles.

- It can appear and disappear many times at the same place.
- Chronic eczema can cause thickening of the skin (lichenification)
- Secondary infections are common.
- Eczema can look very similar to ringworm, especially on the face.

TREATMENT

Clean with soap and water 2 times daily.
Then:

- for acute eczema: calamine lotion, one application 2 times daily
- for chronic eczema: zinc oxide ointment, one application 2 times daily

Look for and treat any pre-existing condition (scabies, lice etc.).
For patients with secondary infections: treat as impetigo (see page 120).
For patients with intense pruritus, antihistamines for a few days.

COMPLICATION

Eczema herpeticum.

- Is a serious infection with herpes virus when the virus affects the body.
- It is mostly seen as a complication of eczema
- Localized eruption of blisters with crusting. Systemically unwell with fever.
- Treat with acyclovir PO 200mg (100mg if <2yrs old) 5 times per day for 10 days. If immunocompromised e.g., HIV give double dose.

PSORIASIS

A chronic inflammatory skin condition that produces thick scaly skin.

SIGNS AND SYMPTOMS

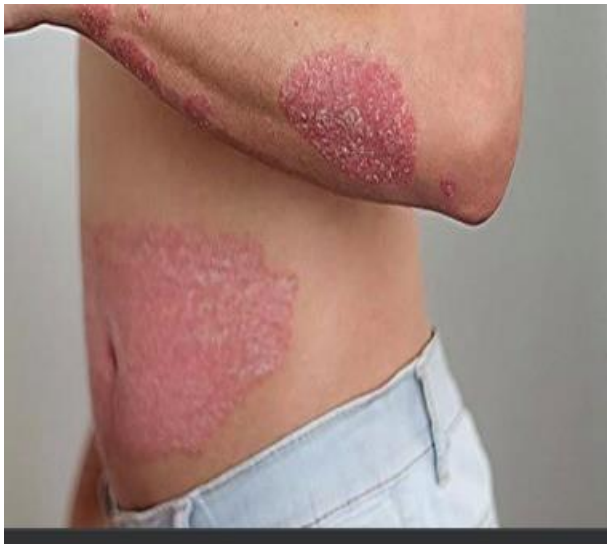
- Skin: chronic scaly pink lesions on extensor surfaces e.g., front of knees, elbows, scalp, and trunk, sometimes itchy.
- Nails: pits in nails, yellow colour.
- Joints: can get swollen joints, especially hands and feet (psoriatic arthritis).

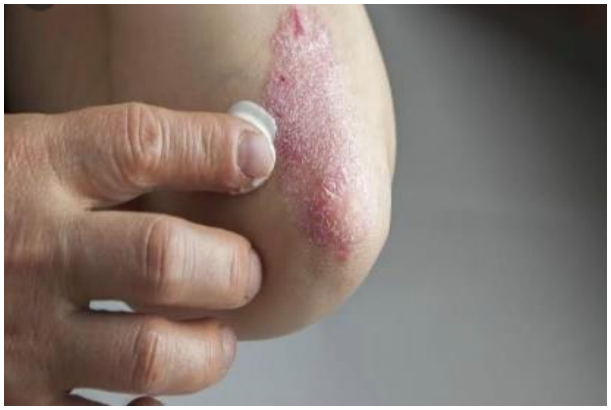
There are many different types of psoriasis. Two most common types are:

- Plaque psoriasis: lesions on extensor surfaces.
- Guttate psoriasis: multiple 1-10mm lesions small scaly lesions (like tear drops) mainly on trunk, upper arms, and thighs.

TREATMENT

- Stop smoking, avoid alcohol, and decrease weight if overweight
- Expose skin to sunlight (UVB).
- Apply Vaseline QID.
- Consider hydrocortisone cream if not improving or if acute flare up (see information above about steroid cream).
- Give NSAIDs +/- omeprazole for stomach protection in cases of arthritis.
- For very thickened skin lesions try Whitfield ointment twice a week – but stop if getting worse.





WOUNDS

A wound is a break in the skin that can be caused by many different things e.g. cut, bite, surgical wound etc.

TREATMENT

For every wound follow these steps to treat the wound. For more detail of each step see below.

1. Always take general precautions for you and the patient e.g., gloves
2. Remove any old dressing
3. Examine the wound
   - Look at the colour
   - Look for infection – consider antibiotics if the wound looks infected/signs of systemic infection
4. Clean the wound – clean with polyvidone iodine solution and sterile water or normal saline and rinse.

5. Explore the wound – use local anaesthetic 1% lidocaine and wait for 2 minutes, look for foreign bodies.
6. Tetanus prevention
7. Assess for sensation, function, and blood supply to the limb
8. Excision of the wound – remove non-viable tissue
9. Suturing – consider immediate or delayed suturing
10. Dressing
11. Consider complications

It is very important to follow these steps:

1. General precautions
- Make sure you explain the procedure to the patient.
- Always wear protective equipment e.g., gloves.
- Always have someone to help you.
- Try to be as sterile as possible, clean equipment between patients.
- Always go from clean to dirty e.g., if multiple wounds start with the cleaner wounds.
- Always give painkillers before examining wound, wait for enough time to allow the medication to work.
- Discard of all sharps in the sharp's containers.
- If wounds are more than 6 hours or contaminated, then delay suturing.
- Give Tetanus prevention care.
- Consider referring deep severe wounds or wounds that cover large areas.

2. Remove old dressing
- Wash hands or disinfect with alcohol rub.
- Use non-sterile gloves, remove the tape/bandage.
- If the last bandage/gauze is stuck to the wound loosen with NSS or sterile water before removing.
- Look at the gauze, if there is lots of discharge/green colour/smells bad then suspect a wound infection and consider starting antibiotics.
- Discard the dressing and non-sterile gloves in the correct place.

3. Examine the wound

(a) Look at the colour
- Black area = necrosis, wet or dry infected eschar (be careful to distinguish from dark red old, blood and black).
- Yellow/green area = infected tissue/pus.
- Red area = granulation – usually a sign of healing (but red edges = inflammation or infection). If the granulation tissue is heaped up higher than the edges of the normal skin, you should dress the wound with some pressure to push down the granulation tissue. This will allow the normal skin edges to grow over the granulation tissue.
- Pink area = epithelization, final stages of wound healing.

(b) Look for infection

If the wound is sutured and you see the following signs, then there is an infection, and you should remove one or more of the sutures and assess for general signs of infection e.g., fever:
- Red, indurated, and painful edges.
- Drainage of pus between the sutures by itself or when pressure applied.
- Lymphangitis or subcutaneous crepitations around the wound.

If you think the wound is infected (or it is a high risk wound (see below)) treat with cloxacillin. Note in immunosuppression e.g., diabetes, kidney failure, HIV etc. healing can be delayed. Treat with antibiotics for a longer time if there is a slowly healing infection.

4. Clean the wound
- Wash hands again/disinfect with alcohol rub.
- Use sterile gloves if available, otherwise use a new pair of non-sterile gloves.
- Clean according to what the wound looks like:
- Clean sutured or clean open wound; use NSS to remove any dirt, work from the cleanest to the dirtiest area, use new swabs for each stroke, dab dry with sterile gauze.
- Necrotic or infected open wounds – clean with polyvidone iodine (7.5% scrub 1-part solution + 4 parts of NSS). Rinse thoroughly with normal saline then dab dry with sterile gauze.

5. Explore the wound
- If the wound is not clean and you are worried that there may be a foreign body inside use local anaesthetic 1% lidocaine and wait for 2 minutes, explore the wound to look for foreign bodies.

6. Consider Tetanus Prevention
- If high risk wound: deep wounds, war wounds, wounds with bone fractures, wounds with devitalized tissue, extensive burns, foreign body; wounds older than 6 hours inject tetanus immunoglobulin around the wound (see below).

7. Assess for sensation, function, and blood supply to the limb
- Make sure the patient can still move and feel the affected area, and that the skin is pink, not cold and cap refill is <2 seconds.
- If there is any abnormality discuss with the doctor. If the wound is severe then the patient

may need an amputation which may not be available at the clinic, so consider referral.

8. Excise the wound
- Remove any non-viable tissue carefully using sterile equipment.

9. Suture the wound (if necessary)
- Immediately suture: if the wound is clean, skin is normal, wound is less than 6 hours old (or less than 24 hours old if on face, scalp, upper limbs, or hands).
- Delay suture: if bite, bullet/shell/mine/shrapnel wound, if the skin has bruising or necrosis, if does not fit criteria for immediate suturing, do daily dressing change with cleaning and removal of necrotic tissue and consider suturing after 72 hours.

10. Dressing the wound
- Clean sutured or clean open wound: re-cover a wound with sterile gauze and bandage.
- Necrotic or infected open wounds: Apply sterile Vaseline and remove all necrotic tissue at each dressing change until the wound is clean.

11. Consider complications
- Foreign body (from the trauma or from gauze packing) can delay healing and make the wound worse. If the wound is not healing, inspect wound inside for foreign bodies. May need to do incision to inspect deep wounds.
- Granulation tissue grows faster than surrounding skin, and the skin edges cannot grow over the heaping granulation tissue. Use skin grafting over the granulated tissue. If skin graft is not available, use moderate pressure dressing to push down the granulation tissue and this will allow skin edges to cover the large wound or ulcer. It can be many weeks of daily dressing changes until the wound is completely healed.

TETANUS PREVENTION

- To complete ATT.

BURNS

Burns are injuries to tissues caused by heat, friction, electricity, radiation, or chemicals.

HISTORY

- When did the burn take place?
- What caused the burn? Electrical burns can cause more extensive damage than is first seen.
- What is the age of the patient? Burns are more severe in the very old and very young.
- Has there been any inhalation of hot smoke? Look for dyspnoea with chest wall indrawing, burned nose hairs or soot around the nose and mouth.

EXAMINATION

Severity of burns are evaluated on the basis of the depth, location, and size of the burn.

Depth of the burn:
Superficial burn
Red, dry, and painful, it does not blister.

Superficial partial thickness burn
Pink and moist blisters may be present.

Deep partial thickness burn
White or mottled pink, with some painless areas.

Full thickness burn
White, mottled or charred and are dry.

Note: *Patients with electrical burns need an* ***ECG.***

Location of the burn:
Document in the IPD chart and lemma the location of the burn

Note: Burns are more severe when on the face, hands, joints, and perineum.

Size of the burn:
To calculate the amount of burned skin (% body surface area) use following table:
Lund Browder table-Percentage of body surface area according to age

For example: 2 year old with burn to right upper arm (=4%), right lower arm (=3%), and hand (=2.5%)
Total body surface = 4 + 3 + 2.5 = 9.5%

Children's Hospital of Wisconsin
A member of Children's Hospital and Health System.

Burn Estimate and Diagram

Date: _____

Age: _____ Sex: _____

Admit Weight: _____

Admit Height: _____

Mechanism of Injury: _____

Date of Injury: _____

Time of Injury: _____

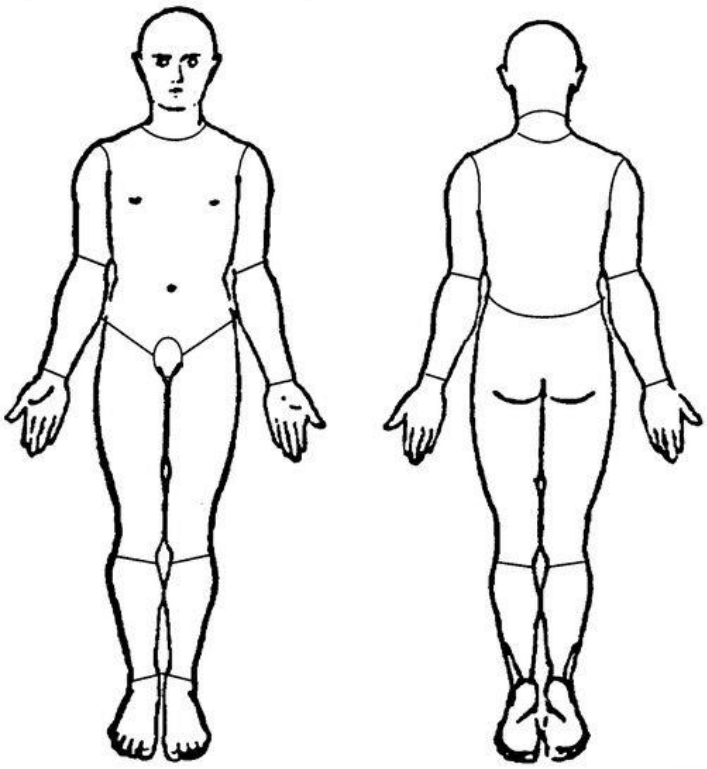
KEY:

FT = Full Thickness

PT = Partial Thickness

Superficial / Partial Thickness

Deep / Full Thickness



Area	Percent of Burn						Severity		Total Percent	Donor Areas
	Birth 1 year	1-4 years	5-9 years	10-14 years	15 years	Adult	PT	FT		
Head	19	17	13	11	9	7				
Neck	2	2	2	2	2	2				
Ant. Trunk	13	13	13	13	13	13				
Post. Trunk	13	13	13	13	13	13				
R. Buttock	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2				
L. Buttock	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2				
Genitalia	1	1	1	1	1	1				
R.U. Arm	4	4	4	4	4	4				
L.U. Arm	4	4	4	4	4	4				
R.L. Arm	3	3	3	3	3	3				
L.L. Arm	3	3	3	3	3	3				
R. Hand	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2				
L. Hand	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2				
R. Thigh	5 1/2	6 1/2	8	8 1/2	9	9 1/2				
L. Thigh	5 1/2	6 1/2	8	8 1/2	9	9 1/2				
R. Leg	5	5	5 1/2	6	6 1/2	7				
L. Leg	5	5	5 1/2	6	6 1/2	7				
R. Foot	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2				
L. Foot	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2				
						Total				

Diagram adapted from Lund-Browder burn assessment chart

Signature/Title: _____ Date/Time: _____

C7440N (3/06)

DT183

Figure 2 Burn percentage of skin

ACNE

Chronic inflammatory condition characterized by papules, pustules, cysts, and scars. **Acne vulgaris** is common and affects >80% teenagers, 50% have a family history. Peak age: 18 yrs. **Male = Female**.

CAUSES

In both sexes, hormones called androgens secretion results in increased sebum excretion; pilosebaceous duct blockage (**producing comedones**); colonization of the duct with Propionibacterium acnes bacteria (**Cutibacterium acnes**), which is present on the skin, and release of inflammatory mediators. Inflammatory acne is the result of the host response to the follicular **Propionibacterium acnes**.

Rarer causes

- **Endocrine:** PCOS (Polycystic Ovary Syndrome – prolong menstrual period with excess male hormone (androgen) levels); Cushing's syndrome; Virializing ovarian tumors (Androgen producing tumors).
- **Cosmetics.**
- **Drugs:** steroids (systemic topical) testosterone therapy.
- **Physical occlusion:** e.g., under a **violinist's chin**.

Presentation

Spots on face, neck, chest and back.

Examination reveals blackheads and white heads, red papules, pustules, cysts, scarring from old lesions.

MANAGEMENT:

1. Wash with soup and warm water **twice daily**.
2. Medication
   - Topical: Benzoyl peroxide

     OR
   - Topical retinoids (e.g., isotretinoin)

     OR
   - Topical antibiotics (e.g., Clindamycin) ± **Benzoyl peroxide.**

   Oral:
   - Tetracycline 500mg BD x **8 weeks**

     OR
   - Doxycycline 100 mg BD x **8 weeks**

     OR
   - Erythromycin 500 mg BD x **8 weeks**

For girls:

- Oral contraceptive pills.
- Discuss with dermatologist if you want to give **oral retinoid treatment**.

ALOPECIA

Alopecia is hair loss.

Alopecia is not curable, but it is treatable and not life-threatening.

CAUSES:

1. Genes and Hormones

- Androgenic alopecia, male pattern baldness or female pattern baldness, is the most common type of alopecia.
- **Dihydrotestosterone (DHT)** is a hormone derived from testosterone, the male sex hormone. DHT binds to testosterone in hair follicle and weakens them. When testosterone and estrogen (female sex hormone) are unbalanced in women, DHT can trigger androgenic alopecia. This can happen before menopause. Some women have a condition called **polycystic ovarian syndrome (PCOS),** in which they make so much estrogen that some gets converted to testosterone, which can contribute to thinning and loss of hair.
- **Alopecia** areata is a condition where the immune system attacks hair follicle. It could also be genetic in some cases.

2. Stress, Medication.

3. Nutrition: Iron deficiency, vitamin D deficiency.

4. Thyroid issues:

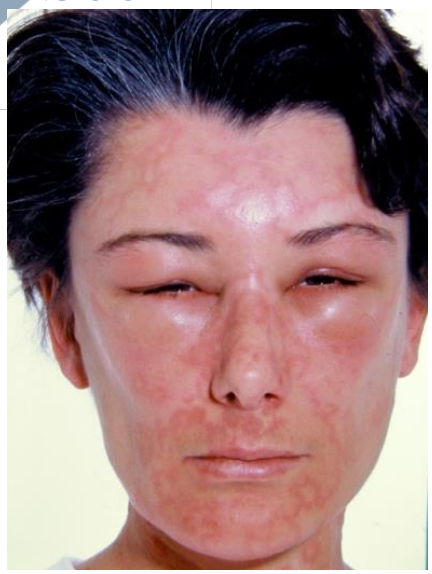
- Both low and overactive thyroids can trigger alopecia. Ask for doctor about a thyroid test if your hair loss is accompanied by unexplained weight changes, High or low energy and menstruation changes.

TREATMENT

Treatment is according to cause.

1. **Topical Minoxidil (Ro gaine)**
2. **Topical corticosteroids**
3. **Finasteride 1mg orally**
4. **Injection of corticosteroids into the bald areas, every 4-8 weeks.**

ANGIO-OEDEMA



Deeper longer-lasting swellings; painful rather than itchy. Commonly affect eyes, lips, genitalia, hands, feet. May affect bowel (abdominal pain, nausea, vomiting, diarrhoea) or airway (Tongue swelling, shortness of breath, wheeze).

CLASSIFICATION

1. **Acquired angioedema**

It can be immunologic, non-immunologic or idiopathic. It is usually caused by allergy. Urticaria may develop simultaneously. Angioedema can be due to antibody formation against **C1INH**. It can occur as a side effect of **ACE inhibitor**, **NSAIDs**.

2. **Hereditary angioedema**

Bradykinin (vasodilator) formation is caused by a deficiency of **C1 esterase inhibitor**. Bradykinin plays a critical role in all forms of hereditary angioedema.

MANAGEMENT

1. **Cetirizine** or **Chlorpheniramine maleate**.
2. **Prednisolone 40mg OD for 3-5 days**.
3. In case airway obstruction happens, **use Epinephrine (adrenaline).**
4. **Stop ACE I,** if the patient is using, alternatively **ARB** (**angiotensin II receptor blocker**) can be used. **ARB** has a similar mechanism but does not affect Bradykinin. However, this is controversial as small studies have shown some patients with **ARBs** can develop Angioedema.

ATOPIC DERMATITIS (ATOPIC ECZEMA) AND CONTACT DERMATITIS

ATOPIC DERMATITIS

SYMPTOMS:

- Itchy.
- Dry and Scaly.
- Appears on flexural areas.
- Most common in children under 5 years old.

CAUSES:

- **Genetic** susceptibility.
- Common in those with allergies and asthma.
- Triggers include stress skin irritation, and dry skin.

DIAGNOSIS:

- Itchy rash with typical age and location pattern
- Family history
- Blood test and patch test

TREATMENTS:

- **Oral steroid:** rarely used.
- **Antihistamine:** Give at night.
- **Topical steroid.**
- **Dilute bleach bath.**
- **Antibiotic:**
  - **Topical**: **Fucidin H**
  - **Oral**: **Flucloxacillin** or **Erythromycin** 250mg – 500mg QID for 2 weeks.

CONTACT DERMATITIS

SYMPTOMS

- Itchy but more likely to cause pain and burning
- Blister and weeps
- Appear anywhere on the body
- Most common in adults

CAUSES:

- Topical exposure to offending substance.
- Delay hypersensitivity response.
- Triggers include nickel, **poison oak**, and latex.

DIAGNOSIS:

- Itchy rash
- Established contact with triggers
- Positive patch testing

TREATMENTS:

- May be used: **prednisolone** 20-30mg OD x 5 days
- **Sedative antihistamine** at nighttime.
- **Topical steroid not used**.

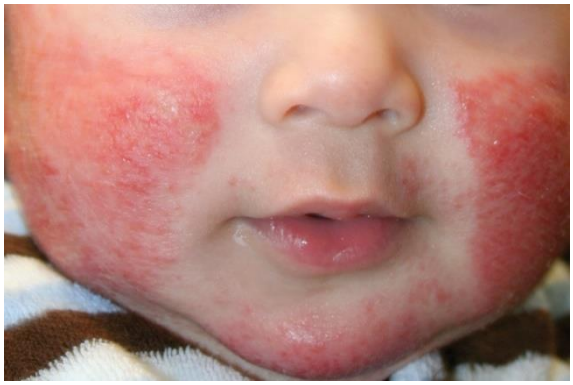
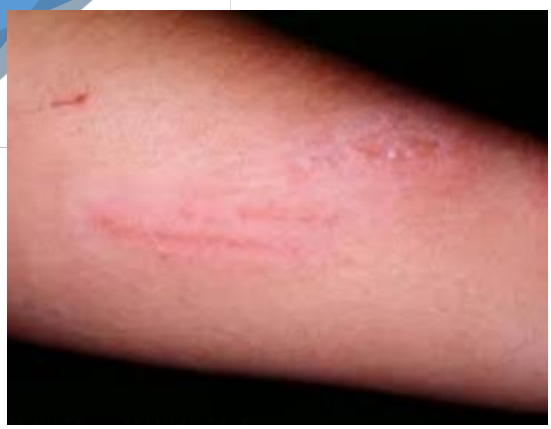


Figure for Atopic dermatitis in child



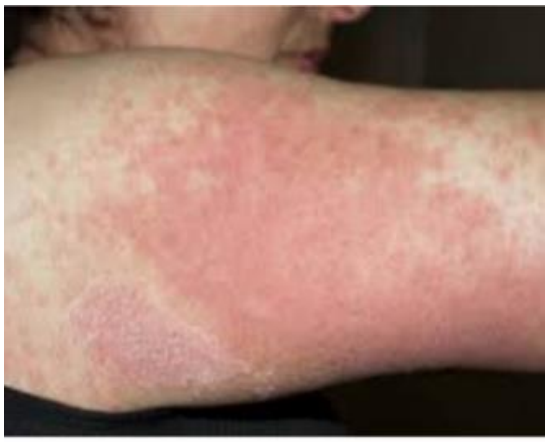


Figure for contact dermatitis

DANDRUFF

It is exaggerated physiological exfoliation of fine scales from an otherwise normal scalp. More severe forms merge with **Seborrhoeic dermatitis** and treatment is the same.

HEAT RASH (PRICKLY HEAT, MILARIA)

- It is not just for babies.
- It affects adult too, especially during hot, humid weather.
- Heat rash develops when blocked pores (sweat ducts) trap perspiration under your skin.
- It is itchy rash of small, raised spots and a stinging or prickling sensation on the skin.

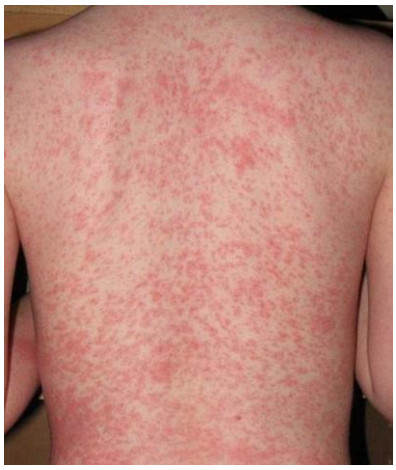


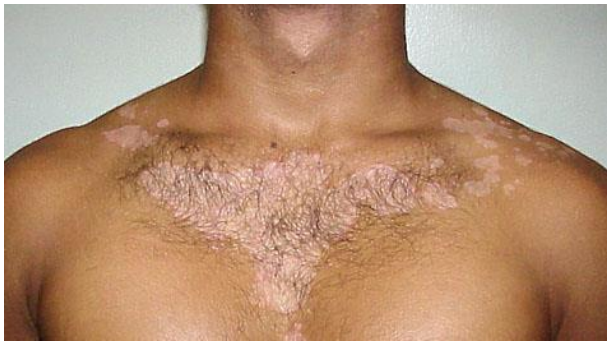
Figure: Heat rash

Treatment:

1. Calamine lotion.
2. Topical steroids.
3. Wearing loose-fitting clothing.

SEBORRHOEIC DERMATITIS

Chronic red, scaly, greasy, itchy, and inflamed skin. Areas of the skin rich in oil-producing glands are often affected including the scalp, face, and chest. In babies, when the scalp is primarily involved, it is called **cradle cap**. **Dandruff** is a milder form of the condition without inflammation. Frequently diaper rash accompanies the scalp rash.

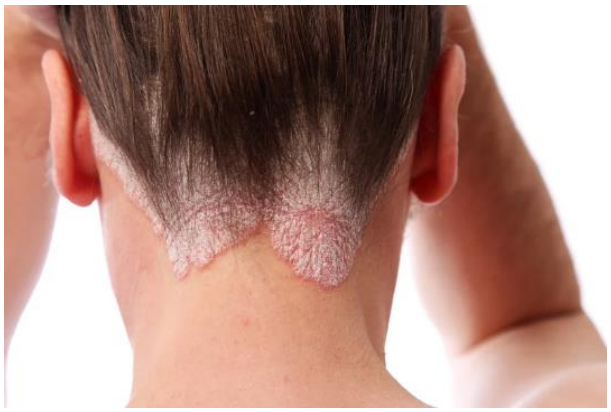


CAUSES

It is due to a local inflammatory response to over-colonization by **Malassezia fungi species** in sebum-producing skin areas (scalp, face, chest, back, underarms, groin).

RISK FACTORS

- Stress.
- Winter.
- Poor immune function (HIV infection).
- Parkinson's disease.
- Stroke.
- Vitamin B6 deficiency.
- Hyperandrogenism (pcos, puberty).



MANAGEMENT

1. **Antifungal: Itraconazole** 200mg OD x 7 days **(OR) Fluconazole** 50 mg OD x 2 weeks.
2. **Ketoconazole** (or) Coal tar shampoo for scalp lesions. Apply **2% Sulphur + 2% salicylate acid cream** several hours before shampooing.

3. **Prednisolone** oral **short course** can be used as a last resort.
4. **Systemic antiandrogen (cyproterone acetate, spironolactone, flutamide)** therapy are generally used to treat only in women. But it can result gynecomastia and infertility in male fetuses in pregnant women.
5. **Anti-histamines**
6. **Isotretinoin:** may be used as a **sebosuppressive** agent but it has potentially serious side effects.
7. **Topical 4% Nicotinamide.**
8. **Phototherapy: UV radiation.**

STAPHYLOCOCCAL SCALDED SKIN SYNDROME (SSSS)

It is a disorder that develops because of a toxin produced by a staphylococcal infection (staphylococcus aureus). The infection causes peeling skin over large parts of the body. It looks like the skin has been
scalded by hot liquid.

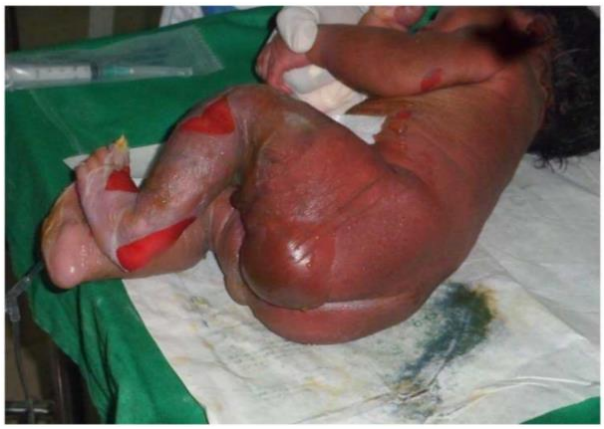


Figure Staphylococcal Scalded Skin Syndrome

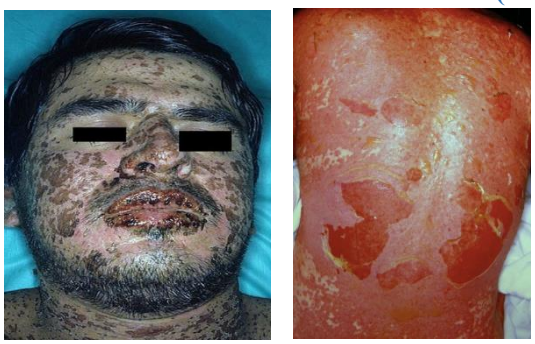
SIGNS AND SYMPTOMS

1. Fever
2. Irritability
3. Fatigue
4. Chills
5. Weakness
6. Lack of appetite
7. Conjunctivitis
8. Red, tender skin
9. Easily broken blisters
10. Peeling skin
11. Common in children under 6 years but can be seen in adults who are immunosuppressed or have Kidney failure.

TREATMENT

1. Rehydration
2. Antipyretic (Ibuprofen or Paracetamol)
3. IV Vancomycin 10mg/Kg 8 hours over 1-hour x 10 days.
   OR
   IV Clindamycin 10mg/Kg 8 hours over 30 min x 10 days.
   OR
   IV Ceftriaxone + Gentamycin
   OR
   Flucloxacillin also can be used.
4. Topical: Mupirocin ointment twice daily.

STEVENS – JOHNSON SYNDROME (SJS)



SJ syndrome (SJS) is a rare, serious disorder of the skin and mucous membranes. It is usually a disorder of immune reaction to **medication or infections** that starts with flu like symptoms, followed by a painful rash that spreads and blisters. Then the top layer of affected skin dies, sheds and begins to heal after several days. A classification in 1993 identifies **Steven – Johnson Syndrome**, **toxic epidermal necrolysis (TEN),** and **SJS/TEN** overlap. All three are part of a spectrum of severe cutaneous reactions (**SCAR**) which affect skin and mucous membranes. Blisters and erosions cover between 3% and 10% of the body in **SJS**, 11-30% in SJS/TEN overlap, and over 30% in TEN**. SJS/ TEN,** and **SJS/TEN** overlap can be mistaken for erythema multiforme. **Erythema multiforme (EM)** has various forms or presentations. Target lesions are a typical manifestation. Although **SJS, TEN and EM** can be caused by infections and medication, EM are most often adverse effects of medications.

CAUSES

Medications: Penicillin, Sulfonamides, Barbiturates, Allopurinol, Vancomycin, Valproate, Levofloxacin, Azithromycin, Diclofenac, Fluconazole, Ibuprofen, Carbamazepine, Nystatin, Pyrimethamine, Isotretinoin, Phenytoin, Lamotrigine, Nevirapine, Etravirine, Telaprevir, Cefixime, Trimethoprim.

Infections

1. Viral:

- HSV
- CMV
- EB virus
- HIV
- Hepatitis virus

- Mumps, Influenza
- Enteroviruses
- Coxsackie virus.

2. **Bacteria:**
   - Beta haemolytic streptococci
   - Diphtheria
   - Brucellosis
   - Lymphogranuloma venereum
   - Mycobacteria
   - Mycoplasma pneumonia
   - Typhoid
   - Rickettsial infections
   - Tularemia

3. **Fungal:**
   - Coccidioidomycosis
   - Dermatophytosis
   - histoplasmosis.

4. **Parasite/protozoa:**
   - Malaria
   - Trichomoniasis

SIGNS AND SYMPTOMS

Fever, Sore throat, fatigue, cough, conjunctivitis, target lesions (red rings with central pale or purple area) on hand and feet, ulcers, and other lesions in the mucous membranes of mouth, lips, genital, and anal regions. Burning pain of their skin at the start of the disease.

TREATMENT

1. Antibiotic: oral **Macrolide or Doxycycline.**
2. IV fluids
3. Nasogastric or parenteral feeding
4. Analgesic mouth rinse for mouth ulcer
5. Corticosteroids
6. Cyclophosphamide, Ciclosporin
7. IV immunoglobulin.

PROGNOSIS

Mortality rate - 5% (<10% body surface area involved). 40% (>30% body surface area involved).

SYSTEMIC LUPUS ERYTHEMATOSUS (SLE)

SLE is an autoimmune disease in which the immune system attacks its own tissues, causing widespread inflammation and tissue damage in the affected organs. There must be multisystem involvement.

Prevalence: 1:3000, Female and Male: 9:1, Onset: 15-40 years

Presentation of SLE

Joint 95%: - Arthritis, Arthralgia, Myalgia and Tenosynovitis.

Skin 80%: - Photosensitivity, Hair loss, facial butterfly rash, Urticaria, Vasculitis rash, Discoid lesions.

Lung 50%: - Pleurisy, Pneumonitis, Pleural effusion, Fibrosing alveolitis.

Kidneys 50%: - Proteinuria, High BP, glomerulonephritis, Renal failure.

Heart 40%: - Pericarditis, Endocarditis, Chest pain.

CNS 15%: - Depression, Psychosis, infarction, Fits, Cranial nerve lesion.

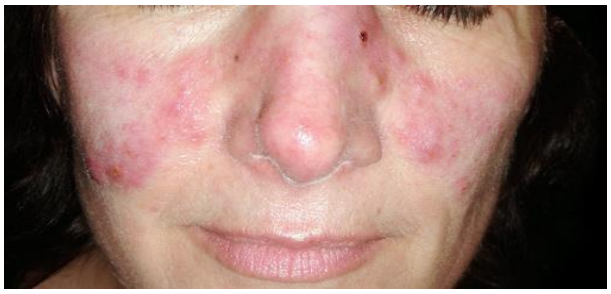
Blood 95%: - Anaemia (very common), Thrombocytopenia, Splenomegaly, Swollen Lymph nodes.

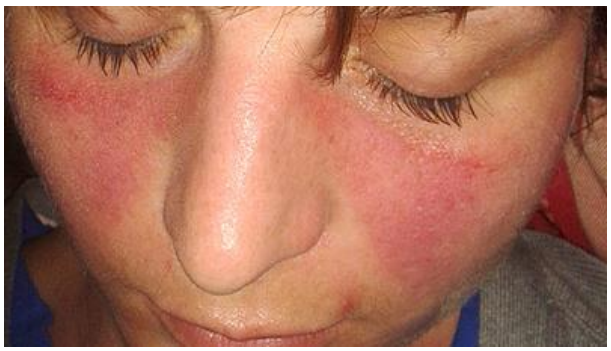
Fatigue 95%

Thyroid: Hypothyroidism

Eyes: Dry eyes syndrome, Scleritis, Episcleritis, Retinopathy, Cataract, Open angle glaucoma.

Reproductive: Fetal death in uterus, Spontaneous abortion.





DIAGNOSIS

- Positive Antinuclear Antibody (ANA).
- Positive LE cells.
- Reduced complement (C3, C4).
- FBC: Low HB, Low WCC, High ESR and High double-stranded DNA.

CAUSES

1. **Genetic** susceptibility.
2. **Drug**-induced lupus erythematosus is a reversible condition.

Minocycline, Isoniazid, Hydralazine, Procainamide, Chlorpromazine, Losartan, Sulfasalazine, Quinine, Phenytoin, OCP.

3. **Vitamin D deficiency.**

MANAGEMENT

1. **Corticosteroids**

2. **Hydrochloroquine**
3. **Cyclophosphamide, Methotrexates, Ciclosporin**.
4. **NSAID,** but potent **NSAIDs** such as Indomethacin and Diclofenac are relatively contraindicated because they increase the risk of **kidney failure and heart failure**. Pain is typically treated with **opioids**.
5. IV immunoglobulin (IVIG)

PROGNOSIS

- No cure is available.
- 80-90% can expect to live a normal life span.

TINEA CORPORIS

Tinea corporis is a superficial fungal infection of the skin that can affect any part of the body. It is commonly called ringworm as it presents with characteristic ring-shaped lesions.

CAUSES

- **Tinea corporis** is caused by a tiny fungus known as **dermatophyte**. These tiny funguses normally live on the superficial skin surface, and when the opportunity is right, they can induce a rash or infection.
- Ring worm can also be acquired from the animals such as dogs, cats, horses, pigs and cows. Person to person transfer can be via direct skin contact with an infected in individual.
- **Individual at high risk** of acquiring **Ringworm include those who:**
  - Live in crowded, humid condition.
  - Sweat excessively.
  - Participate in sports.
  - Wear tight clothing.
  - Have a weakened immune system (e.g., **HIV** patients).

SIGNS AND SYMPTOMS

- Most easily identifiable are the enlarging raised red rings with a central area of cleaning (ringworm).
- Itching.
- The edge of the rash appears elevated and is scaly to touch.
- The skin surrounding the rash may be dry and flaky.
- There will be hair loss in area of the infection.

DIAGNOSIS

Superficial scrapes of skin examined underneath a microscope may reveal the presence of a fungus **(KOH** test). The skin scrapings are placed on a slide and immersed on a dropful of **potassium hydroxide** (**KOH**) solution to dissolve the **Keratin** on the skin scraping thus leaving fungal elements such as hyphae or yeast cells viewable.
See Table: Diagnosis of Tinea Corporis

TREATMENT

1. Oral **terbinafine** 250 mg OD x 2-4 weeks
   (OR)
   Oral **Itraconazole** 100 mg OD x 15 days
   (OR)
   Oral **Griseofulvin** 500 mg OD x 4 weeks. (**Griseofulvin** may be teratogenic. Advise to female to **avoid pregnancy** during treatment and for one-month afterwards).
2. **Topical antifungal** is applied to the lesion twice a day for at **least 3 weeks**.
3. **Personal hygiene also required.**

Table: Diagnosis of Tinea Corporis

Tinea	Affects	Presentation	Differential diagnosed
Corporis (Ringworm)	• Trunk or limbs	• Single/multiple plagues with scaling at the edges.	• **Eczema** • **Psoriasis** • **Pityriasis rosea**.
Cruris (Jock itch)	• **Groin** • **Male > female** • **Common in athletes**	• Associate with Tinea pedis involve upper thigh (+scrotum).	• **Candidiasis**
Pedis (Athlete's foot)	• Feet. • Male > female. • Young > old.	• Itchy, maceration between Toes.	• Contact dermatitis.
Capitis	• Hair and scalp	• Defined, inflamed scaly areas ± **alopecia** with broken hair shafts.	Alopecia areata. Psoriasis. Eczema
Unguium	• Nails • Toenails > fingernails • High prevalence with age	• Begin at distal nail edge and progresses proximally to involve the whole nail. • **Tinea pedis** often coexists.	• **Psoriasis** • **Candidiasis**

INJECTION

DIFFERENT KINDS OF INJECTION

- Intra-Dermal injection = ID
- Sub-Cutaneous injection = SC
- Intra-Muscular injection = IM
- Intra-Venous injection = IV

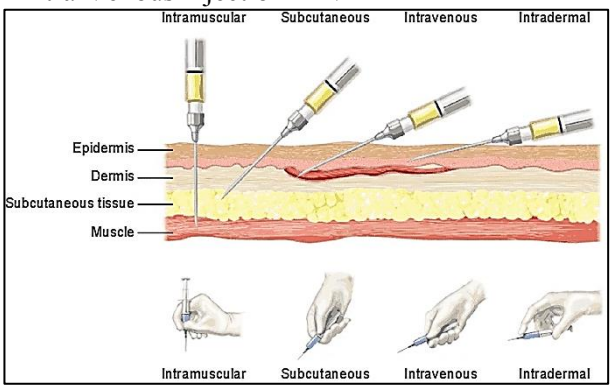


Figure: Types of Injections

When do you give an injection?

- Injection is given only when necessary. **That means:**
- When medicine cannot be taken by mouth.
- When the patient often vomits or cannot swallow.
- In case of emergency.

RISK OF ANY INJECTION

INJECTION

When you give an injection, the needle goes in the body. The needle can be a door for bacteria to go inside the body and to bring infection.

Take these precautions to prevent infection:

- Wash your hands with soap before giving an injection
- Never touch the needle with your fingers
- Always use unique sterile syringe and needle
- Never use the same needle and syringe 2 times:
  1 needle + 1 syringe =1 injection = 1 patient

MISTAKES

There are high risks for the patient if you choose:

- A wrong medicine
- A wrong dosage
- Wrong way of injection (ID,S/C, IM, IV)
- A wrong patient

In consequence, before you give injection, always check:

The prescription
The name of the patient
The name of the medicine
The dosage written on the vial
The dosage to give to the patient
The way of injection

ALLERGY

Some patients may have an unexpected reaction, called allergy, to a medicine.

Signs of allergy:

- Rash on the body: red spots, which appear suddenly, generally few minutes after injection.
- Swelling of the throat.
- Difficulties to breathe.

After an injection:

- Tell the patient to stay in IPD/OPD for 15 minutes after the injection.
- Watch the patient for signs of an allergic reaction
- If there is one of the signs: Stop the injection immediately and call the medic = EMERGENCY

INTRA-DERMAL INJECTION

An intra-dermal (ID) injection is done just under the skin for BCG vaccine.

Where do you do and ID injection?

- Usually in the upper arm.

How do you an ID injection?

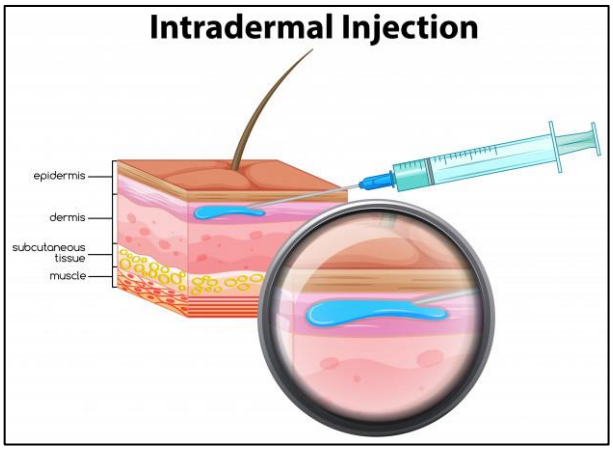
PREPARATION

1. Read carefully, the prescription to check the name of the patient, the name of the medicine, the dosage, the dilution, and the way of injection
2. Wash your hands with soap
3. Prepare the material: tray, syringe 1 ml, needle size 26G-½'', needle size 20G-1'', vial, cotton, boiled water, kidney dishes and needles dishes box
4. Check the name of medicine on the vial, the dosage written and expiry date
5. Open the vial
6. Take the syringe out of the plastic bag with asepsis
7. Adapt the needle 20G-1'' with asepsis
8. Aspirate the dosage of medicine off the syringe according to the prescription
9. Take the needle off and adapt the 26G needle-1/2'' with syringe
10. Remove the air from the syringe.

INJECTION

1. Inform the patient and check that it is the right patient
2. Settle the patient and look for the right place where you have to make the injection
3. Wash your hands with soap
4. Clean the skin of the upper part of the left arm with boiled water
5. Ask the mother to keep the child quiet
6. Hold the child's arm with your left hand. Your hand is under the arm, your thumb and your forefinger come around the arm and stretch the skin

7. With your right hand, take the syringe. Hold it parallel to the skin. Put the bevel (the oblique hole at the end of the needle) facing upwards
8. Insert needle just under the skin, at 15° angle to the skin.
9. Put the thumb of your left hand over the end of the syringe in order to hold it in position
10. Inject the medicine (BCG vaccine) slowly. A small bump will appear under the skin
11. Remove the needle
12. Wash your hands with soap
13. Tell the mother not to cover the arm just after the injection. Let it dry with air and do not massage it.



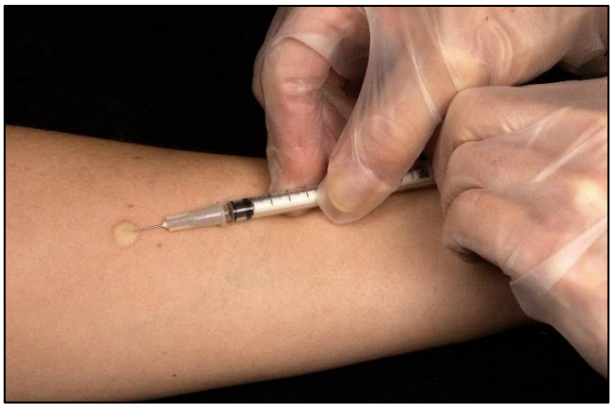


Figure Intradermal Injection

CAUTION:

- Do not push the needle too far under the skin
- Do not point it downward or the needle will go deeply: then the injection will be subcutaneous instead of intra- dermal

SUB-CUTANEOUS INJECTION

A sub-cutaneous (SC) injection is done in the sub-cutaneous tissue, between skin and muscle.

Where do you do an SC injection?

- In the upper arm : fatty tissue over the triceps
- In the anterior thigh (external parts): fatty tissue over the antero-lateral thigh
- In the belly

Note: The upper arm is the preferred site for SC immunization.

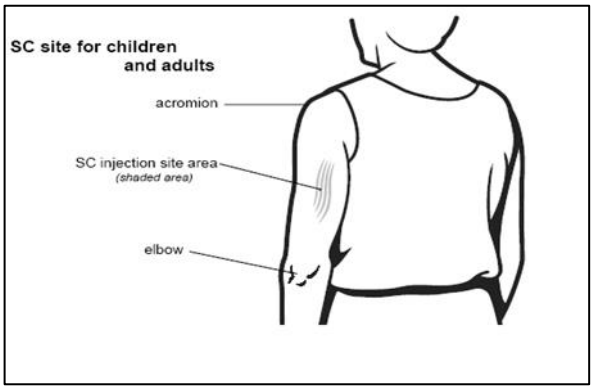
How to do an SC injection?

PREPARATION

1. Read carefully, the prescription to check the name of the patient, the name of the medicine, the dosage, the dilution, and the way of injection
2. Prepare the material: tray, syringe, needle size 20G-1'', needle size 26G-½'', vial, cotton, povidone iodine or alcohol, kidney dishes and needles dishes box
3. Check the name of medicine on the vial, the dosage written and expiry date
4. Wash your hands with soap
5. Disinfect the vial with alcohol or break the vial
6. Take the syringe out of the plastic bag with asepsis
7. Adapt the needle 20G-1'' with asepsis
8. Aspirate the dosage of medicine off the syringe according to the prescription
9. Take the needle off and adapt the 26G needle-1/2'' with syringe
10. Remove the air from the syringe

INJECTION

1. Inform the patient and check that it is the right patient
2. Settle the patient and look for the right place where you have to make the injection
3. Wash your hands with soap
4. Disinfect the skin
5. Pinch up on SC tissue between the thumb and forefinger to prevent injection into muscle, insert needle at 45° angle to the skin
6. Inject slowly and withdraw the needle
7. Disinfect the skin after the injection and make a pressure with cotton on the area. Avoid massaging.
8. Throw the needle away in the needle container
9. Throw everything else in the rubbish
10. Record the injection on the IPD chart or on the **lemma.**
11. Wash your hands with soap
12. The patient must stay for 15 min. in OPD/IPD to check absence of allergic reaction.



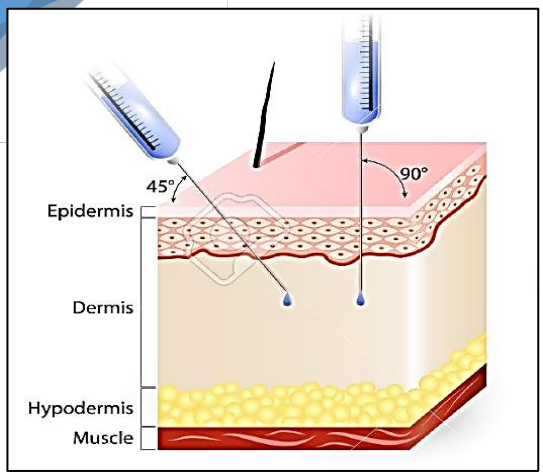


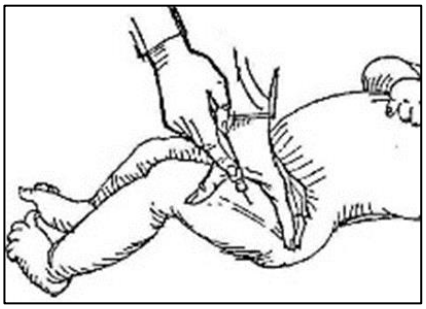
Figure: Sub-cutaneous Injection

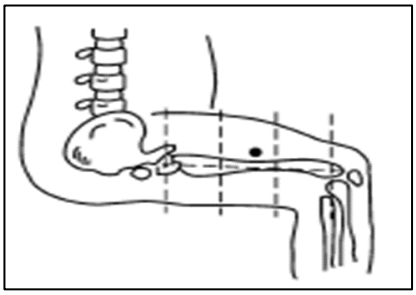
INTRA-MUSCULAR INJECTION

An intra-muscular (IM) injection is done inside the muscle.

Where do you do an IM injection?

For a child: in the upper outer part of the thigh





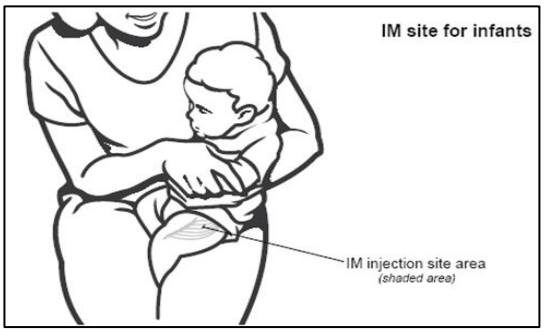
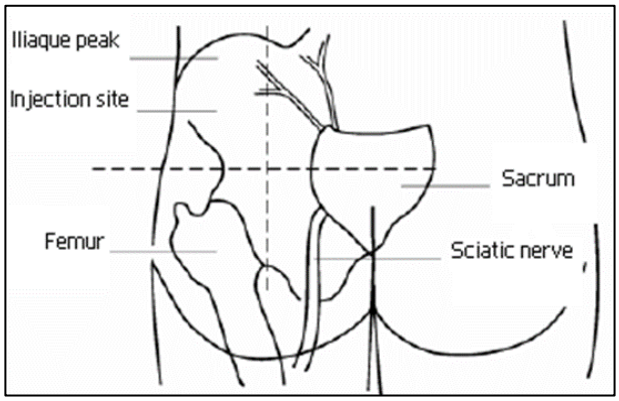
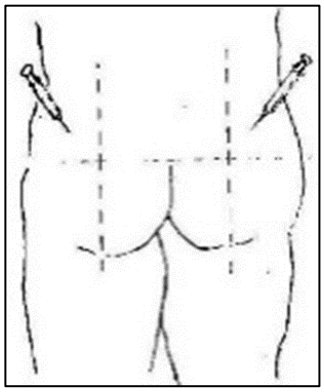


Figure: Position for IM immunization

For an adult

- In the upper outer quarter of the buttocks





- Or in the thickest portion of the deltoid muscle (above level of axilla and below acromion)

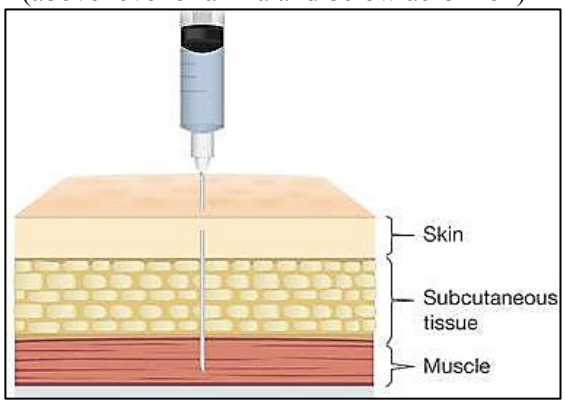
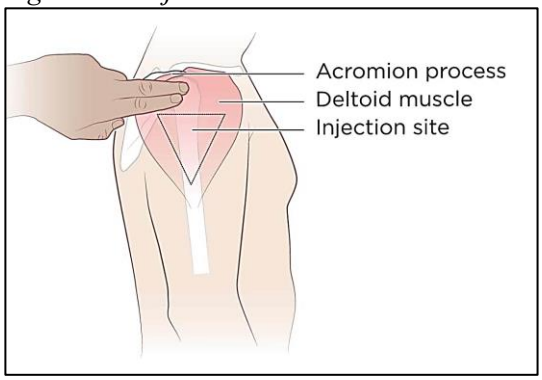


Figure: IM Injection



Safety rules

- IM injection must be done in a large muscle
- Do not inject into a blood vessel
- Do not inject into a large nerve
- Do not inject more than 2.5 to 5 ml in one time for adult
- Do not inject more than 1 to 2.5 ml in one time for children

How do you do an IM injection?

PREPARATION

1. Read carefully, the prescription to check the name of the patient, the name of the medicine, the dosage, the dilution, and the way of injection
2. Prepare the material: tray, syringe, needle size 20G-1'', IM needle size 24G-1'', cotton, non-sterile gloves, alcohol kidney dishes and needles dishes box
3. Calculate the volume needed from the vial
4. Wash your hands with soap
5. Check the name of medicine on the vial, the dosage written and expiry date
6. Disinfect the vial with alcohol, or break it
7. Take the syringe out of the plastic bag with asepsis
8. Adapt the needle 20G-1'' with asepsis
9. Aspirate the dosage of medicine off the syringe according to the prescription
10. Take the needle off and adapt the 24G needle-1'' (but **26G** needle- ½" for child under one year) with syringe.
11. Remove the air from the syringe.

INJECTION

1. Inform the patient about the procedure and check his identity
2. Settle the patient and look for the right place where you have to make the injection
3. Wash your hands with soap
4. Put the gloves
5. Disinfect the skin with alcohol
6. Stick the needle deeply into the muscle at 90°C angle while you are stretching the skin with the other hand
7. Check that the needle is not in a blood vessel: aspirate a little bit (if blood comes in, take the needle up a little bit)
8. Inject slowly all the medicine.
9. Withdraw the needle from the skin and throw the needle in the needle container
10. Disinfect the skin after the injection and make a pressure with cotton for a few minutes. Avoid massaging.
11. Throw everything else in the rubbish with your gloves
12. Record the injection on the IPD chart or on the lemma
13. Wash your hands with soap
14. The patient must stay for 15 min. in OPD/IPD to check there is no allergic reaction.

SPECIFIC RISK OF THE IM INJECTION

If the injection is done too much in the center of the buttock, there is risk to touch the sciatic nerve of the patient. This is very dangerous. The patient may become paralyzed.

INTRA-VEINOUS INJECTION

IV injection is done into the vein, usually in the forearm.

Difference between an artery and a vein

Artery: - Big vessel
- Deep vessel
- You can feel the pulse in an artery

Vein: - Small and superficial vessel
- You cannot feel the pulse in a vein

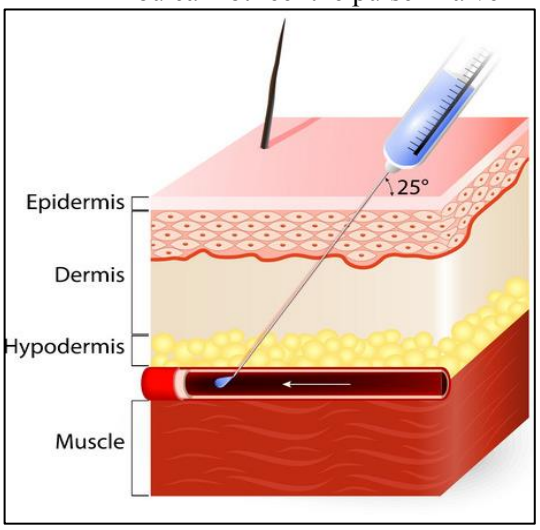


Figure: IV Injection

When do you do an IV injection?

It could be for a usual treatment or in emergency. The action of the medicine begins immediately. It is faster than an IM injection.

How do you do an IV injection?

PREPARATION

1. Read carefully, the prescription to check the name of the patient, the name of the medicine, the dosage, the dilution, and the way of injection
2. Wash your hands with soap
3. Prepare the material: tray, syringe, needle size 20G-1'', needle size 22 or 24G-1'', vial, cotton, alcohol, tourniquet, non-sterile gloves, kidney dishes and needles dishes box
4. Check the name of medicine on the vial, the dosage written and expiry date
5. Disinfect the vial with alcohol before breaking it, or disinfect the plastic cover
6. Take the syringe out of the plastic bag with asepsis
7. Adapt the needle 20G-1'' with asepsis
8. Aspirate the dosage of medicine off the syringe according to the prescription
9. Take the needle off and adapt the IV needle with syringe (according to the age of the patient)
10. Remove the air from the syringe.

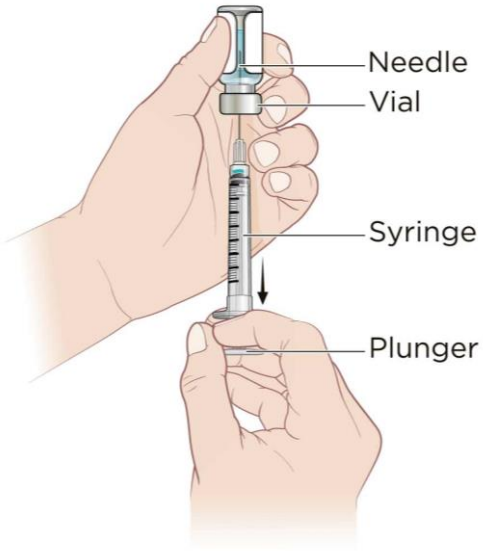


Figure Needle and Viral Holding Technique

INJECTION

1. Inform the patient and check that it is the right patient
2. Settle the patient and put the arm in a good position. Look for the right place to make the injection
3. Wash your hands with soap
4. Put the gloves
5. Put on the tourniquet and disinfect the skin
6. Hold the arm with your left hand and stretch the skin. With your right hand, take the syringe. Hold it parallel to the skin. Put the bevel (the oblique hole at the end of the needle) facing upwards. Immobilize the vein and prick the needle into the vein.
7. Check the blood is coming and remove the tourniquet
8. Inject the medicine very slowly.
9. During the injection check if the needle is still in the vein
10. After the injection, press cotton wool over the injection site for 2 minutes. Ask the patient to do this if possible
11. Throw the needle in the needle container
12. Throw everything else in the rubbish and take off your gloves
13. Wash your hands with soap
14. Record the injection on the IPD chart or on the lema.
15. The patient must stay for 15 min. in OPD/IPD to check there is no allergic reaction.

INFUSION

An infusion is a plastic cannula (with different sizes) placed in a vein, that we connect to a giving set and a bottle of hydration. Usually the infusion is placed in the arm or on the hand. For babies, sometimes, veins are found on the foot or on the head.

When do you place an infusion?

- When a patient cannot drink or eat (e.g. coma)
- When a patient loses a lot of liquid (e.g. loss of water caused by diarrhea/vomiting, loss of blood caused by hemorrhage).
- When an IV treatment is needed
- When a faster effect from medicine is needed.

Which kind of hydration exists?

1. **D5W / D5 ½ S / D10W**
   D = Dextrose (or sugar)
   5 or 10 = 5% or 10% (= 5 g or 10 g of dextrose for 100 ml of sterile water)
   W = Water
   S = NaCL
   Indication: - Vehicle for the administration of medicines
2. **NSS** (Normal Saline 0.9%)
   Indication:
   Vehicle for administration of drugs
   Correction of hypovolaemia
3. **Ringer lactate**
   Indication:
   Severe dehydration, hypovolemia
4. **Plasma**
   Indication:
   Severe dehydration, hypovolemia.

How do you place an infusion?

PREPARATION

1. Read carefully, the prescription to check the name of the patient, the name of the solution or medicine, the dosage, the transparency of the liquid and check the way to give it.
2. Wash your hands with soap
3. Prepare the material: tray, sterile gauze or cotton, infusion cannula (20 or 22G for adult, 22 or 24G for child), giving set , bottle of infusion, povidone iodine or alcohol 70%, tourniquet, pieces of plaster, non-sterile gloves, kidney dishes, needles container, tin, and splint (if it's a child).
4. Check the name of solution, the dosage written and expiry date
5. Remove the plastic cover and wipe the top of the bottle/vial with cotton and antiseptic.
6. Close the clamp, connect a bottle of infusion to the giving set, fill the dropper and purge the system with the fluid. There must not be any air or any bubbles
7. Calculate the rate of flow of the infusion per minute
8. Write the hour, name and the dosage of the medicine, number of drops per minute and the length of the infusion on the bottle.
9. Put the infusion on a tray with all the material or directly on the stand

Figure Examples of infusion bottles

PLACE THE INFUSION

1. Inform the patient and check that it is the right patient
2. Settle the patient and put the arm in a good position. Look for the easier arm (for the patient) to place the injection
3. Wash your hands with soap
4. Put the tourniquet and look at the veins.
5. Always find a place from the hands to the elbow. Try first closed to the hand where the veins are good. If they are damaged, you go back up to the elbow. Try to avoid the elbow because the infusion does not work when the patient bends the arm.
6. Put your gloves
7. Disinfect the skin where you see and feel a straight vein
8. Hold the arm with your left hand and stretch the skin. With your right hand, take the IV cannula. Hold it parallel to the skin. Put the bevel (the oblique hole at the end of the needle) facing upwards. Immobilize the vein and prick the needle into the vein.
9. Check the blood is coming take out needle put it in the needle container and remove the tourniquet
10. Connect the drip set with asepsis
11. NB: In some situations, there is no need to pass liquid, but the infusion has to be kept in case of needs. Nurse should insert an heparin cap in the infusion cannula, then rinse (with about 2 ml of NSS) and closed the bandage.
12. Throw the needle in the needle container
13. Open the drip system.
    At this moment, if there is a swelling closed to the cannula, if it is painful or if the solution does not flow, you have to change the cannula.
14. Attach the cannula catheter with plaster correctly
15. With your watch, adapt the number of drops of the infusion on one minute (Cf. Calculation of usual flows in Appendix)
16. Fix the splint under the arm (if a child)
17. Throw everything else in the rubbish with your gloves
18. Wash your hands with soap
19. Record the infusion bottle on the IPD chart or **on the lemma**.
20. The patient must inform the nurse if there is any incident with the infusion.

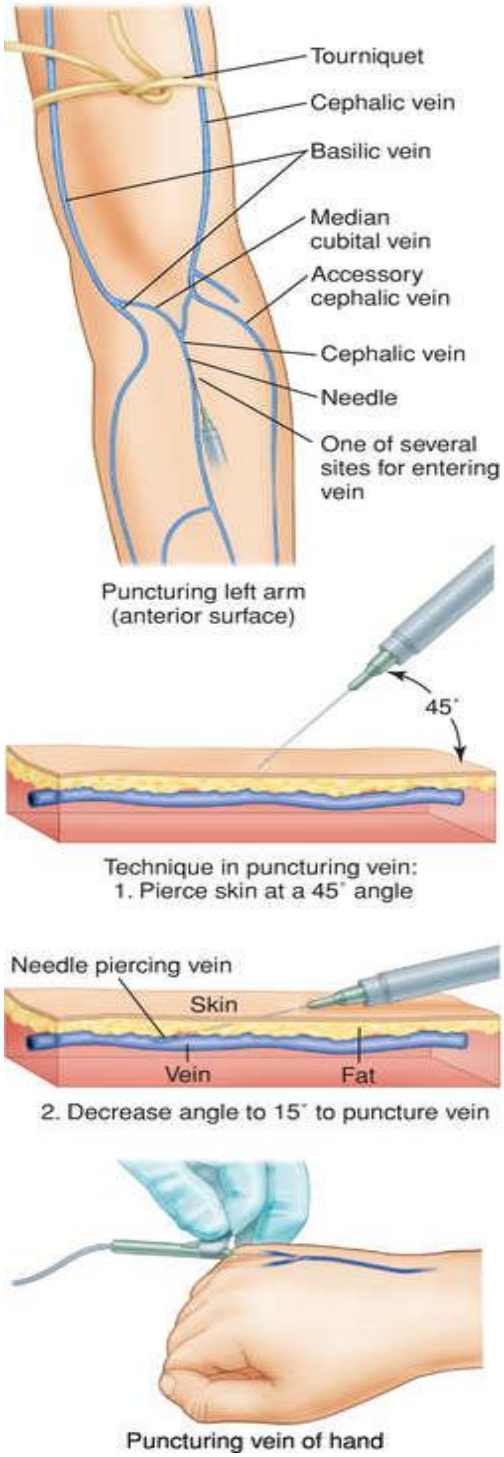


Figure Body place of infusion

The infusion set must be changing every 7 days. Write the date on a plaster and stick it on the set.

How to add a medicine?

In the bottle:

- Disinfect the top of the bottle
- Clamp on the giving set
- Inject the medicine in the top of the bottle.

You always rinse the giving set first, and then inject the medicine.

To do a direct injection:

- Check if the blood is coming to know if you are really in the vein
- Disinfect the plastic part of the tube
- Close the tube
- Prick in the plastic part and inject slowly
- Check the patient is well
- Quickly removes the needle
- Disinfect the plastic part again.

How to calculate the rate of flow of infusion?

The prescription of an infusion will be always being in:

a volume per a time in milliliter per hour usually 100, 250, 500, 1000, 1500, 2000 … ml per 4, 8, 12, 24 hours … for instance

The nurse should precisely respect the prescription of a volume in a strict time. The nurse should know the flow of the infusion. The dropper on the giving set could precisely calculate the flow. The number of drops per minute will be the reference for the respect of the time prescribed. Thus, from a prescription in milliliter per hour, the nurse follows the infusion flow in drop per minute. The number of drop per minute has to be calculated.

Prescription of number of milliliter per hour ➔ Calculation of how many drop per minute

First, REMEMBER AND BE CAREFUL

➔ With an adult infusion set, 1 ml = **20** drops

➔ With the paediatric infusion set, 1 ml = **60** drops

If the prescription is: '500 ml to pass in 4 hours'

You need to know:

A. How many drops in the volume prescribed?

1 ml = 20 drops 500 ml = ? drops ↔ 500 ml x 20 drops = 10 000 drops So: 500 ml = **10 000 drops**

B. How many minutes in the time allowed?

1 hour = 60 minutes 4 hours = ? minutes ↔ 4 hours x 60 minutes = 240 minutes So: 4 hours = **240 minutes**

C. How many drops per minute?

10000/ 240 = 41.66 = **42 drops**

In summary, remember:

$$\frac{Quantity\ needed\ (ml)\ \times 20\ dps}{Time\ request\ (hrs) \times 60\ min} = No.of dps/1min$$

RISK OF INJECTION

Infection

It could be particularly severe if a patient gets a septicemia (infection of blood) : Risk of shock and death.

If a patient has fever, low BP, or shivering, after an IV drip, always think that it could be an aseptic mistake due to IV drip.

Overdose

Too much liquid per day in too short time or too high dose of medicine may be dangerous for the patient, especially for children.

Too much liquid in too short time

If the flow is higher than required, there is a risk of acute pulmonary oedema due to hypervolemia (too much liquid).

Signs of pulmonary oedema:

- High blood pressure
- Difficulties to breathe: RR increases
- Crept in the lungs
- Noisy breathing
- Cyanosis
- Flaring nose
- Foam from the mouth

Too much medicine in too short time

Ex: the medic prescribes Quinine in 500ml of D10W for 4 hours. The drip passes too quickly, and the patient receives more quinine than prescribed. The risk of quinine in high dosage is hypoglycemia. Patient is thus at risk of quinine-overdosage and risk of hypoglycaemia. It can be dangerous.

Too low flow

The patient may need an important quantity of liquid in a short time (e.g., dehydration or shock). If the flow is too slow, the patient does not receive enough liquid and it may be very dangerous. Some medicines are as well no more effective after a certain amount of hours.

Air in the vein

There is a risk of death by air embolism if air goes into the blood.

Allergy

Hereunder are the signs of an allergy:

- Rash
- Swelling of the throat
- Difficulties to breathe
- Low BP ➔ Stop the infusion immediately and call the medic: It is an emergency.

RECOMMENDATIONS

Asepsis

You must work aseptically because of infection risk. That is why the whole system of infusion is

completely changed every 3 days and the bandage every day.

Never let air go inside the vein.
As soon as the bottle is empty, clamp the giving set and put on another bottle, which you prepare just before. Then open the giving set and count again the number of drops necessary.

Daily check:
- The position of the needle inside the vein
- The liquid is dripping into the vein
- There is not swelling, pain or inflammation around the cannula catheter. Otherwise, that means the infusion is not working and that the liquid is going outside of the vein.
- In this last case, remove the infusion and put it on the other arm. Put a dressing with warm water and alcohol on the swollen part.
- Check that the patient has no oedema on the face and legs.

MEDICAL PRESCRIPTION

There are different kinds of medicine for different kinds of disease. Medicine can be very useful but may also be dangerous if not used properly.

THE DIFFERENT WAYS TO GIVE MEDICINE

- Oral
- Intra-vaginal
- Intra-rectal
- External
- Intra-dermal
- Sub- cutaneous
- Intra-venous
- Intra-muscular

WHAT IS A DOSAGE?

A dosage is the quantity of active product of a medicine. The dosage is written on the box and on the vial. For each prescription of drug by a medic, the dosage is clearly indicated.

If we exceed the dosage, the medicine may be dangerous.
If we don't give enough, the medicine doesn't work properly and may not kill all the germs.

WHAT IS AN EXPIRY DATE?

The expiry date is the date after which the medicine cannot be used. After this date, the medicine is not active anymore and thus may be dangerous for the patient.
The expiry date is written on the packing box of the medicine.

INTERPRETATION OF PRESCRIPTION

Sometimes, some medicine need to be given at a precise hour (ex: ALU)
The medical prescription is expected as following:
- Names of prescript drugs have to be written in CAPITALS.
- The drug's name will be reported in its whole (i.e. PARACETAMOL)
- The doses, the number of takes and the duration have to be reported (i.e. AMOXICILLINE one 250 mg tablet, OD, each 24 hours, for 7 days)

PRECAUTIONS FOR ADMINISTRATION: THE "5 rights"

Always remind these 5 questions before giving a medicine to a patient.
- Is this the right patient?
- Is this the right medicine?
- Is this the right amount of medicine?
- Is this the right time to give medicine?
- Is this the right way to give the medicine?

Table: Interpretation of prescription

Prescription	How many times per day?	How many hours between the doses?	When do you give it?
STAT	1 time immediately	Only one dose	
OD	1 time/day	Every 24 hours	Morning (6 am)
BID	2 times/day	Every 12 hours	Morning (6 am) Evening (6 pm)
TID	3 times/day	Every 8 hours	Morning (6 am) Afternoon (2 pm) Evening (10 pm)
QID	4 times/day	Every 6 hours	Morning (6 am) Midday (12 am) Evening (6 pm) Night (12 pm)
PRN	When necessary		

MEDICINE ADMINISTRATION IN IPD

- Look at the prescription carefully. If the prescription doesn't follow the procedure (capitals, complete name, doses, number of takes and duration) or if it's not clear, ask the medic to correct.
- Check the vital signs before you give the treatment
- For baby or patient who cannot swallow very well: crush the tablet with a little of sugar and water.
- Give medicine before breastfeeding and when the baby/child is quiet.
- Never leave the medicine on the chart. Watch the patient swallow it in front of you and check that he doesn't vomit.
- Write on the IPD chart what and when the patient received it.
- For some drugs, it's better to give the medicine when the patient is eating. (Otherwise, there is risk of gastritis).

MEDICINE ADMINISTRATION IN OPD

- Look at the prescription carefully. If the prescription doesn't follow the procedure or if it's not clear, ask the medic.
- Prepare one bag for each kind of medicine
- Write the name of the medicine and the prescription on the bag
- Explain to the patient what the medicine is, when he/she has to take it, and what the main side effects are.
- Check that the patient understands well
- Register in the OPD consumption book

Figure for Specific cancers: Signs and symptoms

	Signs and Symptoms
Oesophageal/Mouth Cancer	Difficulty swallowing, initially to solids but then to liquids, may see mass in mouth, history of betel nut chewing
Lung Cancer	Prolonged cough, haemoptysis, clubbing, history of smoking
Stomach Cancer	Epigastric pain, vomit with blood, melaena, large lymph node above the left clavicle
Bowel Cancer	Change in bowel habit especially in elderly, blood in stool
Bone Cancer	Feel mass on bone, chronic bone pain, unable to straighten joint, limp
Blood Cancer	Large lymph nodes, frequent infections, night sweats
Brain Tumour	Headache, signs of raised intracranial pressure, change in personality/function
Pancreatic/Gallbladder Cancer	Jaundice with no abdominal pain, may have epigastric mass
Liver Cancer	Jaundice, history of hepatitis B/C or cirrhosis

DEFINITION

Cancer is a tumour caused by abnormal very fast growth of cells in the body. The cells can spread to other parts of the body. Sometimes cancers can have non-specific symptoms e.g. weight loss and lethargy, but other times there can be more specific signs and symptoms for each cancer.

Oncology is the treatment of cancer. Treatment is sometimes surgery (to remove a very large mass), chemotherapy (drugs to kill the cancer cells) and radiotherapy (radiation beams to kill the cancer cells). Treatment will not work for all cancers, especially more advanced cancers.

Palliative care is the management of a patient who is near to the end of their life and there is no treatment available to cure them e.g. advanced cancer, very severe COPD, rabies with symptoms. It is necessary to make sure patients have control of their symptoms and have a peaceful end to their life.

ONCOLOGY

SIGNS AND SYMPTOMS

All cancers can cause weight loss. In addition, there are specific symptoms that you should be aware of that may make you think of cancer as a diagnosis:

DIAGNOSIS AND TREATMENT

There are limited resources available to investigate cancer, and the diagnosis at SMRU clinics is often clinical. Actually, diagnosis needs biopsy and intensive investigation. Ultrasound may be helpful to look for a mass e.g. in the abdomen (but can be difficult), and an X-ray may help to find some cancers.

If you suspect cancer, then you must refer for further investigation and treatment or send home with palliative treatment and follow up.

If you suspect cancer, then you must refer for further investigation and treatment or send home with palliative treatment and follow up.

PALLIATIVE CARE

TREATMENT

Care can be divided into palliative medical care, psychological support for the patient, and psychological support for the family/care givers.

1. Palliative medical care

- Teach the family when and how to give pain relief/other medications
- Drugs and materials are needed e.g. provide gloves or materials for dressings.

General Care:

(1) **Oral care** uses soft toothbrush, or rinse mouth with diluted salt water after eating.

(2) **Prevent bedsores** by moving patient every 1-2 hours, use cushions to keep position.

(3) **Prevent pain, stiffness and contractures** in muscles and joints by gently moving and massaging limbs.

Symptoms Treatment

Educate the family to look out for symptoms e.g. pain, constipation, vomiting etc. and when to ask for help. This is how to treat some of the common symptoms:

Palliative treatment for specific symptoms

Anorexia**:**
Prednisolone 5-15mg OD in the morning to increase appetite, stop if no help after 2 weeks.
Anxiety**:**
Diazepam 2.5-5mg at night or BID (not more than 2 weeks).
Chronic Diarrhoea**:**
Loperamide 4mg once then 2mg per loose stool (max 16mg/d) or opioids (like codeine) (if available)10mg TID (max 60mg every 4hrs)
Constipation**:**
Increase **oral fluids**, eat **high fibre foods** e.g. fruit and vegetables, use laxatives if available
Emotional support**:**
Physical methods e.g. touching (stroking, massage), ice/heat, deep breathing Cognitive methods e.g. distraction with radio, music, imagining pleasant scene, prayer
Dehydration**:**
Dehydration may decrease drug excretion from the body and so increase drug side effects, like hallucinations or myoclonic jerks. This is particularly true for morphine. Try to stop unnecessary medication or decrease the dose while maintaining symptom control. Can give extra fluids for a short period of time for strong adverse effects.
Delirium/ confusion:
Mild agitation: Diazepam 5-10mg OD to TID Severe delirium: Haloperidol 1.5-5mg up to TID until improved or Chlorpromazine 25-50mg PO/PR TID (if available). Add **Diazepam** as above, but do not use Diazepam alone for severe delirium because it might make confusion worse.
Insomnia:
Diazepam 5-10 mg HS, use only prn and do not use for chronic insomnia.
Itching:
Chlorpheniramine 4mg QID (max 24mg/day). Assess for cause.
Mouth ulcers:
Prednisolone crush a 5mg tablet and apply a few grains on to ulcer.
Muscle Spasm:
Buscopan 10mg TID (max 20mg QID).
Nausea/Vomiting:
Metoclopramide 10 mg TID.
Oral/Oesophageal Thrush:
Nystatin 1 tablet to be sucked QID for 7 days or 1ml of oral suspension (100,000 IU) QID for 7 days (total 400,000 IU per day) to swish and swallow.
Pain:
Make a plan for adequate pain relief. If not better, try different pain medications to see what helps the patient. Encourage other methods for pain control.
Urinary incontinence:
Male: use plastic drinks bottle over penis Females: cotton cloth pads or plastic pants, wash and dry between use.

2. **Psychological support for the patient**
   - Be honest about the outcome of the illness and treatment.
   - Respect the patient, even if there is social stigma surrounding their illness.
   - Be aware of the psychological and spiritual aspects of patient care e.g. allowing relatives and close personal friends access to the patient.
   - Feelings of sadness, anger, fear, anxiety, regret, psychological stress are common. Medication does not make these feelings go away, be open and listen in a non-judgmental way to the patient's concerns.
   - Confidentiality is the key to setting up a good relationship with the patient and family.

3. **Psychological support for the care givers/family**
   - Support the family during the patient's illness, e.g. provide gloves or materials for dressings. Ask a home visitor to support the patient and/or the family at home.
   - Explain to the family how to give the medical and psychological support to the patient
   - Encourage help from community members, particularly neighbors, to give the main caregiver some help and give them some time to relax, even if it is only for a few hours. This allows the caregiver to enjoy some of the things they like doing such as attending a prayer service or sports that is helpful for them during this difficult time.

Note: Palliative care can also be a very difficult subject for staff members, if you are upset then remember you can talk to your colleagues who have been through similar experiences.

Refer oncological emergencies in Emergency Medicine Chapter.

Palliative Medical and Surgical care may be required.

MENTAL HEALTH AND SUBSTANCE ABUSE

MENTAL HEALTH

Many psychiatric diseases do not have clear signs and symptoms. Alcohol abuse, for example, may be a symptom of depression, anxiety, or trauma (post-traumatic stress disorder/**PTSD**).

Disorders of mental health (mood, thinking and behavior) may be due to a psychiatric diagnosis, a personality disorder or caused by physical disorders. Before you diagnose a mental health problem, you should **exclude underlying physical diseases** and **assess for drug or substance abuse**. For example, **hyperthyroidism** may present as anxiety, or a hypoglycaemia patient may be agitated. When diagnosing a mental health problem, you should always get a detailed medical history.
Also, sometimes mental illness can cause **physical symptoms**, called '**psychosomatic symptoms.**'

- These occur if a person cannot manage increased levels of mental stress.
- Physical symptoms can be seen in depression, bipolar, anxiety and PTSD, and psychosis.
- If the patient cannot manage high stress levels, the body will develop a physical symptom such as headache, abdominal pain, numbness, dizziness, fainting, or even paralysis.
- Sometimes the patient can discuss physical symptoms more easily than the stress (e.g., family problem).
- It is not possible to fix the physical symptom. You must treat the stress and mental problem.

Many mental health problems should not be treated with medication alone. **Drugs should be combined with counselling.**
During pregnancy and breastfeeding, mental health medication should be lowered to the lowest effective dose and the benefits and risks of the medications should be discussed with a doctor if possible.

The following are the more common psychiatric disorders.

MOOD DISORDERS

DEFINITION

There are two types of mood disorders:

1. **Depressive disorder.**
2. **Bipolar disorder (manic depressive disorder).**

DIAGNOSIS

1. **Depressive disorder**
   - There are no manic episodes.
   - Have one or more depressive episode.
2. **Bipolar disorder.**
   - Have at least one ***manic episode*** and one or more ***depressive episodes.***

For depressive episode*: Must have **≥5 of these symptoms and at least 1 of the bold symptoms**. Symptoms must be present at least 2 weeks before you can diagnose a depressive episode.

- **Feeling sad most of the time.**
- **Low interest or pleasure to do normal activities most of the time.**
- Cannot sleep (insomnia).
- Weight loss or no appetite.
- Low energy or fatigue.
- Feel guilty or not competent.
- Loss of concentration.
- Suicidal thoughts or activities

*A depressive episode can also cause low **level of psychomotor activity:** the patient may look sad, not laugh, not want to talk, or want to be alone.

For manic episode: Must have **≥3 of these symptoms**. Symptoms must be present for at least 1 week before you can diagnose a manic episode.

- Extreme feelings of competence (feel like they can do anything).
- Less need for sleep.
- Talking very quickly
- Vivid thoughts (clear ideas).
- Easily excited.
- Increased activity (social, sexual).
- Seeks out pleasurable/fun activities.

Try to find a **trigger event** e.g., death of family member, rape, accident, or new diagnosis like HIV.

TREATMENT

Non-medication treatment options:

- Counselling.
- Encourage the patient to keep active, get up at regular times and do plenty of physical exercise.

Medication treatment options:

1. **Depressive disorder**
   1st Line: Selective Serotonin Reuptake Inhibitor (SSRI):
   e.g., **Fluoxetine** (1 tablet = 20mg) normal dose 40 - 60 mg OD OR
   Sertraline (1 tablet = 50 mg), normal dose is 100 - 200 mg OD.
   - Start at 1 tablet/day and wait least 1 week before increasing these medicines. This treatment must be continued **for 6 months.**
   - **Side effects:** Weight gain, nausea, sweating, and occasional mild neurological signs such as tingling in the fingers.

- It can take 6-8 weeks for this drug to take full effect, but the side effects appear in the first week of treatment. This must be explained carefully to the patient.
- **Note: in the first few weeks of SSRI treatment the patient may feel worse and suicide risk is increased, explain this to the patient and the family.**

2nd Line: Tricyclic antidepressant (TCA) (Use if you do not have an SSRI, or if the SSRI is not effective after 8 weeks)
e.g., **Amitriptyline** normal dose is between 75 - 150 mg OD at night.

- **Side effects:** Sedation, urinary retention, blurred vision, tachycardia, orthostatic hypotension (drop in BP when stand up), agitation, confusion, dangerous in deliberate overdose.
- **Avoid** in patients with cardiac disease, history of seizures, hyperthyroidism, narrow-angle glaucoma and urinary retention.
- **Note: do not give large amounts of TCAs to a patient undergoing unsupervised treatment. Taking an overdose of this medicine can cause death.**

MANAGEMENT OF DEPRESSION

1. After starting treatment follow the patient every 1-2 weeks for 1 month, only give enough treatment for 1 week each time.
2. Tell the patient that it is **dangerous to stop anti-depressants suddenly** – if stop slowly decrease dose of medications over 1-4 weeks.
3. If no effect in 6-8 weeks, consider increasing the dose or switching medicine. (Remember to slowly decrease dose before switching).
4. If the medications are not effective, refer the patient to a hospital where mental health care is provided.

Women are at risk for depression in the first few months postpartum – sometimes so severe they become psychotic, commit suicide, or kill their infant. In these cases, think about the mother and baby's safety: use all counselling, family support and medications necessary.

2. Bipolar disorder

- Bipolar disorder is difficult to control, and these patients are at higher risk for suicide. It is best for these patients to be managed by psychiatric specialists, and acute mania may require hospitalization.
- If that is not possible, patients with a manic episode can be treated with **carbamazepine** 200 mg BID and increase as needed, max 1200 mg/day. This can be continued to prevent future manic episodes.
- For severe episodes with agitation, patients can be treated as **acute psychosis**.
- For a patient with a history of both severe depression and mania, carbamazepine can be given together with an SSRI.
- Carbamazepine can affect the platelets, red blood cells, kidneys, and liver, if possible, check **CBC**, **LFT** and **renal function** every 3-6 months.

Note: if available, **lithium** is inexpensive and may be more effective. Start with 300 mg, normal dose 600-900mg, check thyroid and kidney function every 3-6 months. It also has a small therapeutic window – check lithium levels frequently for overdose. Lithium should not be prescribed if the drug supply is not regular. Low adherence or stopping lithium treatment suddenly may increase the risk of relapse.

MANAGEMENT OF BIPOLAR DISORDER

Important points:

1. If depression in bipolar disease NEVER prescribe antidepressants without also prescribing a mood stabilizer, e.g., carbamazepine. Mono therapy with antidepressant can cause manic symptoms.
2. If manic episode and patient is on antidepressants: DISCONTINUE antidepressants to prevent further risk of mania.
3. Patients with mania are at high risk of developing depression after a manic episode.
4. Pregnant women should not receive carbamazepine, valproic acid or lithium due to the risk of birth defects.

ANXIETY DISORDERS

DEFINITION

Anxiety or mental stress often occurs when we are frightened or worried. Anxiety disorders are defined when a sense of fear or worry makes it hard for someone to do normal activities of life (e.g., completing schoolwork or caring for children) or when anxiety is persistent. When feeling anxiety or stress, the heart usually starts beating faster, reactions are quicker, and we are more alert. Headaches and sweating are common. This is the body's normal reaction to stress, but problems occur when levels of stress are too high, or they are unable to be relieved.

- When these symptoms become chronic the patient may have an anxiety disorder. More severe symptoms from unrelieved anxiety can include sleeplessness, heart palpitations, depression, violence, withdrawal, and psychosomatic complaints.
- An acute anxiety attack is an acute episode of severe anxiety with severe psychosomatic symptoms: patients may have chest pain,

difficulty breathing, palpitations, dizziness, and fear that they are going to die.

TREATMENT

Always look for an underlying mental disorder (depression, PTSD, or psychosis) and give specific treatment.

Acute anxiety attack:

- Try to calm down the patient by talking and listening carefully and reassuring.
- Encourage deep breathing and put them in a quiet private place.
- Consider **diazepam** PO only in severe acute anxiety attacks.
- Use counselling techniques.

Non-medication treatment options:

- **Cognitive behavioral therapy.** This should be carried out by trained health workers. This form of therapy has a lot of similarities with counselling

Treatment by medication:

- For long-term treatment antidepressants **(SSRIs or amitriptyline)** can work well.
- Beta blockers e.g., **propranolol** 40mg OD (increase to TID if necessary) can help with anxiety symptoms of racing heart especially if also have high BP or if tremor/palpitations are the main symptoms. Monitor BP and PR.
- For an acute anxiety attack you can use **diazepam** (5-15 mg PO in 2-3 divided doses for a maximum of 1-2 weeks and reduce dose by half in last few days of treatment) to lower the anxiety.

Diazepam medicine is very addictive: only use it if the patient's anxiety cannot be controlled through counselling.

POST TRAUMATIC STRESS DISORDER

DEFINITION

Post-traumatic stress disorder (PTSD) is a condition that occurs as a response to severe and prolonged fear.

- Continual high levels of anxiety that cause problems in the patient's life (e.g., not leave house because afraid).
- This disorder is common after violent situations or escaped from life-threatening situations.

CAUSES

1. Life threatening violence, either a single event or over a long period of time.
2. Violence experienced either directly by the patient or seen by the patient to have happened to somebody else.
3. Escaping from possible violence, or afraid of capture.

SIGNS AND SYMPTOMS

- **Persistent re-experiencing:** images, thoughts or perceptions about the traumatic experience which intrude despite efforts to block them out (the patient tries not to think about it but cannot). It may include distressing dreams and flashbacks (reliving the experience).
- **Avoidance:** patient avoids places, situations, people associated with the trauma, may use alcohol, drugs to help do this.
- **Increased arousal**: constant state of alert, exaggerated startle response (very easily scared), anxiety, insomnia, poor concentration, may have somatic symptoms e.g., high BP, sweating, shaking, tachycardia, headache etc.

TREATMENT

Non-medication treatment options:

- **Counselling**.
- Relaxation therapy.
- 'Survivors of violence' need to feel safe and secure in their environment.
- **Empathy:** listen and accept what the person is saying. Ask how they feel about the incident, express your support.
- Talk and listen, ask the patient about the history of their problems. For example, when was the first time they felt the headaches, or could not sleep? What things were happening in their lives around that time? Try to locate a probable cause for their symptoms.
- Try to listen to the patient's problems. Do not to judge them based upon their stories, express that you are interested in what they have to say and try to let them express themselves. Above all, let the patient know they are not alone and that you understand the reasons for their stress.
- Group counselling may be helpful – if the patient interacts with others who have had similar experiences, they may feel less alone.

Treatment options by medication

- Consider antidepressants: **SSRIs or amitriptyline** are usually helpful.
- When the patient is suffering from nightmares, a low dose of **haloperidol** (0.5-2mg BID or TID or at night) could be very helpful. Because of possible side effects, use the lowest effective dose and stop if no improvement.
- For other sleeping disturbances, you can use benzodiazepines (e.g., **diazepam** PO 5 mg). However, diazepam is an extremely addictive medicine, so diazepam should not be prescribed for more than 1-2 weeks. **Note:** Long-term treatment with diazepam after a traumatic event can have a negative effect on adaptation, leading to higher rates of **PTSD.**

PSYCHOSIS

DEFINITION

A severe form of mental illness: the patient is unable to distinguish between the real world and the world of their hallucinations and delusions.

Psychosis vs. Neurosis

Specifications	Psychosis	Neurosis
Genetic factors	More important	Less important
Stressful life events	More	Less
Behavior	Severely affected	Not affected
Thinking and perception	Disturbed	Not disturbed
Judgment	Impaired	Intact
Insight	Lost	Present
Drugs	Major tranquilizers	Minor tranquilizers
ECT	Very useful	Not needed
Prognosis	Bad	Good

Hallucinations: **The experience of hearing, seeing, smelling, and even feeling things that are not there** e.g., the patient may hear voices talking to them though there is no-one around them, or see things that are not there. It is important to realize that the patient does not imagine these sensations; these are real experiences for them and can be very frightening.

Delusions: **Fixed false beliefs that are not shared by other members of the person's culture or society**. Ideas that seem strange and bizarre, such as having powers that others do not possess e.g., the patient may say they can read peoples' minds, or say they are from another planet. Delusions are generally so strange that many peoples' first reaction is to laugh. However, in delusions these ideas are fixed, this means that to the patient these beliefs are completely true.

- Due to the extreme nature of hallucinations and delusions, patients are often unable to care for themselves and are likely to be disruptive in the community. Unfortunately, very often people with psychosis may be regarded as "fools" and not considered worthy of medical help. However, with proper medical intervention, psychotic patients can get better.
- Acutely psychotic patients are difficult to talk to, as they are not able to understand what is happening around them. However, medical staff should make attempts to let the patient know where they are and what is happening to them such as telling them that they are in the clinic and that they will receive treatment.

DIAGNOSIS

You may need to get a history from a family member, is this the first time this has happened? It is important to distinguish medical causes of confusion e.g., infections in elderly, steroid induced psychosis, substance abuse, hypoglycaemia.

TREATMENT

Refer to Psychiatric Physician or hospital with Psychiatric OPD after counselling.

Non-medication treatment options

Counselling

- Explain to the patient and family that the symptoms are caused by a mental health condition, that it can be treated, and the patient can recover.
- Do not blame the patient or their family or accuse them of being the cause of the symptoms.
- Explain that the symptoms may return or worsen even when on treatment. This is common, and they should visit a health care provider as soon as possible.
- Avoid alcohol, betel nut, cannabis, or other non-prescribed drugs as they can worsen the psychosis.

Medication treatment options:

1st line:

- Start **Risperidone** 1mg PO daily. Increase 2-6mg daily until improvement. Maximum dose is 8-10mg/day. This is a newer antipsychotic drug and has less side effects (see below).

2nd line:

- Give **Haloperidol** 2.5-5mg PO or IM if patient is agitated or violent. (max 20mg/d). Decrease the dose by half in elderly patients. **Take care for your safety if the patient is violent.** Discuss referral with doctor.

Additional medication:

- **Diazepam** 5-15mg per day in 2-3 divided doses for severe anxiety or agitation for a few days. Do not use long term because it can be addictive.

Monitor these patients closely as these medicines have severe side effects. Try to give the lowest dose of haloperidol that is effective for the patient. The choice of long-term medical management needs to be done case by case and should only be prescribed by experienced medical personnel. Treatment should include counselling, psychotherapy, and social support.

SIDE EFFECTS

Haloperidol

- Parkinsonism: Tremors, stiffness, akinesia (inability to start movements) or bradykinesia (slow movements), postural instability (feel unsteady).
  - **Diazepam** can treat acute Parkinsonism side effects.
  - When a patient has symptoms of Parkinsonism, the dose of haloperidol treatment is too high: lower the dose.
- Oculogyric crisis: Eye rolling movements that are involuntarily, occurs especially in young men.

- Torticollis: Neck twisting movements, occurs especially in young men.

If patient develops muscle rigidity and high fevers that do not seem related to infectious cause, may be drug side effect: STOP haloperidol immediately.

Risperidone

- Sedation, dizziness, tachycardia, metabolic (weight gain, elevated lipids, insulin resistance).
- Sexual dysfunction.
- Neuroleptic malignant syndrome (NMS).
- Caution in patients with cardiac disease.

Drug-drug-interaction: carbamazepine can decrease levels of risperidone while fluoxetine can increase levels.

MANAGEMENT

Follow up (See in counselling)

- Close follow up until symptoms start to respond to treatment.
- Supervise treatment for 4-6 weeks. Can discuss with family member to do DOT.
- If improving continue treatment plan. Can decrease follow up.
- Still need regular follow up to monitor treatment: check adherence, side effects and dosing. Check weight, BP, and blood glucose.
- **Discontinue medication:**
  - **If first episode, relapse or worsening of psychotic symptoms:** Consider to stop medication **12 months after symptoms have resolved.**
  - **Person with symptoms persisting >3 months:** Consider discontinuation of medications if person is in FULL REMISSION of symptoms for several years.
  - Gradually and slowly discontinue medication dose. Patient and family must watch for early symptoms of relapse.

INSOMNIA

Many patients with mental illness have sleep problems.

TREATMENT

First counsel the patient:

- Keep regular sleep/wake schedule e.g., do not sleep in the afternoon.
- Get physical exercise every day (but not right before bedtime).
- Sleep in a dark room.
- Avoid coffee, tea, cigarettes and betel in the afternoon and evenings.
- Avoid alcohol.
- Avoid electronic screens (mobile phones, TV, computer etc.) at least one hour before going to sleep.

Ask if they have any symptoms of a mental health or physical condition. Treat the underlying diagnosis.

- Do they have difficulty falling asleep because they are worrying about something? **(Anxiety disorder)**.
- Do they wake up earlier than they want to without any reason? **(Depression).**
- Do they struggle with nightmares? **(PTSD).**
- Is their sleep interrupted by untreated pain? **(Pain).**

If no improvement, consider:

- **Amitriptyline:** usually at lower doses than for depression (25-50mg). Note**:** do not use high doses if patient is on an SSRI.
- If severe sleep disturbances **diazepam** 5mg PO may be given for a short period of time. Be careful: **diazepam is very addictive.**
- **Note:** Severe insomnia, where the patient doesn't sleep at all for multiple nights, is a risk factor for suicide.

COUNSELLING

1. **DEFINITION**

Counselling is a method used to help treat people with emotional trauma. Counselling is sometimes referred to as a 'talking cure'. This method is used to help people by talking and discussing their problems with them. The counsellor can help to find solutions to problems and find better ways of dealing with emotional trauma. Counselling generally takes some time to be effective and requires experienced counsellors to be fully effective.

Some of the rules

Confidentiality: Whatever you learn in the counselling session is not to be told to anyone else without the person's permission. The only exception to this rule is if the person has told you that he/she plans to either harm himself or others. It is through confidentiality that a trusting relationship can develop.

Trust: Without trust, effective counselling cannot occur. This needs to be developed between the counsellor and the person seeking help.

Empathy: The counsellor needs to try to understand the person's situation as best as they can. To empathize means to see the world through another's eyes, to imagine being the person and imagine how it would feel to suffer their problems.

Non-judgmental: When hearing the person's problems and life story you are being placed in a very powerful position. The person has placed their trust in you and is relying upon you to accept them. People who need counselling are often in a very fragile emotional state and need acceptance and support. Not judging the person's behavior (even though you may disagree with it) is an essential element of counselling.

Listening: The counsellor needs to be a good listener. Allow pauses in conversation, do not try to push the person to speak and let them tell you what they feel comfortable telling you at that time.

Body Language: The way a person sits, and their movements often show what they are feeling. During counselling, it is important to make the person aware that you are interested and listening to them. One way of doing this is to follow these rules:

Remember the letters SOLAR

Square:
Sit facing the person, do not sit sideways to them, and look directly at them.

Open:
Sit with an open posture, do not cross your arms, or lower your head.

Leaning forward:
By leaning slightly forward towards the person you are showing them that you are interested.

Attentive:
Be attentive to what they are saying, listen to them and nod your head to show you understand.

Relaxed:
During the counselling session be relaxed, try not to feel tense or excited; the person will feel this and will become more relaxed themselves.

The Counselling Session:

Here are some guidelines on how a counselling session can be run:

1. **To start**
   Explain that you want to help them, introduce yourself and your profession (e.g., medic, social worker). **Find a quiet, comfortable, and private environment** to talk. Explain that you would like to get to know them better so that you can effectively deal with their specific problem/circumstance. Ask if they have any questions and answer them. Be honest.

2. **Family history**
   Life story e.g. Why did you come to Thailand? How did you come to the camp? What happened to you while in Burma? Obtain their medical history and cultural background.

3. **Discover what the problem** is Ask the person what problems they are having. Allow time for the person to talk, allow pauses in the conversation and be patient. Here are some questions you could ask:
   - How does it feel when you talk about what happened?
   - Does it affect your sleep: do you have nightmares about what happened?
   - What effect does the problem have on your life?
   - Does it affect your health?
   - Do you suffer headaches, or other body pains? If so, did they begin after the incident?
   - How long have you had the problem?
   - How do you think the problem can be solved?
   - Discuss possible solutions with them. But do not feel that you must solve their problem.

4. **During your discussion, assess the person's mental state.**
   - Are they angry, sad or do they feel nothing?
   - Are they depressed or angry?
   - Do they make sense?
   - Are they psychotic?
   - Do their emotions make sense? For example, when telling a bad or sad story are, they are smiling / looking happy or when talking of a happy event are, they sad/crying?
   - Find out if they feel good or bad about themselves, do they have high or low self-esteems (confidence), do they feel powerless, e.g., everything they try or do fails (signs of depression).
   - Do they have a history of violence?
   - Do they feel violent or suicidal?

All these are things that can be discovered, not through one counselling session but perhaps over a series of interviews as the person becomes more relaxed and begins to trust you more. The first session is mainly to begin the process; successful counselling can take months. These questions do not necessarily need to be asked directly but the counsellor can assess or feel the real answers from the person's reactions and attitude.

5. **Positive reflection (This is generally most effective with non-psychotic patients)**
   - As you listen carefully to the patient, **identify strengths** that they already have that can help them. Remind patients of these strengths: e.g.

"You have survived a lot of difficult things. You must be very strong." Or "It seems that you really enjoy talking with your cousin, and she is a great support for you" or "Listening to music seems to help you feel calm."

- Try to identify **ways that they think or do that are contributing to their mental illness**. Reflect, or explain this back to the patient without judging e.g. "It seems that you are saying that when you are alone you start to think a lot about your baby who died, and that makes you feel more depressed" or "It seems that you always have these severe anxiety attacks before exams."
- Think of **simple changes** that the patient can do that may help their mood: e.g. "When your husband leaves the house, instead of staying there alone, what about visiting your cousin?" or "Do you think you could try to listen to some music while you study to help you feel calm?"
- Sometimes patients have **untrue beliefs** that contribute to their anxiety or depression. If you hear these try to help the patient realize that they are untrue: e.g., Counsellor: "You say you cannot pass your classes. Have you passed classes before?" Patient: "Yes, I usually pass my classes, but I failed one class last year." Counsellor, "Good. So, you have passed your classes almost every time, and you have only failed once. Then you must be a generally good student." **Never blame the patient for their untrue beliefs about themselves.**

Always involve the patient in the discussion. As you are reflecting back to them, ask for their feedback. Do they agree with your suggestions? If not, why not? Do they have ideas about what could improve their mood?

At the end of the visit, give the patient one or two simple things to work on as "homework" until you see them next (e.g., "Try talking with your cousin this week at least twice.") Review how those things worked for the patient the next time you see them.

Examples of homework for patients, pick things that the patient identifies as helpful to themselves:

- Exercise: especially walking.
- Talking with good supports in their own community.
- Religious activity: visiting the mosque, temple or church, or private time praying or meditating.
- Keeping a regular sleep schedule.
- Eating regularly.
- Asking for help from a friend or relative (e.g., to watch children so patient can rest)

DO NOT TRY TO DO TOO MUCH DURING THE FIRST SESSION.

6. **Referral** The counsellor may need to decide whether or not the person needs a referral to another service. The person may need medical help, or protection to escape from an abusive relationship. Any referral should attempt to be undertaken with the person's understanding and permission.

Some important points to remember.

- Understand that the person is taking a risk in telling you their story; it is very personal information, which you must respect.
- The person is taking a risk to confront painful memories and undergo change; the counsellor is the one to provide strength and security.
- The counsellor must be aware of the effect of hearing sad and disturbing stories and must be prepared to cope with hearing and advising on difficult life situations.
- The counsellor must be aware that they are taking on a lot of responsibility. The counsellor has a lot of power over the person's life. They need to be aware of this and not use this power in a negative way. If unaware of this relationship, the counsellor can unconsciously become a part of the problem.

Finally

The object of counselling is to help the person to find solutions to their problems, to strengthen the person and to lead them to an independent and happier/healthier life. This ideal cannot always be met but by sharing their problems with another who respects and is interested in them, and their problems, the person will leave any counselling session with more confidence and security.

SUICIDALITY/HOMICIDALITY

DEFINITION

Like severe malaria or tuberculosis, mental illness can be a fatal disease if not adequately treated.
Suicide = the patient killing themselves
Homicide = the patient killing someone else

RISK FACTORS

Risk factors for suicide:

- Thinking about suicide.
- Bipolar disorder, PTSD, psychosis, or recurrent, chronic depression.
- History of trying to commit suicide in the past.
- Family history of suicide.
- Substance abuse (drugs or alcohol).
- Hopelessness (may have loss of relationships or severe debt).
- Isolation: not connected to friends or family.

- Severe insomnia.
- Other suicides in the patient's community.

Risk factors for homicide:
- Substance abuse (drugs or alcohol).
- More common for men.
- Have a gun.
- Domestic violence.

PREVENTION
Gently ask any patient if they have thoughts about hurting themselves, thoughts about hurting someone else, or thoughts that it would be better if they were dead.

****Asking about suicide does not increase the risk of suicide****

- If they do have these thoughts, ask if they have made plans to end their life or to kill someone else (e.g., "if it gets any worse, I would drink poison").
- Do they have access to ways that they can easily kill themselves or someone else? e.g., guns in the home, pesticides from farming, a large number of amitriptyline pills.
- What prevents them from committing suicide or homicide? Often, they will say "Faith" or "I don't want to leave my children without a father". These are usually strong reasons. If they say, "I really have no reason to live", they are at high risk of suicide.
- If you are not reassured by the answers to these questions, or if they have many risk factors, discuss with a colleague or supervisor right away, and make a safety plan with the family or friends.
- Many communities along the border have used "suicide watch" techniques where friends and family take turns watching the person who is at risk to commit suicide. This can be very useful until medication and counselling can improve a patient's symptoms.
- If you have real concerns that the patient might hurt someone else, discuss with a colleague or supervisor right away and consider contacting the person at risk or the local authorities (e.g., village head).

SUBSTANCE ABUSE (ADDICTION)
Addiction can cause abuse of substances like alcohol, opiates and amphetamines can lead to both short term and long-term dangers to a patient through intoxication, addiction, and withdrawal. Other substances like betel and tobacco can increase cancer risk and cause other medical problems. Patients who are addicted to any of these substances may have a very hard time stopping their use. If there is a drug treatment program in your area, suggest that patients get help there. Use counselling techniques and ask the family and community to help.

Addiction is a disease: treat these patients with empathy and respect, even though they can be very difficult. Addiction can occur with many things such as gambling, eating sugary food or drink, smoking, using a smartphone.

ALCOHOL AND DRUG INTOXICATION
DEFINITION
Acute intoxication:
When the patient has taken too much of a substance (e.g., alcohol or drug) and the body cannot remove it quickly enough. Symptoms can last until the drug disappears from the body. Intoxication can lead to dangerous behavior (e.g., driving a motorbike after drinking, getting in a fight after using amphetamines) or overdose.

Remember: if a patient with an overdose of alcohol, opiates (e.g., heroin) or diazepam stops breathing but has a stable BP and HR, they can probably survive if someone helps them breathe with a bag valve mask. This may take hours: try to get family members to take turns if not enough staff.

Addiction: Long term use can lead to addiction of a person to that substance. A patient may be addicted if they have three or more of the following signs:

- A strong desire to take the substance.
- Difficulty controlling taking the substance (e.g., what time of day to start, stop and the amount they take).
- Withdrawal signs and symptoms occur when the person does not take the substance for a certain time (and withdrawal stops when the person takes the substance again).
- The need to take more of the substance each time to reach the same previous effect (tolerance).
- The substance will be the most important thing in the person's life.
- The person continues to take the substance even though he/she knows the bad consequences of taking it (e.g., patient may lose a job or have an accident because of drinking too much, but they still do not stop).

Addicted individuals eventually need the substance in order to function normally.

Withdrawal reaction:
- When addicted patients stop taking their substance, they begin to experience withdrawal. The patient gets signs and symptoms that are usually the opposite of the effects of the drug.

- Symptoms of a withdrawal reaction can persist for several days.

If a chronic substance abuser wants to stop using a drug or alcohol be prepared for the acute withdrawal reaction. Long-term follow up must be organized with counsellors, the patient, and the relatives, otherwise they may start using the drug again.

ALCOHOL

Acute intoxication

DEFINITION

Alcohol intoxication occurs when alcohol intake is more than the body can tolerate. This causes behavioral or physical abnormalities. This means the person cannot function normally and should not drive a car or motorbike.

SIGNS AND SYMPTOMS

- Smell of alcohol
- Vomiting
- Change in behavior.
- Agitation
- Euphoria
- Loss of control
- Poor coordination
- Drowsy or comatose – with increasing amounts of alcohol intake.

TREATMENT

- If in coma, treat it.
- Check glucose and treat according to the result.

CAUTION

If you give prolonged hypoglycaemia treatment without vitamin B1, you might cause the patient to develop Wernicke's encephalopathy. Do not delay treatment for hypoglycaemia, but you should give vitamin B1 as soon as possible (before dextrose infusion is best).

- Rehydrate with **IV NSS** when unconscious.
- If history of chronic alcoholism, give **vitamin B1** 250mg IM or in NSS bag (this helps prevent serious permanent brain damage (Wernicke's Encephalopathy)
- Watch for signs of hypoglycaemia.
- Check urine output and vital signs every hour until the patient is awake.
- Position the patient in lateral coma position, because of the risk of aspiration.
- When the patient can swallow advise plenty of fluids (>3L) in order to expel the alcohol from the body.

In case of agitation or violence:

- **Diazepam** 10 mg IV repeat if needed after 30 minutes.
- Rehydrate (oral or IV). Check for hypoglycaemia and treat if present.

In acute alcohol intoxication there is a high risk of hypoglycaemia. Chronic alcohol intake is associated with vitamin B1 deficiency.

WITHDRAWAL REACTION

DEFINITION

When the patient stops alcohol quickly (drinking every day then suddenly stop), they will develop withdrawal symptoms. Alcohol withdrawal can cause death. Severe complications often **occur around 72 hours** after presentation.

SIGNS AND SYMPTOMS

- Slight fever (this is a sign of severity)
- Seizures (this is a sign of severity: most common around 6-18hrs after last drink)
- Tachycardia
- Sweating
- Nausea, vomiting
- Neurological signs such as anxiety, tremor
- Auditory and visual hallucinations (see and hear things that are not there)
- Confusion, hyperactivity, anxiety attacks, poor sleep

Table for Short Alcohol Withdrawal Score (SAWS)
Check symptoms and keep a record of the score every day.

Symptom	None = 0	Mild = 1	Moderate = 2	Severe = 3	
Anxious					Examine patient and ask questions to get a score. **If<12:** the symptoms are mild/well controlled. Consider **decreasing diazepam** if patient is well. **If ≥ 12**: the symptoms are moderate to severe. Patient may be at risk for seizures. Consider **increasing diazepam.**
Feeling confused					
Restless					
Miserable					
Memory problems					
Tremor (shakes)					
Nausea					
Heart pounding					
Sleep disturbance					
Sweating					

TREATMENT

- **If patient is agitated or will not take medicine, diazepam** 10 mg IV, can be repeated several times until the patient is calm but still awake.
- **If patient can take oral medicine, give diazepam 10-20mg PO QID for the first 1-2 days.** Then give reducing dose e.g., 10mg BID for 2 days, 5mg TID 2 days, 5mg BID 2 days, 5mg OD 2 days, then stop.
- If patients have a history of drinking very large amounts of alcohol, you may need to give higher doses and continue for a longer time. Discuss with the doctor. Evaluate for signs and symptoms of withdrawal and adjust dose based on patients score.
- Try not to hold or tie the patient down physically, they may become more violent: use medicine and help from family members to keep patient controlled.
- **Vitamins:** give **vitamin B1** (thiamine) 250mg IM or in NSS bag. Follow this with oral: **vitamin B1** 100mg OD, vitamin B12 PO 1mg OD, **folic acid** 5mg OD.

Be careful: if you give too much diazepam, the patient can stop breathing. Keep this patient in close observation!

Wernicke's encephalopathy or Korsakoff's syndrome

Chronic alcohol abuse combined with a poor diet can lead to Wernicke's encephalopathy or Korsakoff's syndrome or both due to low vitamin B1 levels. If the patient has any neurological signs e.g., abnormal eye movements, memory problems, confusion, unsteady walk (when not acutely intoxicated) consider these conditions.

OPIOID/HEROIN/MORPHINE

These drugs can be smoked, inhaled via the nose, or injected IV.

ACUTE INTOXICATION

SIGNS AND SYMPTOMS

- Euphoria (patient feels calm/always laughing)
- Flushed skin (feeling of being hot on the face, red skin).
- Itchy skin (especially with morphine).
- Myosis (small pupils).
- Drowsiness
- Deep and slow breathing.
- Hypothermia.
- Bradycardia, hypotension.
- Constipation

TREATMENT

Treatment is symptomatic and prevention of complications.

WITHDRAWAL REACTION

Patients will feel terrible but narcotic withdrawal is less dangerous than alcohol withdrawal. However, watch out for signs they might be suicidal.

SIGNS AND SYMPTOMS

- Anxiety
- Increased respiratory rate.
- Increasing body secretions: sweating, running nose, tears.
- Mydriasis (dilated pupils).
- Pilo-erection (skin hairs becoming straight) ('gooseflesh')
- Tremor
- Minor muscle contractions, muscle pain
- Hot and cold flushes
- Anorexia
- Abdominal pain/cramps, diarrhoea

TREATMENT

Treatment for symptoms:

- Nausea: give **metoclopramide** or **domperidone** if available.
- Abdominal pain: give **Buscopan**.
- Muscle pain: give **paracetamol or ibuprofen.**
- Diarrhoea: give loperamide.

For severe agitation or anxiety can give **diazepam** 5-10 mg IV, IM, or PO. Methadone and clonidine are used elsewhere but are not available in our setting.

AMPHETAMINES

There are many kinds of amphetamine, and they can be mixed together in the same tablet. The tablet may also contain other substances. Amphetamines can be inhaled via the nose, smoked, swallowed, or injected IV. Even if used only once, amphetamines can cause acute psychiatric problems.

SIGNS AND SYMPTOMS

Acute Intoxication:

- Increased energy, increased interest in sex.
- Insomnia (sleeplessness)
- Anxiety
- Auditory and visual hallucinations

Withdrawal:

- Severe depression (including risk of suicide)
- Very tired
- Increased appetite
- Feelings of paranoia or persecution (e.g., think someone is trying to kill them)

Some types of amphetamine can produce more severe signs and symptoms:

- Severe hyperthermia (very high temperature)
- Disseminated intravascular coagulation (bleeding disorders)
- Rhabdomyolysis (muscle damage)
- Seizures
- Acute renal failure
- Liver toxicity
- Heart problems.

TREATMENT

Treatment of symptoms:

- If agitated: give **diazepam.**
- If psychotic: treat **as for psychosis**.
- Can try SSRIs – **fluoxetine** 40 mg or **sertraline** 100mg (start at ½ the dose and increase to full dose after 1 week).

BETEL NUT

DEFINITION

Betel nut is the seed of the betel palm ***(Areca catechu).*** Betel nuts are often chewed. People use betel nut to stay alert and decrease stress. It can be mildly intoxicating and decrease appetite. This means that betel nut is a drug. Betel nut is not good for the health if used regularly, it can cause stomach cancers, and problems in the mouth and gums. Many in this area chew betel nut, so it is important to give information on the risks.

SIGNS AND SYMPTOMS

Psychoactive effects:

- Sense of well-being associated with euphoria.
- Warm sensation in the body.
- Increased capacity to work.
- Insomnia (sleeplessness)

General effects

- Increased sweating
- Increased production of saliva
- Palpitations: related to tachycardia (increased pulse rate)
- Worsening asthma
- Regular betel chewing causes the teeth and gums to be stained red.
- Increased convulsions for epileptic patients.

COMPLICATIONS

Oral Cancer

In countries and communities where, betel nut use is high, there are higher levels of oral cancer. The mouth mucosa loses its red colour and is replaced by a white coat (leucoplakia). The carcinoma then spreads easily through the mouth. The diagnosis is not easy to make in the early stages. Oral carcinoma is difficult to cure (and expensive). Treatment is not available in most clinics in our region.

Vitamin B1 Deficiency

Betel nut chewing can cause vitamin B1 deficiency. Patients with regular complaints of peripheral beri-beri should be advised to stop betel nut consumption.

TOBACCO

DEFINITION

Tobacco is a plant that has leaves that can be dried and chewed or smoked. The leaves contain the addictive drug Nicotine, which makes it very difficult to stop smoking or chewing tobacco if a patient has started to do it regularly. It has similar mild psychoactive effects to betel nut but is considerably **more** dangerous. All patients who smoke or chew tobacco should be counselled about the complications and urged to stop. Most smokers will experience withdrawal symptoms when they quit smoking, e.g., irritability, difficulty concentrating, restlessness, depression, nicotine craving, insomnia, and anxiety.

Passive smoking is inhaling the smoke from someone else smoking e.g., if smoking inside a house, then other family members will breathe in the smoke. This can be dangerous to their health, especially children (increased risk for wheezing, asthma, respiratory infection).

COMPLICATIONS

1. **Cancer:** oral for chewed tobacco, and lung cancer for smoked tobacco. These diseases can kill the patient and treatment is very difficult, often not successful, and generally not available in our area.
2. **Tooth loss.**
3. **Breathing problems**: COPD, pneumonia, worsening asthma. If parents smoke their children are at risk for more respiratory infections, and worse asthma symptoms.
4. **Reproductive problems:** miscarriage, infertility, men can become impotent.
5. **Heart problems:** Increased risk of heart attack.
6. **Brain:** Increased risk of stroke.
7. **If pregnant:** pre-term delivery, stillbirth, low birth weight, sudden infant death syndrome, mental retardation, and cleft lip.

TREATMENT

How to stop:

Stopping smoking reduces the risk of above complications. It is very difficult to stop smoking, but you can encourage patients to try these things:

- If they often smoke in groups, try to stop smoking as a group. Encourage their friends to stop smoking.
- Think about the bad health effects when they want to smoke.

- Throw away all their cigarettes and tobacco. Try not to go to the places where they usually smoke.
- Replace smoking with healthier activities: go for a walk to relieve stress, drink a glass of water or tea, eat fruit, chew some gum.

If cannot stop then try to smoke outside the house and away from children to avoid passive smoking.

Nicotine replacement therapy: Should be combined with behavior changes. It will not prevent all withdrawal symptoms but can decrease the intensity of symptoms. Nicotine therapy is safe and not likely to cause any nicotine addiction. Nicotine replacement therapy is not now available at SMRU, but it might be available in pharmacies.

Can give in different ways, the most common being:

- **Nicotine gum:** Chew slowly for the nicotine to be absorbed through the mucosa. Use for 3-6 months. **Avoid** drinking soda, coffee or orange juice when chewing as they make your saliva acidic, which reduces nicotine absorption.
  - < 25 cigarettes per day: 2mg up to 24 gums each day.
  - > 25 cigarettes per day: 4mg up to 24 gums each day.
- **Nicotine skin patches:** deliver nicotine to the blood through a skin patch. There are different brands so check the instructions for the specific brand you're using.

SNAKE BITE

MYANMAR SNAKEBITE PROJECT

A joint project between Myanmar and Australia to improve the health outcomes of snakebite patients

GUIDE TO SNAKEBITE ASSESSMENT

A good history and examination is important for good medical management of snakebite. Please use the following to guide what should be recorded in patient case notes as a **minimum**.

1. **History**

- **Patient age & gender**
- **What was the time & date of the bite?**
- **Time of arrival at your hospital?**
- **How did the patient get to the hospital? (method of transport used)**
- **Where did the bite occur? (name of nearest village)**
- **What was the patient doing when bitten?** (working in the fields, walking outside, in their home, sleeping, trying to catch or kill the snake, etc)
- **How many times & where on the body was the patient bitten?**
- **Was the snake seen and is there a photo of it available (mobile phone)?**
  - If the snake seen, what type of snake was it? (refer to photos of some common snakes on the back page)
  - Was the snake brought to the hospital? (if the snake was brought in, try and ensure it is kept, not thrown away)
- **Was first aid used?** (when applied, what type e.g. pressure pad, bandage, splint, tourniquet, etc.)
- **Was a traditional treatment used?** (If yes, what type, when, what delays caused)
- **What symptoms has the patient experienced and when did they commence, how long did they last?**
- **Was the patient given any medical treatment before arrival at your hospital?**
  - In particular record any fluids or diuretics, and antivenom (type, number of vials, time of administration, time between bite and antivenom)
  - Where did this treatment occur? (e.g. Rural Health Centre, Station Hospital, Township Hospital etc.)
- **Relevant past medical history, including chronic illnesses, prior to the snakebite**
  - Has the patient ever received antivenom (ASV) for previous snakebites in the past?
  - Does the patient have renal or cardiac disease in the past history?
  - Is the patient on any medications, and if so, list them? (e.g. medications that might affect the 20WBCT)

2. **Examination** (record the presence OR absence of the following)

- **The bite location or locations** (where on the patient's body)
- **Local swelling, and its extent**
- **Lymphadenopathy, and its location**
- **Evidence of coagulopathy** (such as bruising at the bite site, bleeding from the bite site, conjunctiva, gums, mucosal surfaces, gastrointestinal tract, urinary tract/haematuria etc.)
- **Evidence of capillary leak** (conjunctival or peri-orbital edema, pulmonary oedema)
- **Evidence of neurotoxicity** (ptosis, opthalmoplegia, dysarthria, dysphagia, drooling, limb weakness, hyporeflexia, respiratory muscle weakness)
- **Evidence of shock**

3. **Clotting assessment** (20WBCT ~ record results & time of assessment)
4. **Antivenom (ASV) use at your hospital** (refer to the management algorithms on following pages)

Please record the following details:

- **Reason for administration** (indications for using antivenom; record the presence OR absence of the following)
  - Severe local swelling
  - Spontaneous bleeding
  - Rapid extension of swelling
  - Renal angle tenderness
  - Non clotting blood
  - Tender lymphadenopathy
  - Heavy proteinuria
  - Neurotoxicity
  - Oliguria/anuria
  - Shock
- **Type of antivenom (ASV)** (was it MPF/BPI or Indian or Thai and which type of each)?
- **How many vials were given at your hospital?**
- **Time of administration?**
- **Any complications** developing during or after administration of antivenom (include how this was treated)
  - **Allergic or anaphylactic reaction** (Defined as an event occurring < 4hrs post administration of AV and involving 1 or more of the following: urticaria, bronchospasm, swelling of the oral mucosa or tongue, laryngeal oedema, or hypotension.)
  - **Febrile reaction** (Defined as an event occurring <60 minutes post AV administration involving 1 or more of the following: fever, tachycardia or hypotension AND NOT INVOLVING urticaria, bronchospasm, swelling of the oral mucosa or tongue, or laryngeal oedema.)

5. **Record any other treatments** used in the acute admission period such as:
   - Fluids (type & volume)
   - Diuretics (type & dose) (In general diuretics are not helpful in managing snakebite AKI)
   - Other medications (Antibiotics, steroids, antihistamines etc.; type & dose) (In general these medications are not helpful in managing snakebite; routine prophylactic antibiotics are nor recommended in snakebite)
   - Physical interventions (Intubation, ventilation, resuscitation etc.)

Some Common Dangerous Venomous Snakes of Myanmar

Russell's viper | green pit viper | cobra | krait

NOTE: There are many different species of snakes in Myanmar. Most will not cause medically significant bites, but they may be mistaken for a dangerous species of snake.

Key clinical points to consider during the acute management of a snakebite patient:

01: How long has it been since the bite? (time delay)
02: Was this a multiple bite? (might be more severe)
03: Can you determine if the snake is a Russell's viper, green pit viper, cobra, or krait?
04: Was first aid appropriate and is it likely to be effective?
05: If first aid was inappropriate, what harm might it have caused?
06: If traditional treatment was used, has this delayed reaching medical care (time delay), or caused harm?
07: Does the patient have symptoms suggestive of envenoming? If "yes", are they suggestive of coagulopathic envenoming (Russell's viper/green pit viper), or paralytic/neurotoxic envenoming (cobra/krait)?
08: Is there any past history or treatment that might change your assessment or treatment of this snakebite?
09: Does examination of the patient indicate any particular problems that might assist in diagnosis, or indicate an urgent need for treatment? (type of snake, extent of envenoming)
10: Does the 20WBCT indicate coagulopathy?
11: Is there an indication to give antivenom now?
12: If antivenom has already been given earlier at another hospital/RHC, was the correct antivenom used, AND was enough antivenom given?
13: Do you need to give antivenom (or more antivenom) now?
14: If antivenom is needed now, which type and how many vials?
15: Do you have enough of the correct antivenom available now to give to this patient? (If not, why not?)
16: Once you give the antivenom, does the patient have an adverse reaction (which type) and if "yes" do they respond to the recommended treatment? (refer to the management algorithm for protocol for treating adverse reactions)
17: Does your patient need other treatments such as IV fluid load?
18: What is the result of the treatment (antivenom etc) and do they need urgent transfer to another hospital or a specialised medical unit (renal unit, ICU etc)?
19: Has your patient developed kidney failure? If yes, refer to the renal unit urgently.
20: Is your patient developing neurotoxic paralysis and is this impairing breathing? If yes consider urgent intubation and ventilation.
21: Is your patient developing a severe local reaction at the bite site that might indicate developing compartment syndrome OR the need to debride necrotic tissue? If compartment syndrome is possible, FIRST confirm pathologically raised intracompartment pressure AND resolution of any coagulopathy, before considering fasciotomy, because fasciotomy is RARELY indicated in snakebite and may cause permanent disability.
22: Has your patient been immunised against tetanus? If not ENSURE they are immunised AFTER coagulopathy has resolved.

Other important things to record in the case notes during the patient's stay in hospital:

- What happened to the patient (final outcome)? (discharged well, died, "signed and left", transferred to another hospital, transferred to another unit in the same hospital such as Renal Unit or Intensive Care Unit, etc)
- If they develop renal failure, record when and details of treatments used and outcome. (type of dialysis used, start and finish times, number of treatments etc)
- If they develop local necrosis and or infection, record extent, if fasciotomy or amputation is required, and final outcome.
- If they develop other medical problems, record type of problem, how diagnosis made, what treatments used and final outcome.
- For all blood test results, record these as a table, sequentially, so that you and your colleagues can quickly notice any trends/changes that may indicate a need for a revision of treatment strategies.

Myanmar Snakebite Project

Instructions for Performing the 20 Minute Whole Blood Clotting Test (20WBCT)

The only bedside clotting test that has been scientifically validated to detect coagulopathy in snakebite patients is the 20WBCT. Therefore, we recommend only the 20WBCT.

1. The tube used to test the 20WBCT **must be made of *glass*** (NOT plastic) and **must be clean and dry**. Ideally, it should also be new and made from soda-lime glass. Exposure to washing detergent or soap will stop the blood from clotting, a so-called false-positive test result. We recommend that you use only disposable soda-lime glass tubes. If disposable glass tubes are not available, you can use clean glass antibiotic vials after they have been boiled with salt only, never with detergent, soap or other chemicals, and dried afterwards with hot air.

2. **Place about 2mls of venous blood** in the ***glass*** tube.

3. **Let it stand for 20 minutes.** The ***glass*** tube with blood must be left undisturbed for 20 minutes. The tube must not be flicked or agitated whilst waiting for 20 minutes.

4. **At 20 minutes gently invert/tip** the ***glass*** tube checking for the presence of a blood clot. Sometimes, after 20 minutes, a thin layer of serum appears on top of the clot, and this serum may run slightly down the side of the tube when gently inverted. If the tube is left for 30 minutes or longer after the blood has been placed in it, the clot may start to break down, leading to a false-positive result. Therefore, try to read the test at exactly 20 minutes.

4A. **Clot present = negative test** (no coagulopathy present). On gently inverting the tube, ***if there is any clot in the bottom of the tube, the blood has clotted = a negative test***. If a clot has formed after 20 minutes (a negative test), the clot will stop any whole blood from running freely down the side of the tube when gently inverted, but serum on top of the clot may run down the tube. The serum may be yellow or red in colour, but does not have the denser consistency of whole blood. In this case, you can ignore the serum on top of the clot.

4B. **Clot absent = positive test** (coagulopathy present). On gently inverting the tube, if the blood runs down the side of the tube, and ***there is no clot***, it is unclotted (non-clot).

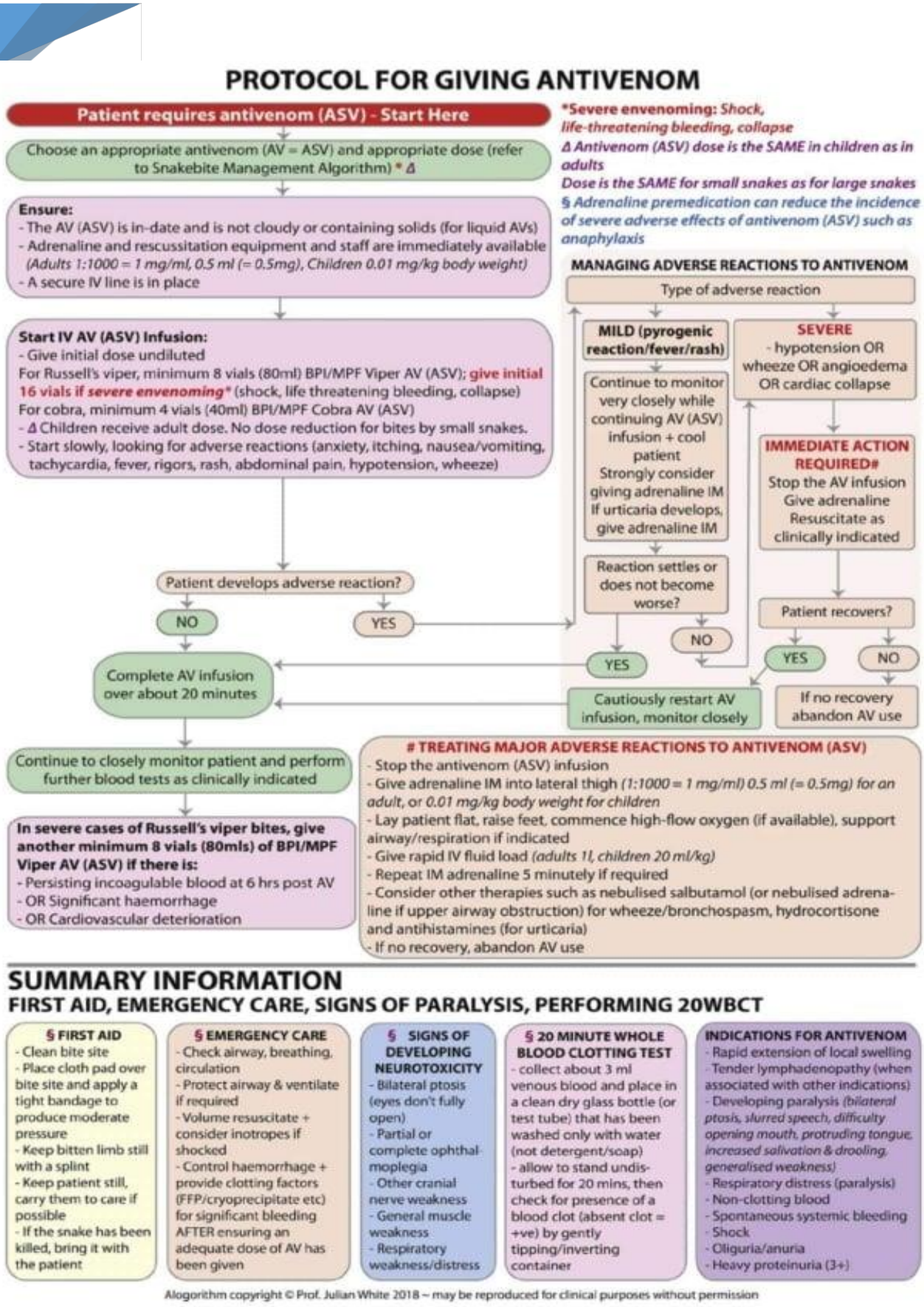
5. If there is any uncertainty about the result of the 20WBCT, a separate 20WBCT ought to be done in parallel using blood from a healthy individual to prove that normal blood will clot after 20 minutes. This is your negative control.

6. If blood from a healthy individual clots after 20 minutes, the finding that blood from a snakebite patient does not clot is a very significant positive test result.

7. If blood from a healthy individual clots after 20 minutes, the finding that blood from a snakebite patient also clots after 20 minutes implies that the patient does not have coagulopathy at that time.

8. If blood from a healthy individual does not clot after 20 minutes, it will be difficult to interpret the result of the 20WBCT from the patient. The most common problem here is contamination of the tube with washing using detergent or soap.

9. Note that the 20WBCT must be repeated at regular intervals after the initial test to detect late-onset coagulopathy.



'age 3 of snakebite management guide for Myanmar; algorithm guiding administration of antivenom. [Original graphic copyright© Julian Whit mission].

BEE STING

- A bee sting is a wound caused by the stinger from a female bee being injected into one's flesh. The stings of most of these species can be quite painful and are therefore keenly avoided by most people.
- In people with bee sting allergy, stings may trigger a dangerous **anaphylactic reaction that is potentially deadly.**
- The venom of the honeybee contains **histamine,** most cell degranulating peptide, melittin, **phospholipase A2, hyaluronidase and acid phosphatase.** The three proteins in honeybee venom which are important allergens are **phospholipase A2**, hyaluronidase, and acid phosphatase. In addition, the polypeptide melittin is also antigenic.
- The **female bees** (worker bees and queens) are the only ones that can sting.

EFFECT OF VENOM

The main component of bee venom responsible for pain in vertebrates is the toxin melittin; histamine and other biogenic amines may also contribute to pain and itching. In any case, the amount of venom injected is typically very small (**5-50 micrograms** of fluid). The sting may be painful for a few hours. Swelling and itching may persist for a week.

TREATMENT

1. The stinger should be removed as quickly as possible.
2. Once the stinger is removed, pain and swelling should be reduced with a cold compress.
3. A **topical anesthetic** containing **benzocaine** will kill pain quickly.
4. Menthol is and effective anti-itch treatment.
5. Itching can be relieved by antihistamine or by a steroid cream.
6. Many traditional remedies have been suggested for bee stings including damp pastes of **tobacco, salt, baking soda, toothpaste, clay, garlic, urine, onions, aspirin** or even application of **copper coins.**
7. **Ammonia and ammonia**-containing liquids, such as **window cleaner**, are often suggested to immediately cleanse the skin and remove excess venom.
8. The area should not be scratched as it will only increase the itching and swelling. **If swelling persists for over a week or covers an area greater than 7-10 cm (3-4 inches), medical attention should be sought**.
9. Recommend a **tetanus immunization.**
10. People known to be highly allergic may carry around **epinephrine (adrenaline)** in the form of self-injected **EpiPen** for the treatment of an **anaphylactic shock.**

BENZODIAZEPINES POISONING

ESSENTIALS OF DIAGNOSIS

- Primarily **CNS** effects, including, drowsiness, slurred speech, confusion, ataxia, respiratory depression, hypotension, coma.
- Isolated benzodiazepines ingestion rarely results in death, mixed ingestion (alcohol, narcotics, other sedatives) increase morbidity and mortality.
- Hypotension and cardiopulmonary arrest are possible after rapid IV injection of diazepam.

DIFFERENTIAL DIAGNOSIS

1. Other sedative-hypnotic agents (e.g., chloral hydrate, barbiturates).
2. Toxic alcohols.
3. Opioid ingestion.
4. Metabolic encephalopathy.
5. Encephalitis, meningitis.

TREATMENT

1. Maintain airway.
2. Monitor vital signs, ECG, pulse oximetry.
3. 100% **O_2** with via non-rebreather mask.
4. Establish IV line/ blood for **FBC, U&E, Creatinine, RBS.**
5. Gastric lavage.
6. Activated charcoal if the time of ingestion is within 4 hours-1gm/kg.
7. IV **Flumazenil** 0.2 mg over 30 seconds repeat till 0.5mg is administered.
   Contraindications
   (1) Concomitant tricyclic antidepressant (**Tripta**) overdose.
   (2) addicted to benzodiazepines).
8. **IV Thiamine** with 50% dextrose.
9. IV **naloxone** should be considered.

BETA BLOCKER OVERDOSE

(Atenolol, Metoprolol, Carvedilol, Propranolol, Labetalol, Bisoprolol, Sotalol etc.)

Most ingestion are benign. **Two beta-blockers** require special consideration:

1. **Propranolol**
2. **Sotalol**

CLINICAL FEATURES

1. Hypotension, bradycardia, A.V block, heart failure, torsade points (due to Sotalol)
2. Altered mental status, psychosis, seizures, stupor, coma.
3. Hypoglycemia, hyperkalemia.
4. Bronchospasm.

DIFFERENTIAL DIAGNOSIS

- **CCB**
- **Tricyclic antidepressant toxicity.**

INVESTIGATIONS

- ECG
- RBS
- Serum electrolytes

- **ECG:** prolonged PR interval, Bradycardia, **A.V block,** widened **QRS**.

MANAGEMENT

1. Monitor vital signs
2. **Stabilize** the patient
   A: Airway-maintain open airway
   B: Breathing-ventilate if necessary. Treat **bronchospasm** with **bronchodilators.**
   C: Circulation-treat bradycardia with **Atropine initially 0.01-0.03 mg/kg**.
   Establish IV line with NS.
3. **Glucagon** 0.05mg/kg IV bolus or 2.5gm bolus may repeat every 1-2 minutes to a maximum of 10 mg. **Start glucagon** drip at 1-5mg/kg (0.15mg/kg in paediatric cases). May increase infusion to a maximum of 10mg/hr.
4. Gastric lavage.
5. Multidose **activated charcoal** for sustained released preparations.
6. Seizures should be treated with **benzodiazepines.**
7. **Hypoglycemia:** treat with **IV Dextrose.**
8. **Hyperkalemia:** treated with **calcium gluconate** (IV), Insulin + Dextrose infusion, salbutamol nebulizer.
9. **Epinephrine** (adrenaline) **75mcg/min** for low Blood Pressure.

CALCIUM CHANNEL BLOCKER OVERDOSE (CCB)

CCB toxicity is the taking of too much of the medications known **as CCBs (Nifedipine, Amlodipine, Diltiazem, Verapamil, Felodipine,** etc.), either by accident or on purpose.

CAUSES

- **CCB,** also known as **calcium channel antagonists**, are widely used for a number of health conditions. Thus, they are commonly present in many people's homes.
- In young children one pill may cause **serious health problem and potentially death**. The **CCB** that caused the greatest number of **deaths in 2010** in the **United State** was **verapamil**. This agent is believed to cause more heart problems than many of the others.

SIGNS AND SYMPTOMS

1. Slow heart rate
2. Low blood pressure
3. Vasodilator shock
4. Heart stopping
5. Reflex tachycardia as a reaction to the low BP.
6. Nausea and vomiting
7. Decreased level of consciousness
8. Breathing difficulties, **SOB**
9. Seizures are rare in adult but in children occur more often.
10. Sleepiness
11. Hypocalcemia
12. High blood sugar levels.
13. Symptoms usually begin within 6 hours of taking the medication by mouth.
14. With extended-release formulations symptoms may not occur for up to a day.

Differential diagnosis: Beta Blocker toxicity.

INVESTIGATIONS

- **RBS**
- **ECG** (low sinus rhythm, long QT, BBB, first degree A.V block, sinus tachycardia)

MANAGEMENT

1. Monitor vital signs, **ECG, SPO_2** and maintain airway.
2. Gastric lavage.
3. Activated charcoal.
4. Whole-bowel irrigation with **polyethylene glycol** for extended-release formulation.
5. High dose of **IV insulin with glucose.**
6. IV fluid bolus with NS.
7. **Atropine** for slow heart rate.
8. **IV calcium gluconate** or **calcium chloride.**
9. **Adrenaline** for **low BP.** In those who have no symptoms or signs 6 hours following taking an immediate release formulation and 24 hours after taking an extended-release formulation need no further treatment.

Prognosis: high risk of death.

CARBON MONOXIDE (CO) POISONING

CO (automobile exhaust gas, house gas, indoor combustion of firewood, smoke inhalation in a fire) is a colorless, odorless, and tasteless gas.

METABOLISM

- Absorption is by inhalation, widespread distribution by blood, with elimination via the lungs by exhalation. **CO** has an affinity for **Hb 250 times** that of oxygen, impairing release of **O_2** to the tissues. It binds to and inactivates myoglobin.
- During hypoxemia, cardiac myoglobin takes up **CO** even more avidly, resulting in myocardial necrosis and depressed myocardial function.
- **CO** causes diffuse demyelination of the brain, with autopsy findings of cerebral oedema and necrosis of superficial white matter.

SIGNS AND SYMPTOMS

Mild exposure:

- Non-specific, e.g., headache, nausea and vomiting, dizziness, fatigue. Several members of the same time, seemingly indicating a flu-like illness.

Acute exposure

- **CNS:**
  - headache, peripheral neuropathy, altered mental state, coma, seizure, cerebral oedema, behavior and personality changes, ataxia, memory impairment.
- **Respiratory:**
  - Dyspnoea and hyperpnea, bronchopneumonia, and non-cardiogenic pulmonary oedema.
- **Cardiovascular:**
  - Angina, ST-segment changes, tachycardia, ventricular dysrhythmia, hypotension, myocardial infarction, heart block, **CCF** and cardiac arrest.
- **Renal:**
  - Oliguria from acute renal failure, proteinuria, myoglobinuria and haematuria.
- **Hematological:**
  - Carboxy hemoglobinemia, tissue hypoxia, polycythaemia, haemolytic anaemia, **DIVC**, leukocytosis.
- **Skin:**
  - Cyanosis, bullae.

Ophthalmologic:

- Flame-shaped retinal haemorrhages, decreased visual acuity, papilledema.

- **Musculo Skeletal:**
  - **Rhabdomyolysis**, myonecrosis, compartment syndrome.
- **Potential sequalae:**
  - Delayed neuropsychiatric sequalae (3 weeks to 3 months after exposure) occur in up to 40% of cases after apparent recovery.
    (1) Headache/dizziness.
    (2) Memory deficits.
    (3) Personality alternations.
    (4) Parkinsonism.

MANAGEMENT

1. Supportive measures
2. Supplemental oxygen therapy 100% **O_2** via tight-fitting face mask.
3. Monitor ECG.
4. Consider IV **$NaHCO_3$** infusion.
5. **Lab tests: FBC, RBS, CXR**
6. **3 hyperbaric oxygen** treatment within a 24-hour period. The benefit of hyperbaric **O_2** is the prevention of damage caused by **O_2** exposure rather than the removal of **CO**.

CHILD WITH ABDOMINAL PAIN

Notice

1. The duration of pain is useful since a surgical diagnosis is less likely in a child with chronic abdominal pain.
2. The presence of fever suggests on infective cause or peritonitis.
3. The possibility of functional abdominal pain should be considered in older children.
4. The age of the child is useful since the diagnosis is narrowed accordingly.
5. Bilious vomiting or persistent vomiting in the presence of abdominal pain is always an ominous sign and should be considered due to a mechanical obstruction till proven otherwise.

See **Table Common causes of abdominal pain in children**

INVESTIGATIONS:

1. **FBC**
2. Urea, electrolytes, creatinine, Blood sugar.
3. LFT, amylase
4. R.E urine
5. UPT
6. Plain X ray abdomen
7. **USG** abdomen

MANAGEMENT

1. Assess the child's ABCs, Vital signs, Pulse oximetry.
2. Administer **crystalloids via** peripheral IV lines.
3. Treat the underlying causes.

CHILD WITH VOMITING

1. Vomiting in the child is **not normal**.
2. **Not every child who vomits has an acute gastrointestinal problem** be aware of meningitis, increased intracranial pressure, otitis media, acute asthma, lower lobe pneumonia or UTI, which also present with vomiting.
3. **Beware the infant or neonate who vomits:** the diagnosis of 'overfeeding' or 'mild reflux' is made only after medical or surgical conditions have been excluded. Be aware that vomiting is often the presenting symptoms of a septic neonate, a neonate with inborn error of metabolism, an infant with acute appendicitis, or meningitis, or pyloric stenosis.
4. **Avoid** prescribing **Metoclopramide** and **Prochlorperazine** to children under 12 years old since oculogyric crises are a distressing and undesirable side effect.
5. **Oral Promethazine** syrup is safe and mild antiemetic.

6.

Table Common causes of abdominal pain in children

Neonatal	Infancy **(<2 years)**	Childhood (2-10)	Adolescence
Non-surgical			
Colic	Gastroenteritis	Gastroenteritis	Gastroenteritis
Milk allergy	Viral syndrome	Constipation	Viral syndrome
Gastroenteritis	Constipation	Functional pain	Functional pain
Gastroesophageal reflux	Urinary tract infection	Viral syndrome	Pneumonia
	Sepsis	Urinary tract infection	
		Pneumonia	
Surgical			
Volvulus/ malrotation	Intussusception	Appendicitis	Appendicitis
Incarcerated hernia	Incarcerated hernia	Trauma	Trauma
Pyloric stenosis	Trauma	Meckel's diverticulum	Ectopic pregnancy
Intestinal anomalies	Meckel's diverticulum	Intussusception	Testicular torsion
Hirschsprung's disease	Appendicitis	Tumour	Trauma
Intestinal perforation	**Tumor (Wilm's)**		
Trauma			

CAUSES

Neonates:

General-sepsis, Meningitis, Hydrocephalus, Neurological disorder, Urinary Tract infection, Motility disorder, Inborn error of metabolism, Congenital Adrenal hyperplasia, poor feeding techniques.

Oesophageal-Atresia, webs, swallowing disorders.

Stomach-Gastro-esophageal reflux, Duodenal atresia/Stenosis.

Small-intestines-Malrotation, Stenosis/atresia, Adhesions/ Bands, Meconium peritonitis/ileus, Enterocolitis.

Large-intestines/Rectum-Stenosis/Atresia, **Hirschsprung's** disease, Anorectal malformation.

Infants:

General-Sepsis, Meningitis, Hydrocephaceplus/Neurological disorder, Urinary Tract infection, Tumors e.g., neuroblastoma, metabolic disorders, Oesophageal stricture.

Stomach-Gastro-Oesophageal reflux, pyloric stenosis.

Small intestines-Malrotation/volvulus, Adhesions, **Meckel's** diverticulum, Hernias, Appendix (rare).

Large intestines-Intussusception, **Hirschsprung's disease**, Enterocolitis/gastroenteritis.

Older child:

General-sepsis, Neurological disorder, Tumours, Metabolic disease, Oesophageal stricture.

Stomach-Gastro-Oesophageal stricture/reflux, Peptic ulcer disease, Gastric volvulus.

Small intestines-Malrotation/volvulus, Adhesions, **Meckel's** diverticulum, Appendicitis/Peritonitis.

Large intestines-Intussusception, Foreign body, Worm infestation, Constipation.

INVESTIGATIONS

1. **Urine dipstick** for **Ketonuria, nitrite/leukocytes, blood.**
2. **RBS, FBS, Urea, electrolytes, creatinine.**
3. CXR, plain X ray abdomen, KUB, USG, Otoscopy.

MANAGEMENT

1. Monitor vital signs, pulse oximetry.
2. Establish IV lines, administer **NS 20ml/kg** bolus over 20-30 minutes.
3. Oral **promethazine** syrup is safe.
4. Treat the cause.

CYANIDE POISONING

SOURCES

1. Hydrogen cyanide gas and cyanide salts
2. Breathing in smoke from a house fire.
3. Workplaces involved in metal polishing and certain insecticides.
4. Medication sodium nitroprusside (Hypertensive crisis).
5. Seeds of apples and apricots, bitter almonds, oranges.
6. Foods (Tapioca, Bamboo shoots)
7. Tobacco smoke, cosmetic nail remover.

SIGNS AND SYMPTOMS

Absorbed rapidly by inhalation, through skin, or gastrointestinal.

1. General weakness
2. Dizziness
3. Headache, nausea
4. Vertigo
5. Confusion
6. Unconscious
7. Rapid breathing
8. Anxiety
9. Bradycardia

10. Hypotension
11. Shock
12. Pulmonary oedema
13. Seizures
14. Coma, cardiac arrest
15. Death

INVESTIGATIONS

Renal profile, RBS, ABG, Serum lactate level

DIFFERENTIAL DIAGNOSIS

1. **CO** poisoning
2. **ACS** (Acute Coronary Syndrome)
3. Lactic acidosis caused by methanol, metformin, salicylates, Iron.

TREATMENT

1. Monitor vital signs, **SPO_2**.
2. 100% **O_2** face mask.
3. For ingestion, activated charcoal.
4. Inhaled **Amyl nitrite** (1-2 ampoules).
5. IV **Sodium nitrite (3%)** 300mg 10ml over 2-5 minutes (adult). IV 0.2-0.33ml/kg (6-10mg) for children.
6. IV **25% sodium thiosulphate 50 ml** over 10 minutes. (Adult) can repeat half dose x1.

(children) 1.65 ml/kg IV over 10 minutes.

7. **Glucose:** It has been suggested that glucose is itself on effective counteragent to cyanide.
8. **Hydroxocobalamin**: **vitamin B_{12}** 5mg to be reconstituted with 200ml of 0.9% NaCl (25mg/ml).

DIGOXIN POISONING

Accidental ingestion is common in children toxicity may occur over a short period of time following an overdose or gradually during long-time treatment. Digoxin is a medication used for heart failure or atrial fibrillation. An **ECG is a routine part of diagnosis.** Blood levels are only useful more than 6 hours following the last dose.

SIGNS AND SYMPTOMS

Chronic toxicity: fatigue, malaise, visual disturbance.

Acute toxicity: nausea, vomiting, vertigo, abdominal pain, headache, dizziness, confusion, delirium, vision disturbance (blurred or yellow vision). Cardiac disturbances include bradycardia, supraventricular or ventricular dysrhythmias, ventricular tachycardia, ventricular fibrillation, sinoatrial block and AV block. High amount of electrolyte potassium **(K^+)** in the blood (**hyperkalaemia**) is characteristic of digoxin toxicity.

DIFFERENTIAL DIAGNOSIS

1. Beta-blocker or **C.C.B** toxicity.
2. **Tricyclic antidepressant** ingestion.
3. **Organophosphate** insecticide poisoning.

INVESTIGATIONS

- ECG
- U&E
- Renal profile
- Blood test for digoxin level if available (the level of digoxin for treatment is 0.5-2 **ng/ml**).
- RBS.

TREATMENT

1. Monitor vital signs, **ECG, RBS.**
2. Gastric lavage if less than one hour since ingestion.
3. Activate charcoal.
4. Maintain adequate airway and assist ventilation as necessary.
5. **Calcium** is contraindicated.
6. Correct hypomagnesemia, hypoxia, hypoglycemia, hypo/hyperkalemia.
7. **Atropine**, pacemaker for bradycardia or **A.V block**.
8. Lidocaine, Phenytoin, **Mg^+** for ventricular arrhythmias.
9. **Digoxin-specific antibody**, Digi bind, (Digoxin immune fab) which is an antibody made up of anti-digoxin immunoglobulin fragments. Digi bind (Digitalis Fab fragments) 5-10 vials IV (40 **µg Fab/vial**) if Digoxin level unknown.

ELECTRICAL AND LIGHTNING INJURIES

Low voltage injuries **(<1,000 volts)** are less serious than high voltage injuries. As voltage increases, the likelihood of extensive burns increases. The longer the duration of contact, the more severe the injury. Never forget to address possible associated injuries:

1. Cervical spine injuries
2. Toxic inhalations
3. Falls with fractures/dislocations
4. Foetal injury during pregnancy

Table for Complications of electrical and lighting injuries

Body system affected	*Shared complications*	*Unique features*
CVS	Ventricular dysrhythmias, low BP (fluid loss), High BP (catecholamine release), myocardial Ischaemia.	Myocardial infarction is rare and tends to be a late finding in both types of injury.
Neurological	LOC, altered mental state, convulsions, aphasia, amnesia, peripheral neuropathy.	Respiratory center paralysis, ICH, cerebral oedema and infarction, parkinsonism are features of lightning injuries. Neuralgias are a late features.
Skin	Electrothermal contact burns, non-contact arc and 'flash' burns, secondary thermal burns of varying depth (clothing ignition and heating of metal jewellery).	Scars and contractures are late features.
Vascular	Thrombosis, coagulation necrosis, intravascular necrosis, intravascular haemolysis, delayed vessel rupture, compartment syndrome.	Disseminated intravascular coagulation in lightning injuries.
Respiratory	Respiratory arrest, aspiration pneumonia, pulmonary contusion.	Pulmonary infarction and pneumonia are late features.
Renal/metabolic	Myoglobinuria, haemoglobinuria, metabolic acidosis, hypokalaemia, hypocalcaemia, hyperglycaemia.	Renal failure is uncommon.
GI tract	Gastric atony and intestinal ileus, bowel perforation, intramural Oesophageal haemorrhage, hepatic and pancreatic necrosis, GI bleeding.	
Muscular	Compartment syndrome, clostridial myositis and myonecrosis.	
Skeletal	Secondary blunt trauma common in both types including vertebral compression fractures (from falls), long bone fractures (from victim being flung or violent muscle contractions), large joint dislocations, aseptic necrosis, periosteal burn, osteomyelitis.	
Eye	Corneal burns, intraocular haemorrhage or thrombosis, uveitis, retinal detachment, orbital fracture.	Late injuries are delayed cataracts, macular degeneration, and optic atrophy.
Ear	Hearing loss (temporary), tinnitus, haemotympanum, CSF rhinorrhoea.	Tympanic membrane rupture is rare.
Oral burns	Delayed labial artery haemorrhage (from child biting electrical cord) with subsequent scarring and facial deformity, delayed speech development, impaired mandibular/dentition development.	These injuries are almost always seen in electrical injuries only.
Foetal	Spontaneous abortion, Foetal death, oligohydramnios, intrauterine growth retardation, hyperbilirubinaemia.	
Psychiatric	Hysteria, anxiety, sleep disturbance, depression, storm phobia, cognitive dysfunction.	These features tend to be more common in lightning injuries.

MANAGEMENT

1. Maintain airway with cervical spine immobilization.
2. Monitor ECG, **SPO_2**, vital signs.
3. FBC, electrolytes/urea/creatinine, RE urine, GXM.
4. IV crystalloid to maintain urine output of 1-1.5 ml/kg/hr.
5. X rays C spine, CXR.
6. IM/IV **Pethidine** 25-50 mg.
7. IM Diclofenac (volteran) 50-75 mg.
8. Insert foley catheter.
9. Consider Ryle's tube.
10. IM **ATT 0.5 ml.**
11. Admit all patients with high-voltage injury (>1,000 volts), specific organ system involvement, suspected neurovascular compromise to the extremities, oral commissure burns, deep hand burn.

HUMAN BITES

Human bites have a higher risk of infection compared to dog or cat gites. Human bites are potentially dangerous wounds and constitute a significant cause of morbidity. Early treatment appropriate prophylaxis and surgical evaluation are key to achieving desired treatment outcomes.

There are two different types:

1. **Occlusion bites:** most common type. They occur when someone else's teeth sink into your skin with enough force to break through the surface of the skin.
2. **Clenched or closed fist bites:** these can be accidental as they occur when someone's teeth, puncturing the hand in the process. While this type of bite may not be as intentional, it typically creates more serious injuries because the knuckles get damaged. This can lead to infections in the finger's joints, tendons, and bones, along with tendinitis and joint stiffness.

RISK FACTORS

You are more likely to get an infection following a bite if you:

1. Have been bitten on the hand, foot, face and scalp, or on a sensitive bone/joint.
2. If you are taking medications that suppress your immune system.
3. Have diabetes.
4. Suffer from alcoholism.
5. Have vascular disease.
6. Are over the age of 50 years.

SIGNS AND SYMPTOMS

1. The site of injury may also bleed.
2. Intense pain and swelling.
3. Pus around the wound.
4. The wound feels warm to tough.
5. Reddening of the skin in the wounded area.
6. Fever chills or generally feeling unwell.
7. Sexual biting is a passionate and animalistic behavior that emerges when people are highly aroused.

COMPLICATIONS

1. Clenched first injuries can lead to septic arthritis of the **MCP** joint, which is a rapidly destructive process.
2. Fist bite injuries with retained fragments of tooth in the wound can lead to infection.
3. **HIV** is a risk when there is blood in the mouth of the person who bites and there is a breach in the skin of the victim. **HIV PEP** is not routinely indicated after a human bite. It may be prudent to obtain a baseline HIV serological test with a 6 month follow up test.
4. The rate of transmission of **HBV** is not high enough to warrant routine prophylaxis in bites from or unknown source. If possible, the assailant should be tested for **HBV** surface antigen and **HBV** envelope antigen.
5. Necrotizing fasciitis
6. Penile bites have been reported to transmit many serious infections such as **streptococcal toxic** shock syndrome and **Fournier's gangrene**.
7. The most common **aerobic** isolates were **streptococcus, staphylococcus,** and **Eikenella** species. The most common **anaerobic pathogens** were **Prevotella** and **Fusobacterium** species. Isolated cases of transmission of **herpes virus**, **tetanus, tuberculosis**, **Actinomyces** and **Treponema pallidum (syphilis)** through human bites have been reported in the literature.

DIAGNOSIS

1. The extent of damage to the soft tissue, depth of the bite, involvement of tendons, presence of infection or foreign bodies such as fragments of teeth must be assessed.
2. All bite marks in a young child should raise suspicion of abuse. The normal distance between the maxillary canine teeth in adults is **2.5-4.0 cm.**
3. Suspicious wounds should be photographed next to a ruler.
4. **X-ray** must be taken in all clenched fist injuries and penetrating scalp wounds in children to rule out fractures, presence of foreign bodies or teeth fragments in the wound or, in late cases, osteomyelitis.
5. Think of punch bite cellulitis/clenched fist injury in puncture wounds or infections at the 4^{th} or 5^{th} metacarpophalangeal joints.

MANAGEMENT

1. **Clean out the wound.** This should be done with **saline solution and/or povidone iodine**. If you

have access to a syringe, you should use it to wash the wound, as the pressure will help reduce the level of bacteria. If needed remove any loose, dead skin or foreign objects from the wound.
2. Take tissue cultures, do blood tests, take **X-ray.**
3. Most human bite wounds are usually not closed primarily except for cosmetic purposes, e.g., face and neck in females.
4. In more severe cases, all dead tissue (must be removed and) followed by a skin graft to close the wound.
5. **Antibiotics** might be recommended for soft-tissue infections **(7 to 14 days) severe infections** (10 **to 14 days) and severe bone/joint infections (4-6 weeks).**
   - Amoxicillin + clavulanic acid (Augmentin) 375 mg 8 hourly.
   - If **allergic to penicillin**, give **clindamycin, Trimethoprim + sulfamethoxazole, ciprofloxacin**.
6. Adults who are bitten should receive a **tetanus toxoid vaccine** if the most recent tetanus vaccine was greater than 5 years previously.
7. Surgical management of human bites ranges from simple surgical exploration of the wound to repair of complex structures under the microscope.
8. **Admit if:**
   (a) Any degree of infection occurs beyond limited local wound cellulitis.
   (b) Wound seen > 24 hours after bite.
   (c) Immunocompromised patient.
   (d) Human bites of hands and genitalia.

IRON POISONING

Dangerous dose of iron can be as small as 30mg/kg. The toxic effect of iron is due to unbound iron in the serum.

CLINICAL MANIFESTATIONS

- **Stage 1** (6-12 hours)
  - Gastrointestinal bleeding, vomiting, abdominal pain, diarrhoea, hypotension, dehydration, acidosis and coma.
- **Stage 2** (12-16 hours)
  - Symptom free period but has nonspecific malaise.
- **Stage 3** (16-24 hours)
  - Profound hemodynamic instability and shock.
- **Stage 4** (2-5 weeks)
  - Liver failure and gastrointestinal scarring with pyloric obstruction.

MANAGEMENT

1. Supportive care.
2. **Ingestion < 30mg/kg** patients are unlikely to require treatment.
3. **Ingestion of > 30mg/kg** perform abdominal X-ray. If pellets are seen, then use gastric lavage with wide bore tube.
4. **IV Desferrioxamine 15mg/kg** till maximum of 80mg/kg in 24 hours.
5. If serum iron is not available, severe poisoning is indicated by nausea, vomiting, **leucocytosis**>15x10^9 and **hyperglycemia >8.3 micro mol/l.**
6. Gastrointestinal bleeding, hypotension, metabolic acidosis, coma and shock are poor prognostic features.

ISONIAZID (INH) POISONING

INH toxicity primarily cause life-threatening seizures and lactic acidosis through depletion of vitamin B6.

TOXICODYNAMIC

Isoniazid decreased pyridoxal 5-phosphate levels by inhibiting formation and increasing rate of elimination. **P5P** is **vitamin B6**. P5P is a cofactor in >100 enzyme reactions, including conversion of glutamate to **GABA**. Thus, **INH** cause **GABA (Gama Amino-Butyric Acid)** depletion resulting **CNS** excitation and seizures. Lactic acidosis results from seizures and from impaired conversion of lactate to pyruvate.

RISK ASSESSMENT

1. >1.5 g (20 mg/kg) symptoms develop.
2. > 3 g (40 mg/kg) seizures, metabolic acidosis, coma.
3. > 10 g (130mg/kg) always lethal without treatment.

CLINICAL FEATURES

1. Dizziness, blurred vision, photophobia, nausea and vomiting.
2. Tachycardia, mydriasis, dysarthria, ataxia and hyperreflexia.
3. Rapid confusion, coma, seizures, lactic acidosis.
4. Seizures are usually generalized tonic-clonic in nature and may resolve spontaneously then recur rapidly.
5. Complication of prolong seizures.

INVESTIGATIONS

1. ECG
2. ABG if available
3. INH level if available

MANAGEMENT

1. Attend to **ABCs**
2. Treat seizures with benzodiazepine.
3. Intubation for prolonged seizures.
4. **Gastric lavage** and give **activated charcoal**.

5. **Pyridoxine B6** 1gm IV for each gram of INH ingestion up to maximum of 5g (70mg/kg in children) give 5 gm IV if **INH dose,** is unknown.
6. Observe asymptomatic overdoses for 6 hours, then discharge if remain well and no treatment required.

KEROSENE AND OTHER HYDROCARBONS POISONING

- Ingestion of kerosene and other hydrocarbons (gasoline, benzene, baby powder etc.) are common in children.
- Aspiration (substance enters the airway) occurs either during ingestion or later due to vomiting, 1ml is sufficient to produce significant injury in the lungs (chemical pneumonitis) and producing neurological manifestations e.g., respiratory suppression, respiratory failure, drowsiness, seizure, coma. Some hydrocarbons are arrhythmogenic and might result in dysrhythmias and sudden death.
- When receiving a child with kerosene poisoning ask about amount of ingestion (remember even 1 ml is dangerous if aspirated), time of ingestion. The accident might be witnessed; hence diagnosis is straight forward in that case. If accident is not witnessed, the parent may smell the chemical on the child's skin, clothing, or breath, or they may report that their child is coughing, choking, cyanotic or vomiting.

INVESTIGATIONS

- **CXR** after 6 hours from ingestion.
- **ECG.**
- **ABG** in severely ill patients.

MANAGEMENT

1. **Admit** the patient, remove all contaminated clothes, wash face, neck and other parts of body if kerosene spilled on and contaminated. Use water and soap for washing.
2. Check **SPO_2**, give supplemental **O_2** to all patients, monitor vital signs.
3. Intubate the patient with severe respiratory distress.
4. IV fluid.
5. **NBM** for at least 6 hours.
6. Analgesic for rest or fever. E.g., **PCM** IV or retally (not oral).
7. Trial of **bronchodilators** in the patient with suspected **bronchospasm.**
8. Avoid inducing **emesis** (to prevent aspiration).
9. **Gastric lavage is contraindicated.**
10. No role for **activated charcoal** because it does not bind with hydrocarbons.
11. **Prophylactic antibiotic** is not necessary unless there are signs of bacterial superinfection for e.g., high fever.
12. **Corticosteroid** is not beneficial (increase, risk of bacterial superinfection).
13. Patients with dysrhythmias should be treated with **beta-blockers**.
14. Seizures should be treated with **IV Diazepam**. (Phenytoin should be avoided).
15. After 6 hours if the child is doing well and radiology is negative, discharge the patient home on simple **antipyretic with instructions**. (If there is high fever patient should be brought back to medical attention).

LEAD POISONING

Results from chronic exposure; sources include solder, batteries, paint.

SIGNS AND SYMPTOMS

Colicky abdominal pain, gum lead line, constipation, headache, irritability, neuropathy, learning disorder in children, episodes of gout. Ataxia, confusion, obtundation, seizures.

INVESTIGATIONS

- Complete blood count
- Renal profile
- Blood chemistry
- Blood lead level
- Abdominal X ray
- Long bone radiograph (looking for lead lines)

Blood lead > 10µg/dl toxic
> 70 mg/dl severe

DIFFERENTIAL DIAGNOSIS

- **Other heavy metal toxicity** (arsenic mercury).
- **Co-exposure** (Tricyclic antidepressants overdose, alcohol withdrawal, meningitis, encephalitis, hypoglycemia, Idiopathic gout, IDA, Depression, learning disability)

TREATMENT

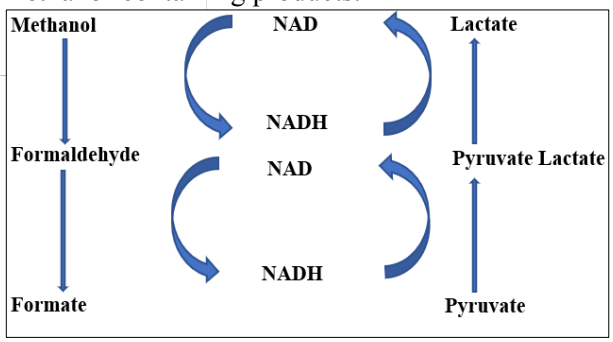
1. Airway protection, monitor vital signs, pulse oximetry.
2. Gastric lavage for acute ingestion.

METHANOL POISONING

Methanol intoxication is due to accumulation of formate.

Over half of the world's methanol is used in various chemical applications. Methanol is used as a feedstock to produce chemicals such as acetic acid and formaldehyde, which in turn are used in products like adhesives, foams, plywood subfloors, solvents and windshield washer fluid. Foods such as fresh fruits and vegetables, fruits juices, fermented beverages, and diet soft drinks containing aspartame are the primary sources of methanol in the human body. Most methanol poisoning occur as a result of drinking beverages

contaminated with methanol or from drinking methanol-containing products.



Methanol metabolites cause

1. **GI tract irritation:** nausea, vomiting and abdominal pain, specific smell on the breath.
2. **CNS intoxication:** headache, confusion and decreased level of consciousness, poor or no coordination.
3. **Ocular toxicity**: Decreased vision may start as early as 12 hours after exposure. Long term outcomes may include blindness, look for retinal oedema and **hyperaemia** of the disc, and document visual acuity.
4. **Metabolic acidosis** with high osmolar gap. Methanol is found in windshield washer fluid, carburetor fluid, glass cleaners, lacquers, adhesives, inks. Toxicity and death may occur even after drinking a small amount.

DIFFERENTIAL DIAGNOSIS

1. **Infections**
2. **Exposure to toxic alcohols (Ethanol)**
3. **DKA**
4. **Hypoglycemia**

INVESTIGATIONS

1. Blood acidosis (ABG)
2. Increase osmol gap
3. Methanol blood level

MANAGEMENT

1. Monitor vital signs, **RBS, SPO_2**.
2. Maintain adequate airway and assist ventilation.
3. Supportive therapy for coma and seizures.
4. **Ethanol** and **fomepizole** have been shown to slow the metabolism of methanol to formate. One of these two antidotes should be used as soon as possible to prevent the production of formate.

   Ethanol dosing: oral method
   - **Loading dose** – 50% concentration by Ryle's tube: 2ml/kg (0.8gm/kg).
   - **Maintenance dose** – 0.11-0.13 gm/kg/hr.
   - **IV method: loading:** 10% concentration in **D5** through central line at 10ml/kg maintenance: 1.6 ml/kg/hr.

   Fomepizole dosing
   - **Loading dose:** 15mg/kg
   - **Maintenance dose:** 10mg/kg every 12 hours for 48 hours.
   - **After 48 hours:** 15mg/kg every 12 hours.
5. **Hemodialysis**
   - **Prognosis:** good with early treatment.
   - **Frequency:** 1,700 cases per year (US).

MUSHROOM POISONING

CLINICAL FEATURES

- Flushing
- Dry skin, dry mouth
- Dilated pupils
- Fever (hyperthermia)
- Absent bowel sounds
- Urinary retention, Distended bladder
- Blurred vision
- Seizures
- Myoclonus

INVESTIGATIONS

- Serum electrolytes
- Creatinine
- Calcium
- Glucose
- RE urine
- ECG.

MANAGEMENT

1. Gastric lavage if less than 1 hour since ingestion.
2. Single dose **activated charcoal 1gm/kg**
3. IV NS, cooling fan, ice water bath.

NEEDLE-STICK INJURY

- A needle stick injury is the penetration of the skin by a hypodermic needle or other sharp object that has been contact with blood, tissue or other body fluids before the exposure.
- These injuries can lead to transmission of **blood-borne diseases.** The risk of contracting **hepatitis B, hepatitis C, and HIV** is the highest.
- Healthcare workers are more susceptible to contracting these diseases from a needle stick injury.

CAUSES

1. When drawing blood, administering on intramuscular or intravenous drug, or performing any procedure involving sharps, accidents can occur.
2. Injuries commonly occur during needle recapping or via improper disposal of devices into an overfilled or poorly located sharp container.
3. Lack of appropriate personal protective equipment.
4. **NSI** may occur when needle is exchanged between personal, loaded into a needle driver, or

when sutures are tied off when still connected to the needle.
5. Needle stick injuries are more common during night shifts.

PREVENTION

1. Wearing appropriate PPE.
2. Use of two pairs of gloves (double gloving) or Triple gloving.
3. Education with training for at-risk healthcare workers.
4. Not to do recapping of needles.
5. Proper disposal of needles into the sharp container.
6. Needle exchange programs for **IVDU.**

TREATMENT

1. Wash the area with soap and water.
2. If water is not available hand wipes and alcohol-base or liquid or gel.
3. An antiseptic such as povidone-iodine may also be applied.
4. Gauze with a dressing.
5. Immediately seek medical attention.
6. Get counselling to reduce post-traumatic stress disorder.
7. Eligibility for PEP for HBV after risk from a known positive patient source
8. Eligibility for PEP for HIV
9. Action to be taken after **NSI** from a known positive **(HCV)** patient source no **PEP** recommended. HCV PCR after 2-4 weeks if negative, repeat 6-8 weeks after exposure.
   Follow-up test: anti-**HCV** at 6 weeks, 3 months, 6 months.

Table: Eligibility for PEP for HBV after risk from a known positive patient source

Exposed person status	**Recommend action**
vaccinated	Administer **HBV** immunoglobulin with 48 hours of exposure initiate full **HBV** vaccination schedule as soon as possible.
Vaccinated, anti-**HBs level ≥ 10 mIU/ml**	Reassure individual. No specific PEP
Vaccinated, anti-**HBs level ≤ 10 mIU/ml**	**Administer HBV immunoglobulin**. Administer one dose of **HBV** vaccine and plan to revaccinate.
Vaccinated, anti-HBs levels not known	Test for anti-HBs levels and take appropriate recommended action.
HBs Ag positive **(HBV carrier)**	Counsel the individual. No specific **PEP**

Table: Eligibility for PEP for HIV

Source	**Exposed person**
Known positive patient	• **Four-week** course of a combination of three antiretroviral drugs. • **AZT** (Zidovudine) 300mg BD + Lamivudine (3TC) 150 mg BD + **IDV (Indinavir)** 800 mg TDS x 28 days. • **Follow-up test:** • Anti-HIV: 6 weeks, 3 months, 6 months.

ONCOLOGY EMERGENCIES

Patients with malignancies are prone to emergencies either arising from their treatment or related to their malignancy. The four most common and life-threatening **oncologic emergencies** are:

1. **Neutropenic sepsis.**
2. **Thrombocytopenia.**
3. **Hypercalcemia.**
4. **Cord compression.**

1. NEUTROPENIA FEVER/SEPSIS

- This is an emergency and is the most common fatal side effect of **chemotherapy**.
  Definition of neutropenia**:** Absolute neutrophil **count (ANC) < 1,000**.

Drugs	**When neutropenia starts**
• Taxane Camptothecin	Days 7-10
• Anthracyclines (Adriamycin)	Day 12-14
• Alkylating agents (Cyclophosphamide)	Days 12-14
• Mitomycin C	1 week

Management

- Investigate FBC, BUN, Creatinine, electrolytes, LFT, CXR, Blood and urine culture.
- IV Antibiotics immediately (after blood cultures drawn).
  1. **IV Ceftazidime (Fortum)** 1-2 gm stat **AND**
  2. IV Gentamicin 2mg/kg stat.
- If the patient is more ill, give:
  1. IV Ceftazidime (Fortum) 2gm AND
  2. **IV Amikacin** 7.5mg/kg body weight **stat.**
- If the patient is allergic to penicillin, give IV Ciprofloxacin and Gentamicin.

  Notes: No IM injection unless critical to management. No need Blood culture if the patient has no neutropenia.

2. THROMBOCYTOPENIA

There is a significant chance of **CNS bleeding** if platelet count is < 20,000.

Management

1. GXM random platelets 6 vests.
2. No IM injections.
3. Avoid **NSAIDs.**

3. HYPERCALCAEMIA

Definition**:** elevated **serum ionized calcium**.

Symptoms and signs are non-specific including Aches and pains, lethargy, weakness, nausea and vomiting, dehydration, polyuria, polydipsia, constipation, confusion, seizures, coma. If untreated, it can be life-threatening.

Investigations

- **Serum calcium.**
- **Urea.**
- **Electrolytes.**
- **Creatinine.**

Management

IV NS (3-4 liters) in 24 hours to improve urine output and excretion of calcium.

4. CORD COMPRESSION

This complication usually signifies advanced malignancy and a limited survival. Hence, cord compression is a **true emergency**.

Signs and symptoms

- Back pain in **>95%**
- Localized tenderness on palpitation.
- Weakness, sensory changes, decreased reflexes.

Management

- Plain X-ray of spine.
- Give IV Dexamethasone 12-16mg in 50ml normal saline infusion immediately followed by 4 mg 6 hourly.

OPIOIDS POISONING

Features

Respiratory depression, miosis, altered mental status.

Signs of IV drug abuse (needle marks, a tourniquet)

1. Seizures (**Tramadol, dextromethorphan, propoxyphene meperidine**).
2. Non-cardiogenic pulmonary oedema.
3. May produce myoclonus, hyperreflexia, diaphoresis, tremor, diarrhoea, fever, **incoordination (dextromethorphan, meperidine produce serotonin syndrome**).

DIFFERENTIAL DIAGNOSIS

1. Alcohol/ Clonidine/ Phenothiazine/ overdose organophosphate exposure.
2. Congestive heart failure.
3. Infectious/ metabolic encephalopathy.
4. Hypoglycemia, hypoxia, postictal state.

TREATMENT

1. Maintain airway.
2. Monitor vital signs, pulse oximetry.
3. Supportive therapy for coma, hypothermia, hypotension.
4. Benzodiazepines for seizures.
5. Gastric lavage for very large ingestions presenting within 1 hour.
6. Activated charcoal.
7. **IV Naloxone**
   - **0.4 mg** (mildly sedated).
   - **2 mg IV** (severely sedated, comatose).
   - **repeated dose** up to 10mg IV.

ORGANOPHOSPHATES POISONING

The active agent in most pesticides and insecticides is parathion, which inhibits **acetylcholinesterase** and results in excess **acetylcholine** accumulating at the myoneural junctions and synapses.

PATHOPHYSIOLOGY

1. **Muscarinic effects:**

   D. Diarrhoea
   U. Urination
   M. Miosis
   B. Bronchorrhea/ Bronchospasm/ Bradycardia/ Pulmonary oedema.
   E. Emesis
   L. Lacrimation
   S. Salivation, hypotension

2. Nicotinic effects

Diaphoresis (sweating), hypoventilation, tachycardia, muscle fasciculations, cramps, weakness leading to flaccid muscle paralysis.

3. CNS effects

- Anxiety and insomnia.
- Respiratory depression

- Convulsion and coma.

MANAGEMENT

1. All staffs wear protective equipment.
2. Maintain airway.
3. High flow **O_2**.
4. Perform gastric lavage and send specimen.
5. Monitor ECG, pulse oximetry.
6. Peripheral IV line with NS.
7. **Lab:** FBC, Urea, electrolytes.
8. **Activated charcoal** via gastric lavage tube. **Dosage: 1gm/kg body weight.**
9. **Atropine** IV 2mg every 15 minutes **PRN** children 0.05/kg body weight every 15 minutes PRN until secretion have been controlled or signs of **atropinization** are obvious (flushed skin, dry skin, tachycardia, mydriasis, and dry mouth).
10. **Pralidoxime** (2-PAM, protopam).
    Dosage:
    Adult: 1gm IV over 15-30 minutes can be repeated in 1-2 hrs **PRN.**
    Children: 25-50mg/kg body weight IV over 15-30 minutes, can be repeated 1-2 hours.
11. IV **Diazepam** 5-10mg for anxiety/restlessness.
12. IV **Furosemide** 40 mg for **pulmonary congestion** after full **atropinization**.

PARACETAMOL POISONING

Paracetamol is also called acetaminophen and commonest form of drug overdose. Toxicity has been shown to occur with **ingested dose > 150mg/Kg body weight (or) 7.5 gm (15 tablets)** in an overage-sized adult. Fatality is **unlikely if < 225mg/kg is ingested.**

CLINICAL MANIFESTATION

Stages of paracetamol toxicity

- **Stage 1:** (up to 24 hour)
  - Abdominal pain, loss of appetite, nausea and vomiting, some asymptomatic, probable pallor and sweating.
- **Stage 2:** (24-48 hours)
  - Enlarged and tender liver. Symptoms often abate. **Liver enzymes** elevated, and **Renal function test** may be abnormal. **Prothrombin Time (PT)** elevated.
- **Stage 3:** (72-96 hours)
  - Symptoms of nausea, vomiting, anorexia return. Clinical **jaundice is obvious.** Liver function test are at their highest level of abnormality. **Hepatic failure and renal impairment may occur during this stage.**
- **Stage 4:** (4 days to 2 weeks)
  - Recovery phase lasts 7-8 days. If a patient presents late or has not been treated earlier in the disease, the **hepatotoxicity** induced by **paracetamol** may progress to **hepatic failure, coma and possibly death.**

MANAGEMENT

1. Maintain airway
2. Monitor ECG, vital signs every 15 minutes, pulse oximetry.
3. **RBS/ LFT/ PT/ APTT/ RFT** for 3 days
4. Establish peripheral IV line. Administer **O_2** if **SPO_2** is decreased.
5. Perform **gastric lavage** if patient presents within one hour of ingestion and collect specimen.
6. Initiation of **N. Acetylcysteine (NAC)** within 10 hours of ingestion but it is still beneficial up to 24 hours of ingestion. **N. Acetylcysteine (PARVOLEX)** IV infusion.
   - **Initial dosage:** 150 mg/kg IV over 15 minutes. Followed by continuous infusion (50mg/kg in 500 ml of 5% dextrose in 4 hours). Followed by continuous infusion (100mg/kg in 1 liter 5% dextrose over 16 hours).
   - **Total dosage:** 300mg/kg in 20 hours. (Adverse effects of **parvolex:** nausea, flushing, urticaria and pruritus. Treatment is to stop infusion for 15 minutes and restart the infusion at the slowest rate).
7. **Activated charcoal:** Administer via the gastric lavage tube.
   - **Dosage:** 1 gm/kg bodyweight (maximum 50gm). If **PT** is prolonged, give **vitamin K 10mg** IM.

SALICYLATES POISONING

(Aspirin, Sport liniments, and Traditional Chinese Medicines)

Ingestion of **> 0.15 g/kg** will cause symptoms. The fatal dose is estimated to be **0.2-0.5 g/kg**. It is main effects are as a metabolic poison causing metabolic acidosis and hyperglycemia.

CLINICAL MANIFESTATIONS

- **Mild Toxicity**
  - hyperventilation, ototoxicity (especially tinnitus)
- **Moderate Toxicity:**
  - vomiting generally starting 3-6 hours post ingestion severe hyperpnea, hyperthermia, diaphoresis (perfuse sweating), dehydration, epigastric pain, acute hepatitis.
- **Severe Toxicity:**
  - Delirium, Seizures (convulsion), cerebral oedema, coma, Non-cardiogenic pulmonary oedema, dysrhythmias, **UGIH,** acute renal failure.

MANAGEMENT

1. Maintain airway
2. Monitor vital sings every 15 minutes, pulse oximetry, ECG.
3. Administer 100% **O_2** via non-rebreather reservoir mask.

4. **Investigations:** FBC, PCV, BUSE/Serum creatinine, LFT, PT/APTT, RBS, ABG, Serum salicylate level if available. **Note:** Serum salicylate level of 30mg% is non-toxic range.
5. Perform gastric lavage even beyond 1 hour as **salicylates** delay gastric emptying.
6. Establish peripheral IV line with NS.
7. **Activated charcoal** via lavage tube or PO: 1gm/kg body weight.
8. IV bolus 1-2mmol/l/kg 8.4% **$NaHCO_3$** (Sodium Bicarbonate) infusion: 150ml 8.4% **$NaHCO_3$** in 850ml D5 (Titrate flow rate against urine **pH** 7.5-8.0). If urine **pH** is increased to **pH 8** the urinary excretion of salicylate increases **10-20-fold.**

SCORPION STINGS

Scorpion stings are common in many tropical countries. Although most scorpion stings cause only localized pain without life-threatening envenoming, about one third of stings cause systemic envenoming which can result in death. Children are particularly sensitive to scorpion envenoming. Although the incidence of scorpion stings is higher in adults, the severity of envenoming is significantly greater in children, in whom the case fatality rate is up to ten items higher than in adults.

Scorpions have two pincers, 8 legs and an elongated body with a tail composed of segments. The last tail segment contains the stinger (telson) that transmit a toxin to the person who has been stung. They are shy creatures, active at night during the hot season, but often live-in house or near inhabited areas.

Composition of scorpion venom

Scorpion venom is composed of toxins and enzymes with neurological tropism acting on ion channels of excitable cells. Toxins binding to the sodium channel are most important because they induce paralysis and cardiac arrhythmia. Other toxins affecting membrane ion channels, including those for potassium, are of great interest in neurobiology and can have a synergistic action on clinical symptoms, resulting in severe complications.

The venom of the same scorpion can have multiple toxins that may interact with each other, modulating the response of the ion channels involved and leading to complex and rapidly progressive symptoms.

CLINICAL MANIFESTATIONS

- **Grade I:** Local pain associated with local paresthesia, erythema, ecchymosis, blisters.
- **Grade II:** Mild systemic envenoming
- **Grade I + Hyperthermia:** Cardiovascular and respiratory symptoms

  Tachycardia, arrhythmia, dyspnea, hypertension/hypotension, ECG abnormalities, priapism

  Hypersecretory syndrome (salivation, sweating, Bronchorrhea, nausea, vomiting, diarrhea, urination)
- **Digestive tract:** abnormal distension, abdominal cramps.
- **Neurological disorders:** hyperleukocytosis, hyperglycemia, acidosis.
- **Grade III:** Life-threatening envenoming
- **Grade II + multivesicular failure**
- **Cardiovascular systems:** heart failure, cardiogenic shock, pulmonary oedema, diaphoresis.
- **Neuromuscular disorders:** dysfunction of both skeletal and cranial muscles: convulsions, paralysis, **GCS ≤ 6.**
- **Biological disorders: SPO_2** < 90% increasing biomarkers of cellular necrosis (aspartate transaminase, creatine phosphokinase, troponin I, alanine transaminase, gamma glutamyl transferase, alkaline phosphatase, lipase amylase)
- **Electrolyte disturbance:** hyponatremia, hypocalcemia, hyperkalemia.

Note

- **Grade I** represent 70% of patients.
- **Grade II** 20%
- **Grade III** < 10%

MANAGEMENT

Scorpion stings usually occur at night, at the victim's home, in suburbs, or center of small towns, and in rural areas. Arrival at the health center may be delayed by up to 1-2 hours after the sting because of an initial preference for traditional medicine, the health center being remote, or the patient having been referral from a health center locking appropriate health care resources. First aid is usually administered by health staff with limited appropriate training.

1. **Aspirin** 20mg/kg orally every 4 hours (or) paracetamol 1-2 tablets 4 hourly
2. **Local anesthesia** with **1% lignocaine.**
3. **Prazosin** 30 microgram/kg orally every 6 hours.
4. **Midazolam** 0.5mg/kg every 12 hours orally or IV.
5. Immunotherapy (Anti-venom).
6. **Contraindication: morphine** or its derivative (**Tramadol, codeine**) cause respiratory depression. **Atropine** (anti-parasympathetic drugs) cause blockage of sweating, which is essential for temperature regulation especially in children, and potentiate the adrenergic effect of scorpion venom. Barbiturates have depressive effect on respiration.
7. **Wash the sting** with soap and water. Apply ice to the sting area.
8. Collect dead scorpion to show to the physician.

9. All but the mildest of symptoms require hospital admission for 24 hours of observation, especially for children.

SPECIFIC ANTIDOTES FOR TOXINS

Toxin	*Antidote*	*Dosage*
Acetaminophen, Paracetamol	N-acetylcysteine (Parvolex ml contain 200mg Parvolex)	IV 150mg/kg in 200ml **D_5w** x 15 min, then IV 50mg/kg in 500 ml **D_5w** x 4 h, then IV 100 mg/kg in 1000 **D_5w** x 16 h
Arsenic, mercury, lead	BAL (dimercaprol)	5 mg/kg body weight IM
Atropine	Physostigmine	0.5-2 mg IV
Benzodiazepines	Flumazenil (Anexate)	See section on coma cocktail'
Carbon monoxide	oxygen	100% **O_2** (hyperbaric for moderate-severe exposure and exposure in pregnant women) Refer to ***poisoning, carbon monoxide.***
Cyanide	Amyl nitrite pearls Sodium nitrite (3% sol)	Inhalation of contents of 1-2 pearls **Adults:** IV 300 mg (10 ml) over 2-5 min. **Children:** IV 0.2-0.33 ml/kg (6-10 mg)
	Sodium thiosulphate (25% sol)	Adults: 50 ml IV (12.5 g) over 10 min; can repeat halt dose x 1 prn; children: 1.65 ml/kg IV over 10 min.
Ethylene glycol, methanol	Ethanol (10%) mixed in **D_5W**	Loading dose: 800 mg/kg Maintenance: 1-1.5 ml/kg/h
Iron	Desferoxamine	15 mg/kg/h IV
Lead	EDTA: calcium disodium edetate	1000-1500 mg/m^2 /day IV continuous infusion
Nitrites	Methylene blue (1% solution)	1-2 mg/kg IV x 5 minutes
Organophosphates	Atropine	2-4 mg IV q 5-10 min prn (adult); 0.5 mg/kg IV q 5 min prn (child)
	Pralidoxime (2-PAM)	25-50 mg/kg IV (up to 1 g)
Opioids	Naloxone	See section on 'coma cocktail'
Phenothiazines	Benztropine (Cogentin) Diphenhydramine	2 mg IV/IM 50 mg IV/IM/PO
Isoniazid (INH)	Pyridoxine	5 g IV (can repeat if fits persist)
Digoxin, digitoxin, oleander	Digitalis Fab fragments (Digibind)	Digoxin level unknown: 5-10 vials IV (40 µg Fab/vial): can repeat Digoxin level known: # vials Digibind = (serum digoxin) x 5.6 liter/kg x weight in kg 1000/0.6

TRICYCLIC ANTI-DEPRESSANTS POISONING

(Imipramine, Amitriptyline, Trimipramine)

CLINICAL MANIFESTATIONS

- **CVS:** Sinus Tachycardia, Hypotension, complex arrhythmias, widen QRS,
- **CNS:** Agitation, confusion, convulsion, drowsiness, coma, **physical findings:** clonus, increased muscle tone, hyperreflexia, Extensor plantar responses.
- **Anticholinergic effects:** fever, Dry mouth, Ileus, dilated pupils/mydriasis, flushing, Dry skin, Blurred vision, urinary retention.
- **Respiratory:** Respiratory depression, pulmonary oedema, pneumonia, **ARDS**.

MANAGEMENT

1. Vital signs, maintain airway, High flow O_2
2. Monitor ECG.
3. Establish IV line and NS.
4. CXR, FBC, U&E, Creatinine.
5. Place urinary catheter.
6. Perform gastric lavage.
7. **Activated charcoal** 1-2 gm/kg/dose 4-8 hourly.
8. 1-2 mmol/kg **$NaHCO_3$** in slow IV bolus.
9. IV **Diazepam** 2-5mg bolus repeated every minute to a total of 20mg for convulsions.
10. **Noradrenaline** infusion 0.5-1.0 micrograms/min for hypotension.
11. **$MgSO_4$** IV bolus 1-2gm over 60 seconds. Infusion 1-2gm/hr for torsades de pointes.

BASIC CARDIO - RESPIRATORY RESUSCITATION

Basic **cardiorespiratory resuscitation** is the immediate care given to someone in cardio-respiratory shock.

What is a shock?

DEFINITION

A shock is a clinical syndrome in which the peripheral blood flow is inadequate to return sufficient blood to the heart for normal function. Transport of oxygen to organs and tissue is not enough. If this is not treated quickly, heart and brain may fail, which can lead to death.

What causes circulatory shock?

- The heart fails to pump blood, or the blood vessels dilate, as in severe infection or allergic shock, reducing the blood pressure.
- Fluids or blood loss, through burns, severe diarrhea, or vomiting.

SIGNS OF SHOCK

At first step

- a rapid pulse
- pale, grey-blue skin, especially inside the lip. Fingernails or earlobe, if pressed, will not regain its colour immediately.
- sweating and cold, clammy skin.

Shock developed. There may be:

- weakness and giddiness
- nausea, and possibly vomiting.
- thirst
- rapid, shallow breathing
- a weak pulse, when the pulse at the wrist disappears, about half the blood volume will have been lost.

As the brain's oxygen supply weakness, there may be:

- Restless, anxious, and even aggressive
- Gasp for air (air hunger)
- Unconscious
- The heart will stop.

STEPS OF RESUSCITATION

Resuscitation of the patient means 'stimulating breathing and/or heartbeat when the patient fails to do this itself'. The nurse must act calmly and with confidence.

D – Is there Danger?
R – Is the patient Responsive?
S – Send for HELP!
A – Open/clear Airway
B – Is the patient breathing?
C – Start CPR
30 compressions: 2 Breaths
OR
Continuous compressions

Requirements

- Minimal CPR interruptions
- Oxygen cylinder
- Equipment
- Self-inflating bag-valve mask
- Cannula
- IV fluid set
- IV Adrenaline and IV fluids
- Syringes and needles

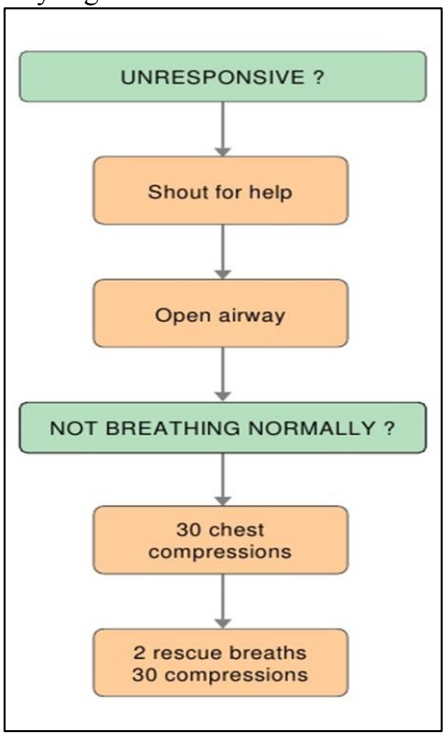


Figure: Resuscitation in adult (ref: UK's RC)

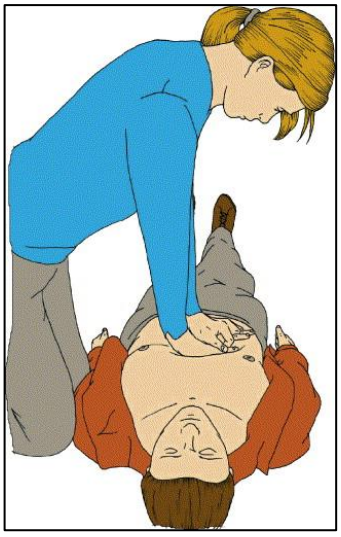


Figure Body position of cardiac massage

Figure Hand position of cardiac massage

- Kneel by the side of the patient. Patient is lying on the back on a hard surface
- Place the heel of one hand in the center of the patient chest.
- Place the heel of your other hand on top of the first hand.
- Interlock the fingers of your hands.
- Position yourself vertically above the patient's chest and, with your arms straight, press down on the sternum 4-5cm.
- After compression, release all the pressure on the chest without losing contact.
- Repeat at a rate of about 100 / minute, about 1 or 2 massages per second.
- Combine 30 chest compressions with 2 artificial ventilations.
- Two techniques: mouth to mouth or Ambubag.

Artificial ventilation – Adults

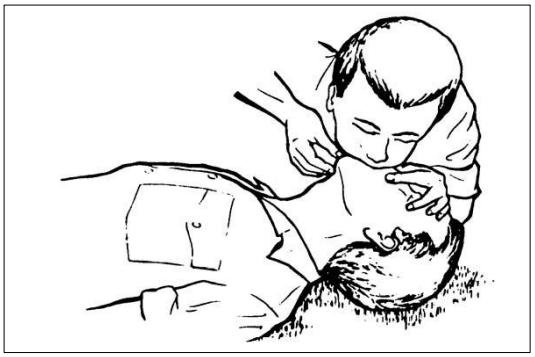


Figure: Mouth to mouth ventilation

1. **Mouth to mouth**
   - Be sure that the airway is free
   - Pinch the soft part of the nose closed.
   - Maintain chin lift
   - Take a normal breath and place your lips around the mouth. Blow steadily into the mouth during 1 second. Check movement of the chest.
   - Repeat it one time.

2. **Ambubag**

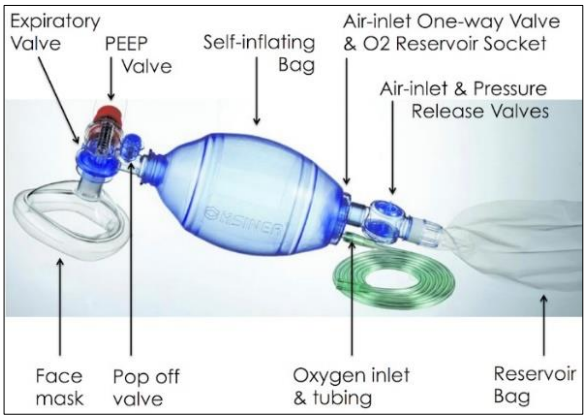


Figure: Ambubag ventilation

- Choose the correct size of mask for the patient
- Maintain the hyper extension of the head
- Apply the mask properly over the patient's face by grasping his chin but without strangling him
- Press the balloon adapted to Ambubag at the same rhythm than mouth to mouth.

Always check the effect of your artificial respiration:

- Avoid air escaping
- Look at the chest movement

Within the first 10 seconds, the procedures had to be done are

1. Call for **HELP**
2. Move the table to allow access around the patient
3. Start good quality CPR with minimal interruptions (never more than 10s off the chest)

Do not stop CPR unless told to!

Within the first minute, the procedures had to be done are

1. Bag-valve mask should be used to ventilate the patient WITH oxygen. Use two-person technique.
2. 30:2 CPR: Ventilation ratio.
3. IV access should be obtained with IV fluids connected.
4. IV adrenaline 1mg should be given STAT (then every 5 minutes).

5. Every 2 minutes, pause CPR and do a central pulse check (femoral and/or carotid).

Resuscitation should be stopped if:

1. Signs of life develop.
2. Return of pulse.
3. Team decides that resuscitation will be unsuccessful (After the resuscitation have not succeeded by 20 minutes).

If returned of spontaneous circulation occurs:

1. Put patient in recovery position with oxygen (aim saturation 94-98%).
2. Continue to treat underlying cause.
3. IVF if needed, check glucose.
4. Severe observation chart.

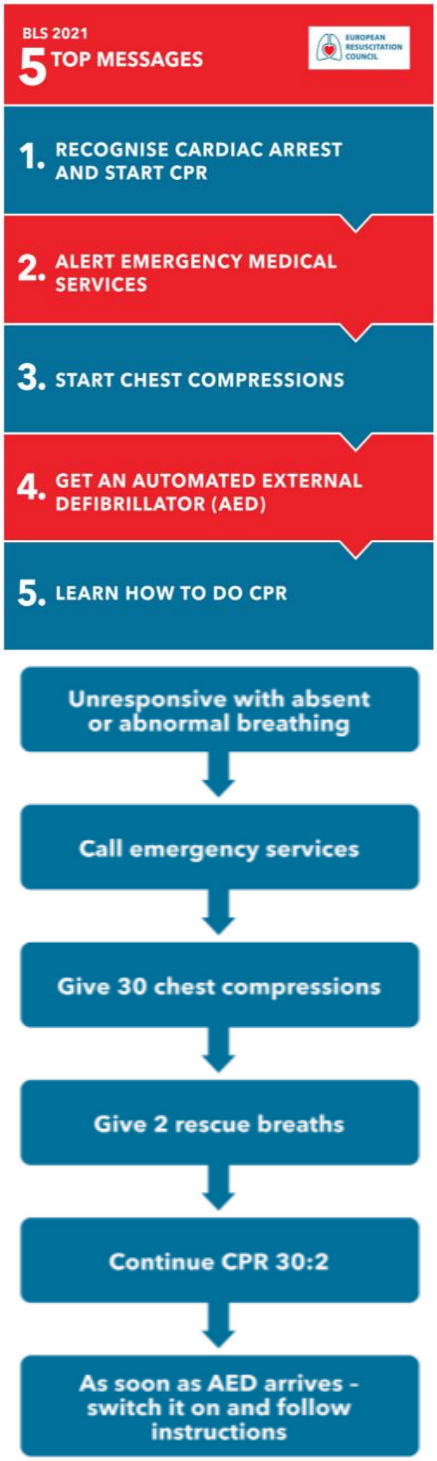
Importance notes

1. Everyone knowing their roles within the team.
2. Minimal distractions/calm atmosphere.
3. No one shouting.
4. Not everyone watching.
5. Privacy and dignity.
6. Use of curtains around bed.
7. Easy access to equipment.
8. Prepare cardiac Arrest box.
9. Debriefing as a team.
10. Identifying sick patients and monitoring them closely.
11. Prevention is always best.
12. If a patient is very sick or has serious co-morbidities, always alert for CPR preparation.
13. Ideally this should be decided early in admission.
14. Should be discussed with patient and family.
15. This needs to be documented and handed over.

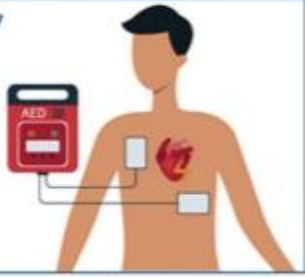
What do you do in priority to unresponsive patient with a normal breathing?

- Turn the patient into the safety lateral position
- Check for continued breathing

BASIC LIFE SUPPORT (EUROPEAN RESUSCITATION COUNCIL GUIDELINES, 2021)



SEQUENCE/ACTION	TECHNICAL DESCRIPTION
SAFETY 	• Make sure that you, the victim and any bystanders are safe
RESPONSE Check for a response 	• Shake the victim gently by the shoulders and ask loudly: *"Are you all right?"*
AIRWAY Open the airway 	• If there is no response, position the victim on their back • With your hand on the forehead and your fingertips under the point of the chin, gently tilt the victim's head backwards, lifting the chin to open the airway
BREATHING Look, listen and feel for breathing 	• Look, listen and feel for breathing for **no more** than 10 seconds • A victim who is barely breathing, or taking infrequent, slow and noisy gasps, is not breathing **normally**
ABSENT OR ABNORMAL BREATHING Alert emergency services 	• If breathing is absent or abnormal, ask a helper to call the emergency services or call them yourself • Stay with the victim if possible • Activate the speaker function or hands-free option on the telephone so that you can start CPR whilst talking to the dispatcher
SEND FOR AED Send someone to get an AED 	• Send someone to find and bring back an AED if available • If you are on your own, **DO NOT** leave the victim, but start CPR
CIRCULATION Start chest compressions  	• Kneel by the side of the victim • Place the heel of one hand in the centre of the victim's chest - this is the lower half of the victim's breastbone (sternum) • Place the heel of your other hand on top of the first hand and interlock your fingers • Keep your arms straight • Position yourself vertically above the victim's chest and press down on the sternum at least 5 cm (but not more than 6 cm) • After each compression, release all the pressure on the chest without losing contact between your hands and the sternum • Repeat at a rate of 100-120 min-1

SEQUENCE/ACTION	TECHNICAL DESCRIPTION
COMBINE RESCUE BREATHING WITH CHEST COMPRESSIONS 	• **If you are trained to do so,** after 30 compressions, open the airway again, using head tilt and chin lift • Pinch the soft part of the nose closed, using the index finger and thumb of your hand on the forehead • Allow the victim's mouth to open, but maintain chin lift • Take a normal breath and place your lips around the victim's mouth, making sure that you have an airtight seal • Blow steadily into the mouth whilst watching for the chest to rise, taking about 1 second as in normal breathing. This is an effective rescue breath • Maintaining head tilt and chin lift, take your mouth away from the victim and watch for the chest to fall as air comes out • Take another normal breath and blow into the victim's mouth once more to achieve a total of two rescue breaths • Do not interrupt compressions by more than 10 seconds to deliver the two breaths even if one or both are not effective • Then return your hands without delay to the correct position on the sternum and give a further 30 chest compressions • Continue with chest compressions and rescue breaths in a ratio of 30:2
COMPRESSION-ONLY CPR 	• **If you are untrained, or unable to give rescue breathes,** give chest-compression-only CPR (continuous compressions at a rate of 100-120 min-1)
WHEN AED ARRIVES Switch on the AED and attach the electrode pads 	• As soon as the AED arrives switch it on and attach the electrode pads to the victim's bare chest • If more than one rescuer is present, CPR should be continued whilst the electrode pads are being attached to the chest
FOLLOW THE SPOKEN/ VISUAL DIRECTIONS 	• Follow the spoken and visual directions given by the AED • **If a shock is advised,** ensure that neither you nor anyone else is touching the victim • Push the shock button as directed • Then **immediately** resume CPR and continue as directed by the AED

SEQUENCE/ACTION	TECHNICAL DESCRIPTION
IF NO SHOCK IS ADVISED Continue CPR 	• **If no shock is advised,** immediately resume CPR and continue as directed by the AED

IF NO AED IS AVAILABLE
Continue CPR
 
	• If no AED is available, **OR** whilst waiting for one to arrive, continue CPR
	• Do not interrupt resuscitation until:
	  • A health professional tells you to stop OR
	  • The victim is definitely waking up, moving, opening eyes, and breathing normally
	  • OR
	  • You become exhausted
	• It is rare for CPR alone to restart the heart. Unless you are certain that the victim has recovered continue CPR
	• Signs that the victim has recovered
	  • Waking-up
	  • Moving
	  • Opening eyes
	  • Breathing normally

IF UNRESPONSIVE BUT BREATHING NORMALLY Place in the Recovery Position 	• If you are certain that the victim is breathing normally but still unresponsive, place them in the recovery position **SEE FIRST AID SECTION** • Be prepared to restart CPR immediately if the victim becomes unresponsive, with absent or abnormal breathing

RESUSCITATION IN CHILD

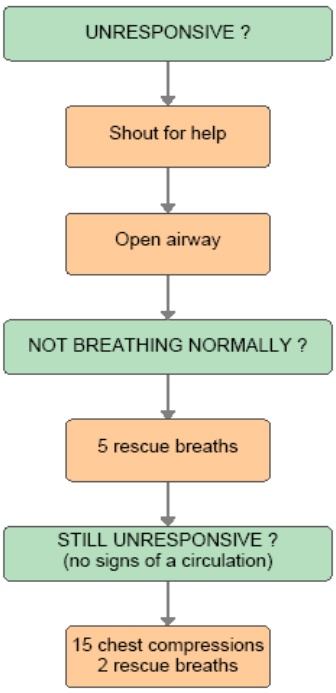


Figure : Resuscitation in children (ref: UK's RC)

Artificial ventilation (Children)
Three techniques: mouth to mouth, mouth to mouth and nose or Ambubag

For child over 1 year: Mouth to mouth-

Figure: Mouth to mouth ventilation (Child over 1 year)

- Pinch the soft part of the nose closed with the index and thumb of your hand on his forehead
- Open his mouth a little, but maintain the chin
- Take a breath and blow steadily into the mouth over about 1 – 1.5 seconds. Repeat it 5 times.
- Identify effectiveness by seeing that the chest has risen and fallen in a similar fashion to your rescue breaths

For infant: Mouth to mouth and nose

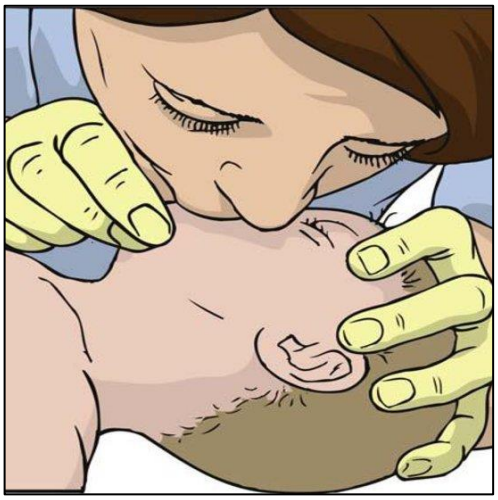


Figure: Mouth to mouth and nose ventilation (Infants)

- - Ensure a neutral position of the head and chin lift
- - Same procedure as above. But cover the mouth and nasal apertures with your mouth

Ventilation with Ambubag-

Figure: Ventilation with Ambubag (Infants, Children and adults)

- Choose the correct size of mask for the patient
- Maintain the hyper extension of the head
- Apply the mask properly over the patient's face by grasping his chin but without strangling him
- Press the balloon adapted to Ambubag at the same rhythm than mouth to mouth.

Always check the effect of your artificial respiration:
- Avoid air escaping
- Look at the chest movement

If you detect signs of circulation:
Continue rescue breathing until it starts spontaneously
Put the child in safety lateral position
Check frequently the child

Two fingers chest compression (Infants)
Use 2 fingers for an infant under 1 year. Place both thumbs flat side by side while the other hand is holding the head

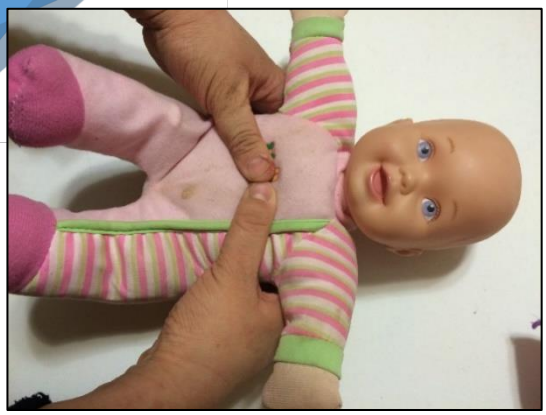


Figure: Two fingers technique (Infants)

Use one or 2 hands for a child over 1 year

- 1 hand technique (Children)
- 2 hands technique (same as adult)

Figure: One hand technique CPR (Children)

In addition to resuscitation

- Raise and support the victim legs to improve the blood supply to the heart and brain. Take care if you suspect a fracture.
- Give appropriate treatment for the cause of shock.
- Reassure the victim.
- Keep the victim warm by covering with coat or blanket.

What do you do in case of airway obstruction?

Airway obstruct ion occurs when the airway becomes blocked due to a solid object, fluids or the back of the tongue.

A person who is choking may quickly stop speaking, stop breathing, attempt to cough, lose consciousness and finally die.

It's important not to confuse the ariway obstruction with heart attack, seizures, fainting.

Chest thrusts for baby and child

- If a baby is distressed or stops coughing, lay face down on your forearm with the head low and support his back and chin.
- Give up to 5 back slaps between the shoulder blades.
- Check the mouth. Remove any noticeable obstruction with one finger.
- If this fails, turn the baby on to his/her back. Give up to 5 forceful chest thrusts with 2 fingers. Check the mouth.

If the baby is unconscious, try up to 5 mouth-to-mouth breathings.

Continue the cycle: back slaps, chest thrusts, mouth checks and breathing attempts until the baby restarts breathing.

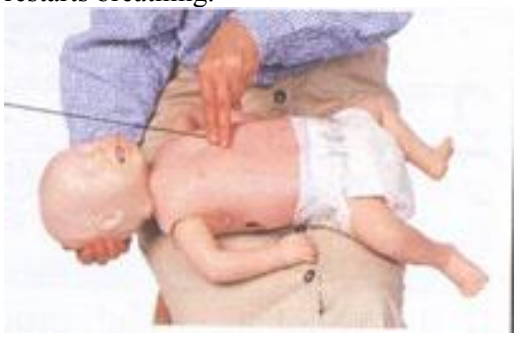


Figure: Chest thrusts for baby and child

Chests thrusts and abdominal thrusts for adult

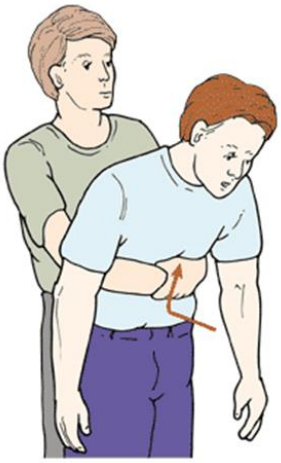


Figure: Chest thrusts for adult

Apply up to 5 back blows as follows:

1. Stand to the side and slightly behind the victim
1. Support the chest on one hand
2. Give up to five sharp blows between the shoulder blades with the heel of other hand

If it fails: do abdominal thrust (Heimlich maneuver)

1. Stand behind the patient and put both arms round the upper part of his abdomen
2. Clench your fist and place it above the umbilicus

3. Grasp this hand with your other hand and pull sharply

Repeat 5 times

If necessary: alternate five back blows with five abdominal thrusts

SHOCK

In shock, the blood flow (and blood volume) is not enough to keep the person alive. The vital organs (e.g., brain, heart) do not get enough blood and oxygen to work.

Shock is an emergency, delay in treatment causes death

Low BP is a late sign in shock. Do not wait for low BP before treating shock

CAUSES

1. **HYPOVOLEMIC SHOCK** (Shock caused by loss of blood or fluids):
   Causes:
   - Severe bleeding anywhere in the body (e.g., trauma, ectopic pregnancy, ruptured aorta aneurysm)
   - Severe fluid loss (e.g., severe vomiting and diarrhoea, burns, severe ascites, severe dengue)

2. **VASODILATORY SHOCK** (Shock caused by widening of the blood vessels):
   - Bacterial infection (septic shock)
   - Severe allergic reaction (anaphylactic shock)
   - Severe brain injury or bleeding (neurogenic shock)
   - Taking of certain drugs or poisons.

3. **CARDIOGENIC SHOCK** (Shock caused by weak pumping of heart = heart failure):
   - Vitamin B1 deficiency.
   - Damaged heart valve.
   - Abnormal rhythm of the heart: too fast (tachycardia) or too slow (bradycardia)
   - Lung collapse (pneumothorax).
   - Heart attack (myocardial infarction).

4. **SEPTIC SHOCK** (shock caused by the effects of an infection on the body)
   Causes:
   - Any severe infection
5. **ANAPHYLACTIC SHOCK** (Shock caused by a severe allergic reaction): Causes:
   - Severe allergic reaction e.g., penicillin, peanuts.

SIGNS AND SYMPTOMS

Signs and symptoms can vary with the different kinds of shock, but some are common in most patients:

- Fast and weak pulse (>100 bpm in adults).
- Fast, shallow breathing (> 30 respirations per minute in adults).
- Cold, sweaty ('clammy') skin occurs in most shock patients. An exception is the flushed skin in the early stages of vasodilatory shock (for example, in septic shock).
- Hypotension (low blood pressure) – **Systolic BP < 90 mmHg** occurs in most shock patients. **Note:** Low BP is a late sign of shock, do not wait for low BP in treating a patient with other signs of shock
- Low urine output (= oliguria): urine production less than 0.5ml/kg/hr in adults and 1ml/kg/hr in children.
- Change in mental state: at the onset patients are agitated, then confused, then drowsy and then in coma.

In **SEPTIC SHOCK** you also find:

- High or low temperature.
- History of chills before the fever started.
- Warm skin.

In **ANAPHYLACTIC SHOCK** you also find:

- Sometimes a history of taking certain medicines (especially penicillin and anti-inflammatories), of insect bite, or ingestion of some food (especially seafood and nuts). Symptoms of anaphylaxis can last from 5 minutes to several hours.
- Oedema (swelling) of lips and throat which makes breathing difficult.
- Wheezing.
- High BP before it drops to low levels.
- Sometimes an itchy rash quickly spreading over all the body.
- Sometimes vomiting and diarrhoea.

	ASSESS FOR	TREATMENTS LIKELY TO BE NEEDED FOR SHOCK
DR	Danger Response	Gloves Safe place, call for help
A	Airway obstruction Speaking, stridor, swelling, secretions	Simple airway manoeuvres +/- airway if needed Suction if needed (and available) Oxygen (high flow) Adrenaline nebulizer 5ml STAT if anaphylactic shock and airway swelling or stridor
B	RR, SpO2, Chest indrawing/cyanosis tracheal tug Listen to chest	Salbutamol nebulizer Adult/>5yr 5mg; Child <5yr 2.5mg STAT if have wheeze (consider anaphylactic shock) Position patient: If dyspnoea sit up right (but if very low BP raise legs to level above head)
C	HR, BP, Cap refill Urine output, Temp Listen to HS	Put in 2 biggest (16G or 18G) IV cannula – take bloods e.g., Hct, CBC, MS, BC, dextrose etc. If signs of shock give fluid bolus NSS or R/L if diarrhoea (unless cardiogenic shock)
D	Check dextrose Any drugs needed e.g. antibiotics, paracetamol	For details on specific treatment see below Septic shock: ceftriaxone Anaphylactic shock: adrenaline IM, chlorpheniramine, hydrocortisone Cardiogenic shock: furosemide +/- vitamin B1 Give dextrose if low
E	AVPU/GCS Expose and examine all over body	Review notes and charts History, further investigations, treatment plan

1. HYPOVOLEMIC SHOCK: BLOOD/FLUID LOSS

- If bleeding stop by applying pressure
- Give IV fluids NSS Adult: 500ml-1L STAT; Child 10-20ml/kg STAT (or R/L if diarrhoea). If severe hypovolaemia may need to give at least 2L in the first hour in adults.
- If there is still bleeding, fluid replacement must include ongoing losses: this could mean giving 2L of fluids per 1 hour in adults.
- Shock from blood loss requires blood transfusion, several units may be necessary.

AIM TO REPLACE 2-3 TIMES THE ESTIMATED LOSS
e.g., if loss is **1L** then the patient will need 2-3L rapidly

2. SEPTIC SHOCK

- Give IV fluids NSS Adult: 500ml-1L STAT; Child 10-20ml/kg STAT (or R/L if diarrhoea). Re-assess vital signs after fluid bolus.
- Give high doses: ceftriaxone, preferably IV (or IM if cannot get IV access).
- Try to find the source of the infection.

3. ANAPHYLACTIC SHOCK

- Drug or blood infusions should be stopped immediately.
- Give IV fluids NSS Adult: 500ml-1L STAT; Child 10-20ml/kg STAT. You may need to give at least 2L in the first hour in adults.

- Give:

ADRENALINE IM: 1 in 1,000 (1 vial = 1ml = 1mg)	**CHLORPHENIRAMINE** IV or IM (1 vial = 1ml = 10mg)	**HYDROCORTISONE** SLOW IV OR IM
ACUTE PHASE		
>12yrs/Adult: 0.5ml 6yrs-12yrs: 0.25ml 6m-6yrs: 0.12ml <6m: 0.05ml	Adult: 10-20mg 12–18yrs: 10mg 6–12yrs: 5mg 6m–6yrs: 2.5mg <6m 250 mcg/kg (max.2.5 mg)	>12yrs/Adult 200mg 6-12yrs: 100mg 1-5yrs: 50mg <1yr: 25mg
Repeat dose at intervals until BP and pulse are back to normal	Give STAT over 1 minute	(Can also use dexamethasone)
AFTER ACUTE PHASE		
	Continue QID, switch to PO chlorpheniramine when improved: **>12yrs/Adult:** 4mg QID (max 24mg/d) **6-12yrs:** 2mg QID (max 12mg/d) **3-5yrs:** 2mg QID (max 6mg/d) **1-2yrs:** 1mg BID (max 3mg/d)	Can repeat hydrocortisone 3-4 times per day if required. Switch to PO **prednisolone** when improved/stable.

4. CARDIOGENIC SHOCK

- Treat the cause (e.g., anaemia, Beriberi).
- For heart failure treatment see pg.36.

GENERAL REMARKS

Careful monitoring in all patients of:

- Vital signs (pulse rate, blood pressure, respiratory rate) every 15 minutes.
- Urine output (consider a urinary catheter) – minimum output should be at least 0.5ml/kg/hr in adults and 1ml/kg/ hr in children.
- Fluid balance chart: record all fluid input and all fluid losses: urine, blood.
- Lung crepitations and/or rising respiratory rate may indicate too much fluid.

DIAGNOSIS

Determine the cause of shock AFTER the patient is stabilized **(using DR-ABCDE)**

TREATMENT

Try to identify the underlying cause and treat as above.

LONG-TERM MANAGEMENT

Shock is an acute condition – if you do not manage to improve the patient's vital signs rapidly, he/she will die.

If the condition improves and vital signs return to normal (e.g., Adults: pulse <100 bpm, systolic BP>90 mmHg, urine output >0.5ml/kg/hr and mental condition improves) adjust the rate of infusion to 1L in 6hrs.

PREVENTION

Once someone is in shock, the sooner shock is treated the less damage there may be to the person's vital organs such as the kidney, liver, and brain. Early first aid and emergency medical help can save his or her life.

Ideally, people who have a history of a severe allergy reaction to insect bites or medicines should be instructed to carry (and use) an emergency kit consisting of injectable adrenaline (epinephrine) and chewable antihistamine (if available). They should also wear a bracelet or necklace stating their allergy.

COMA

DEFINITION

Reduced level of consciousness. There are different degrees of reduced level of consciousness and coma is the most severe.

Drowsiness: Patient can be easily woken up by talking or touching them

Stupor: Patient can be woken up with strong stimulation (e.g., speaking loudly or touching firmly).

Coma: Patient cannot be woken up

EMERGENCY TREATMENT

	ASSESS FOR	TREATMENTS LIKELY TO BE NEEDED FOR **SHOCK**
DR	Danger Response	Gloves Safe place, call for help
A	Airway obstruction Speaking, stridor, swelling, secretions	Simple airway manoeuvres +/- airway if needed Suction if needed (and available) Oxygen (high flow)
B	RR, SpO2, Chest indrawing/cyanosis tracheal tug Listen to chest	Nebulizer if wheeze Position patient: If dyspnoea sit up right but if very low BP raise legs to level above head
C	HR, BP, Cap refill Urine output, Temp Listen to HS	Put in 2 biggest (16G or 18G) IV cannula – take bloods e.g., Hct, CBC, MS, BC, dextrose etc. Give fluid bolus NSS Adult: 500ml STAT; Child 10ml/kg STAT (or R/L if, diarrhoea)
D	Check dextrose Any drugs needed e.g., antibiotics, paracetamol	Give dextrose if low Give medications according to cause
E	AVPU/GCS Expose and examine all over body	Review notes and charts History, further investigations, treatment plan Assess for cause of coma, and treat Coma position to prevent aspiration (see below)

Possible Cause

- Coma with fever
  - Malaria, meningitis, encephalitis, sepsis, or other severe infections
- Coma with or without fever
  - Severe hypoglycaemia (dextrose <45mg/dL or <2.5mmol/l)
  - Severe dehydration
- Coma without fever
  - Head trauma (accident), poisoning, stroke, cerebral haemorrhage

Glasgow Coma Scale

BEHAVIOR	RESPONSE	SCORE
Eye opening response	Spontaneously	4
	To speech	3
	To pain	2
	No response	1
Best verbal response	Oriented to time, place, and person	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	No response	1
Best motor response	Obeys commands	6
	Moves to localized pain	5
	Flexion withdrawal from pain	4
	Abnormal flexion (decorticate)	3
	Abnormal extension (decerebrate)	2
	No response	1
Total score:	*Best response*	15
	Comatose client	8 or less
	Totally unresponsive	3

LONG TERM MANAGEMENT OF COMA

1. Re-position the patient every 2 hours from one side to the other. Show the family how to re-position the patient. Remind them not to let the patient lie flat on his back. In that case the tongue might block the airway or vomit may enter the airway.
2. Put in a urine catheter. Monitor fluid balance (input/output) in order to avoid dehydration.
3. If the coma is following a head trauma **DO NOT use 5% dextrose** during the first 48 hours (sugar can worsen the brain damage) except in hypoglycemic patients.
4. Regularly reassess the patient: check the vital signs every 2 hours.
5. Check GCS on admission and then twice a day.
6. Check dextrose twice a day as the patient cannot eat or drink.
7. Wash the patient all over once a day. Clean the patient whenever urine and/or stools are passed. Wash the affected area and do not just wipe with dry cloth or paper. Help the family to do this.
8. Clean the mouth and moisten lips at least 4 times a day. Vaseline applied on the lips prevents cracking.
9. Clean the eyes with NSS and cotton wool. Apply **Terramycine Eye Ointment (TEO)** BID to avoid conjunctivitis, drying up of cornea, and injury. Drying up of cornea can lead to blindness. Close the eyes with a plaster/tape if they stay open.
10. Teach the family how to do massages and perform passive limb movements every 4 hours to maintain muscle tone and prevent contractions.

11. In prolonged coma consider NG feeding depending on the cause and prognosis. This must be discussed with the doctor.
12. Ask the family not to leave the patient alone.
13. If the patient condition does not improve despite full treatment, see palliative care chapter for end of life care.

CONVULSIONS

Convulsions are a **sudden loss of consciousness** with or without cyanosis and strong movements of the arms and legs generally lasting for a few minutes. Sometimes the patient also passes urine or bites his tongue.

If your patient regains consciousness immediately and is not disorientated after the attack, or if the patient remains conscious during the crisis, it is not a convulsion

When the movements stop, the patient may remain unconscious and breathe deeply for up to half an hour. The patient slowly returns to normal consciousness, and during this time the patient may be disoriented, asking the same questions many times (e.g., about what happened to him/her, where he/she is etc.).

EMERGENCY TREATMENT

	ASSESS FOR	**TREATMENTS LIKELY TO BE NEEDED FOR SHOCK**
DR	Danger Response	Gloves Safe place, call for help
A	Airway obstruction Speaking, stridor, swelling, secretions	Simple airway manoeuvres +/- airway if needed Suction if needed (and available) Oxygen (high flow)
B	RR, SpO2, Chest indrawing/cyanosis tracheal tug Listen to chest	
C	HR, BP, Cap refill Urine output, Temp Listen to HS	Put in 2 biggest (16G or 18G) IV cannula – take bloods e.g., Hct, CBC, MS,BC, dextrose etc.
D	Check dextrose Any drugs needed e.g., antibiotics paracetamol	If fitting continues for more than 3 minutes give: Diazepam Slow IV or IM or PR Adults: 10mg (1 vial) (if IV max 0.5ml in 30 seconds) Child: 0.4mg/kg (max 10mg) **When the patient is moving, it can be easier to give first dose IM or PR but IV is quicker and better.** If dextrose low give IV Adult and Child: 5ml/kg 10% dextrose bolus Neonates: 2ml/kg 10% dextrose bolus Give any other drugs according to cause
E	AVPU/GCS Expose and examine all over body	History, further investigations, treatment plan. Assess for cause of convulsion and treat. Coma position to prevent aspiration (see below) after fitting if no respiratory distress

Diazepam IV
1 vial = 10mg / 2ml
Give IV injections **SLOWLY** (max 0.5 ml in 30 seconds)

Diazepam Rectally (PR) or IM
Diazepam PR or IM is NOT diluted
How to give PR:

- Draw up the dose from an ampoule of diazepam into a 1ml syringe
- Remove the needle
- Insert the syringe into the rectum 4 to 5 cm and inject the diazepam solution
- Hold buttocks together for a few minutes

If the patient is **still fitting:**

- After 3-5 minutes give a second dose of diazepam
- CALL DOCTOR, AND BEGIN REFERRAL PROCESS
- After another 3-5 minutes give a third dose of diazepam

****Note:** Ideally, we would give **IV phenobarbitone** but not available so need to refer – the patient is at risk of not getting enough oxygen to the brain, so this must be done urgently**

DIAGNOSIS

- Check blood sugar for hypoglycaemia.
- Look for signs of infection (meningitis, malaria etc.).
- Ask for past and recent medical history, previous convulsion episodes, and medication taken.

When looking for causes, the next list could be helpful: remember **AEIOU**

A: Alcohol, **E:** Eclampsia, **I:** Infections, **O:** Organ failure, **U:** Uraemia (= renal failure)

TREATMENT

Goals of treatment are:

- Stop convulsions quickly.
- Treat fever if present especially in children under 5 as it can be the cause of the convulsions.
- Find and control the underlying cause.
- Prevent complications by protecting the person from injury. Try to prevent a fall. Lay the person on the ground in a safe area. Clear the area of furniture or other sharp objects.

LABORATORY INVESTIGATIONS

Appropriate use of the laboratory, particular the judicious selection of investigations, is an important skill for the GP to perfect. It is wise to remember that the laboratory staff includes clinical pathologists, microbiologists and hematologists, who can offer invaluable assistance and advice. Hence, it is important to provide a properly collected specimen accompanied by a succinct and relevant clinical history,

This section discusses useful investigations and their clinical interpretation, including some that tend to mystify. A summary of reference values appears at the end of the chapter.

It is advisable for practitioners to be conversant with the specificity and sensitivity of the various tests in order to make rational decisions about their interpretation and to provide appropriate counselling to their patients.

POLYMERASE CHAIN REACTION (PCR)

PCR is a mainstream test that is linked to the genetic material DNA and RNA. It is a type of nuclei acid amplification technology (NAAT) that has opened the frontiers of improved diagnosis in virology, and slow-growing and fastidious organisms. More than 60 of these tests are now available and the scope is growing.

Polymerase is an enzyme that catalyses formation of nucleotides into DNA molecules before cell division, or RNA molecules before protein synthesis.

PCR is a process that permits making, in vitro, exponential numbers of copies of genes. This initiated with a single molecule of DNA, leading to the generation of billions of similar molecules within a few hours. This has huge practical importance as a method of investigating genetic material. Thus, the technique of PCR can be used in investigating bacterial infections, parasites, viruses associated with cancer, human immunodeficiency virus (HIV), genetic disorders such as diabetes and breast cancer, and various disorders of the blood, such as thalassaemia, and of muscle.

ERYTHROCYTE SEDIMENTATION RATE (ESR)

ESR relies on the principle that blood components separate faster in illness. It is mainly determined by the effect of serum proteins on the negative electric charge on the erythrocyte surface. The ESR is a marker of inflammation and malignant disease. It reflects the presence of all acute-phase proteins (especially fibrinogen) as well as the immunoglobulins. It should be used to screen asymptomatic patients for the presence of disease.

There is a lag phase of 24-48 hours between the onset of inflammatory stimulation and the production of inflammatory proteins that increase the ESR. There is also a delay in the fall of the ESR after resolution of the inflammation because the fibrinogen levels can remain elevated for 6 days or so after acute tissue damage-this can take up to 4-8 weeks to return to normal.

A normal value of <20 mm/h generally excludes inflammation. The oral contraceptive pill can push the level to 20-25 mm/h

Normal values of ESR-reference interval

Child: 2-15 mm/h

Adult male

- 17-50 years: 1-10 mm/h
- >50 years: 2-15 mm/h

Adult female

- 17-50 years: 3-12 mm/h
- >50 years: 5-20 mm/h

C-REACTIVE PROTEIN (CRP)

CRP was discovered in the blood by Tillet and Francis in 1930 and named because of the manner it reacted with the C polysaccharide of Streptococcus pneumoniae.

It is an important product of the acute-phase response and is generally accepted as the most accurate measure of the acute-phase response and, hence, of tissue inflammation. Like the ESR, it is a non-specific marker of inflammation and neoplastic disease.

Relative values (mm/h) of typical examples of erythrocyte sedimentation rate (ESR) reading

- Very high (up to 100+mm/h)
  - Giant cell arteritis/ Polymyalgia/ rheumatic/ temporal arteritis
  - Multiple myeloma
  - Tuberculosis
  - Deep abscess
  - Bacterial endocarditis
  - Acute osteomyelitis
- High (40-80 mm/h)
  - Rheumatic fever
  - Pyelonephritis
  - Other bacterial infection
  - Viral infections with cold agglutini
  - Collagen disorders (e.g., rheumatoid arthritis, systemic lupus erythromatosus: (SLE)
  - Solid tumours, especially metastases
  - Leukemia/lymphomas
  - Myocardial infarction
  - Inflammation of healing
- Moderate to low elevation (20-40 mm/h)
  - Most acute and chronic infections (e.g., recent viral)
  - Severe other illness
  - Anaemia
  - Pregnancy

- Drugs, especially contraceptives
- Elevated serum cholesterol level Laboratory error (e.g., tilted tube)
- Idiopathic-normal

- Low (<1 mm/h)
  - Idiopathic-normal
  - Sickle-cell anaemia
  - Polycythaemia
  - NSAIDs
  - Old specimen

CRP levels rise within 6 hours and may double every 8 hours, reaching peak levels at 50 hours. Levels can fall very rapidly but resolve with a 24-hour half-life following tissue injury.

- A CRP level >100mg/l has an 80% sensitivity and 88% specificity for bacterial infection.
- A CRP level of 10-40 mg/l has a 69% sensitivity and 54% specificity for viral infection.

Rules for inflammation

4-10 = mild inflammation
10-20 = moderate inflammation
>40 = marked inflammation

The CRP can be used to follow response to therapy (e.g., antibiotic treatment) or activity of disease (e.g., Crohn disease, spondyloarthropathy).

Levels above 100 mg/l are more likely to be associated with bacterial infection. Normal value of **CRP:<10 mg/l**

Comparison between ESR and CRP

- There tends to be a broad correlation between them.
- Both are markers of inflammation.
- CRP levels rise faster than the ESR.
- The levels are similar after 24 hours or so.
- CRP levels fall faster than the ESR.
- CRP is superior in terms of rapidity of response and specificity for inflammation.
- CRP levels (unlike the ESR) are not affected by pregnancy.
- The ESR may be very high with a normal CRP in giant cell arteritis/polymyalgia rheumatica.
- CRP costs more.

A guide to C-reactive protein (CRP) levels

- **Marked elevation >40 mg/l**
  - Bacterial infection
  - Abscess
  - Crohn disease
  - **Active rheumatic disease:** rheumatic fever
  - **Connective tissue disorders:** rheumatic arthritis, vasculidities.
  - Malignant disease
  - Trauma/tissue injury
- **Normal to mild elevation**
  - Viral infection
  - Ulcerative colitis
  - Systemic lupus erythematosus (SLE).
  - Scleroderma
  - Atherosclerosis
  - Steroid/estrogen therapy
  - Leukemia

RECOMMENDED TESTS FOR INFECTIOUS DISEASES

Adenovirus

- Serum for antibody levels
- PCR for faeces and respiratory specimens

Amoebiasis

- Stool examination for trophozoites and cysts
- Serum for antibody levels (positive titre is 1:128 or more) usually in extra-intestinal amoebiasis only (e.g., hepatic). Note that the test remains positive for as long as 10 years after treatment.

Bordetella pertussis

- Nasopharyngeal swabs or aspirate (preferred) for PCR studies.
- Serum for IgA detection-may take several weeks to rise, especially in infants and children. Hence, repeat testing may be necessary. Not affected by immunization (no antibody response).

Brucella

- Serum for Brucella antibodies. Acute and convalescent (3-4 weeks) samples. Blood culture if febrile.

Cat-scratch disorder

- Acute and convalescent sera to detect a fourfold rise in ***Bartonella henselae antibodies.***

Chickenpox/varicella zoster virus

- Usually a clinical diagnosis, but where it is unclear or atypical or to determine susceptibility to varicella zoster infection, take blood sample for viral antibody detection. A fourfold increase over 2-4 weeks supports diagnosis of acute varicella infection. Also, viral culture of vesicle fluid and smears of base of lesion for PCR.

Herpes simplex virus (HSV)

- The above methods can be used for detection of HSV but blood tests for antibodies are of limited use in differentiating type I or II herpes. PCR testing of genital lesions is the most accurate form of diagnosis.

Chlamydia

- ***Chlamydia pneumoniae:*** for atypical pneumonia-acute and convalescent blood samples for antibodies.
- ***Chlamydia trachomatis:*** for diagnosis of STIs, conjunctivitis and pneumonia in neonates-swabs or endotracheal aspirate for culture and PCR tests.

The PCR test does not necessarily require cervical or urethral swabs as it allows prompt diagnosis of genitourinary chlamydia infection in both males and females using the first 20-30 ml of the stream. PCR will not differentiate trachoma from genital chlamydia species, which has implications for remote diagnosis of 'sexual abuse' in relevant rural communities.
Patients should not have urinated for the previous 2 hours. Specimens should be stored in a yellow-topped urine container at 4 degree Celsius and sent to the laboratory as soon as possible.
Chlamydia antibodies are non-specific in the diagnosis of genital tract infection or trachoma.

Clostridium difficile
- Fresh faeces to detect ***Clostridium difficile*** toxin and culture where antibiotic diarrhoea/colitis is suspected.

Cryptococcal infection
- ***Cryptococcus*** antigens in specimens of blood and CSF (antibodies not so diagnostic).
- Positive in >90% of patient with ***cryptococcal*** meningitis. Also, culture of CSF.

Cytomegalovirus (CMV)
- Acute and convalescent (2 weeks) blood samples for CMV antibodies. A fourfold increase indicates recent infection. The presence of specific IgM in a neonate may represent intrauterine infection. This can be supplemented by PCR tests. Audity antibodies to date the infection in pregnancy.

Epstein-Barr mononucleosis (EBM)
- EBM screening tests: white cell count, blood film, Monospots and Paul Bunnell.
- Antibody tests: blood for immunoassay for IgM and IgG antibodies to viral capsule antigen and Epstein-Barr nuclear antigen (EBNA)-used in those with the mononucleosis syndrome when EBM screening tests are negative.

Fungal (topical) infections
- Topical antifungals should be stopped at least 3 days before a specimen is taken.
- Collect specimen into a sterile, yellow-topped jar. The more material submitted, the greater the odds of positive findings.
- Skin lesions: take a scraping of the advancing edge.
- Nails: collect clippings and scrapings, include necrotic debris from beneath the nail.
- Hair: include hair roots (plucked hairs).
- Microscopy is usually reported immediately while culture is maintained and examined on a regular basis for 2-4 weeks.

Hepatitis A, B, C, D, E
- Blood for immunoassay for respective antibodies and hepatitis B virus antigen.
- PCR tests for viral load with hepatitis B and C. Genotyping is available and important for determining those who benefit best from treatment. A PCR test on blood can be performed for hepatitis C virus.

HIV/AIDS
- Blood for HIV-1 and HIV-2 antibodies are routinely tested. Positive results indicate HIV infection. Negative results do not exclude infection if serum has been taken within 3-4 weeks of a risk exposure. Repeat testing is recommended after that time. The sensitivity of this screening test is almost 100%.
- HIV antigen may assist in the diagnosis of early HIV infection and neonatal HIV infection.
- Detuned ELISA testing can date the time of primary infection.

Markers
- **CD_4** lymphocyte counts
- HIV viral load

Hydatid disease
- Serology for ELISA, Western blot and immunoprecipitation.

Influenza
- Blood for antibodies requires acute and convalescent (2-4 weeks) sera. Requires a fourfold increase in titre to >128. A single titre of >256 is suggestive of infection.
- Sputum microscopy and culture is the quickest and most reliable test if ***legionella sp.*** are identified.
- Urine antigen tests for ***legionella pneumophila*** type I.

Leptospirosis
- Blood for antibodies will give a diagnosis according to levels matched with clinical features.
- Use PCR to identify the numerous serovariants.

Malaria
- Thick and thin blood films for microscopic examination-usually require repeat examination (at least three at separate times).
- Serological tests (ELISA) are not commonly used but field-based card assays using agglutination tests are useful for travelers e.g., Paracheck V test, ICT card test.
- PCR methods are highly specific and sensitive but not widely practical at present because specialized laboratory methods are required.

Mumps

- Blood for antibody testing diagnoses immune status and mumps infection (acute and convalescent sera) with **IgM** assays.
- **CSF:** the presence of IgG in **CSF** confirms the diagnosis of mumps meningitis although levels may be low for 2-3 days after the onset of the illness.

Mycobacterium tuberculosis
- Sputum (there separate samples)/bronchial brushing or washings: acid-fast staining and microscopy and culture for susceptibility testing.
- PCR testing on sputum.

Mycoplasma pneumoniae
- Blood for antibodies (acute and convalescent samples). Presence of IgM antibodies and a rise in titre indicates infection. High titers can persist for more than 12 months.

Q fever
- Blood in acute phase and 2-3 weeks after onset of illness for antibody levels. PCR testing of tissues.

Parvovirus B19
- Blood for antibody detection. Suspected fifth disease (erythema infectiosum) and other clinical conditions, such as maternal infection with hydrops foetails, aplastic crisis in chronic haemolysis, polyarthritis and rash adult. PCR for confirmation.

Rubella
- Blood for antibody tests-acute phase and convalescent (after 10-14 days)
- A fourfold increase in **IgG** indicates recent infection.
- **IgM** antibody becomes positive about 7 days after onset of the illness but will become undetectable after 8 weeks. **IgM** antibodies in maternal serum indicates high Foetal risk, while in cord blood suggests congenital infection.

Toxoplasmosis
- Blood for acute and convalescent (2+ weeks) antibody testing. A fourfold rise in IgG titre is diagnostic for toxoplasmosis. IgM antibodies at a level >16 indicate recent infection. The diagnosis of congenital toxoplasmosis is supported by the presence of IgM antibodies. Avidity antibody testing will date the infection.

VIRAL SKIN RASHES

When a patient presents with a fine maculopapular skin rash, serology tests can be performed for all of the following causative agents. Invariably, a rising antibody level between acute phase and convalescent sera (2-4 weeks) is required for diagnosis.

- **Measles**-rising IgM titre diagnostic (raised IgM=previous infection or immunization).
- **Rubella**-rising IgM or IgG=resent infection.
- **Parvovirus B19.**
- **Echovirus**
- **EBV**
- **CMV**
- **Ross River virus**
- **Barmah Forest virus**
- **Dengue fever**
- **Other arboviruses**

SEXUALLY TRANSMITTED INFECTIONS

- ***Neisseria gonorrhea***
  - Culture (urethral, cervical, rectal, pharyngeal).
  - PCR is excellent on cervical or urethral swabs or first-stream urine.
- **Chlamydia trachomatis**
  - Antigen detection (PCR recommended) on cervical or urethral swabs or first-stream urine (preferably first 20-30 ml). the first 10 ml flushes out urethral epithelial cells.
  - Culture available on request serology not recommended.

Syphilis
- Serology (RPR, TPHA, FTA-ABS, EIA)

Hepatitis B
- Serology

HIV
- Serology

Trichomonas vaginalis
- Microscopy from vaginal swab
- PCR

Herpes simplex
- Viral culture
- Antigen detection (PCR best)
- Serology

Lymphogranuloma venereum
- ***Chlamydia*** serology
- Lymph nodes biopsy

Chancroid
- Microscopy/culture for ***Haemophilus ducreyi***

Granuloma inguinale
- Biopsy

URINARY TRACT INFECTION (UTI)

Microscopy

White blood cell count >10 per µl is abnormal and reflects response to local infection.

- Higher counts have greater significance.
- Epithelial cells suggest the possibility of genital contamination in females (i.e., poor sample).

Culture

Counts are expressed as organisms per ml.

- Counts $>10^5$ organisms per ml are more significant.
- UTI can occur at lower counts, especially in pure growth and supported by the clinical picture and significant pyuria.
- Significant organisms are usually in pure growth (not mixed).
- Significant UTI are usually associate with a pyuria but may occur in its absence.

FEVER IN RETURNING TRAVELERS

- **Serology**
  - Dengue fever (acute and convalescent)
  - Typhoid fever (acute and convalescent)-limited use (use stool culture)
  - Viral hepatitis A, B
  - Amoebiasis-liver abscess
  - Typhus
- **Blood culture**
  - Typhoid fever (best to detect typhoid)
  - Meningococcal infection
- **Full blood cout (FBE), thick and thin film**
  - Malaria
- **Spot agglutination tests**
  - Dengue fever
  - Malaria
- **Stool examination**

  Culture
  - Campylobacter, Salmonella, Shigella, Typhoid

  Microscopy
  - *Amoeba, Giardia, others*
- **Liver function tests**
  - Hepatitis
- **ESR**
  - Screening

LYMPHADENOPATHY

- FBE, ESR, mononucleosis screen (e.g., Paul Bunnell)
- Serology
  - EBV, CMV, HIV
  - Toxoplasma
  - Rubella, syphilis, cat-scratch disorder

INTERPRETATION OF IRON STUDIES

A sound knowledge of the metabolism of iron and its transportation helps in the interpretation of iron studies. The serum (or plasma) level of iron falls gradually below the normal range (about 14-30 µmol/L) when the amount of iron in the body decreases after the iron reserves become exhausted. The level in the serum of ***transferrin,*** the major iron-transporting protein in the circulation, rises under these circumstances to perhaps above normal levels.

Transferrin, as the carrier protein, binds most of the iron in the serum. The capacity of transferrin is represented by the total amount of iron that can be bound to serum protein, meaning that the ***total iron-binding capacity*** **(TIBC)** provides and alternative estimation of the concentration of transferrin.

The interpretation of iron studies

Condition	Serum Fe	TIBC	% Transferrin Saturation	Ferritin
Iron deficiency	↓	N or ↑	↓	↓↓
Thalassaemia	N or ↑	N	N or ↑	↑ or N
Anaemia of chronic disease	↓	N or ↓	↓	N or ↑
Sideroblastic anaemia	N or ↑	N	N or ↑	↑
Haemochromatosis	↑	↓	↑↑	↑↑

N = normal

Transferrin saturation is the extent to which the iron-binding sites on transferrin are occupied by iron. This is calculated by dividing the iron level by the serum iron-binding capacity. The percentage saturation is normally 20-55%. It is markedly elevated in hemochromatosis-above 50%- and is the key marker for that disorder.

The serum ferritin level bears a direct relationship to the amount of iron stores in the body and subnormal values can be detected when iron stores are exhausted even before the serum iron level has significantly declined. The normal range varies between sexes and age groups: 20-250 µg/L in females and lower again in children.

LIVER FUNCTION TESTS (LFTS)

- Unconjugated -from breakdown of red blood cells
- Conjugated-after metabolism in the liver

Albumin

- Synthesized in the liver with a half-life of 20 days (a good indicator of chronic liver disease, not acute)

Plasma transferases

- Alanine aminotransferases (ALT)-specific to liver, raised in obesity, fatty liver, metabolic syndrome
- Aspartate aminotransferases (AST)

Both are indicators of hepatocellular damage.

Plasma alkaline phosphatase (ALP)

- Present on the sinusoidal surface of hepatocytes and in bile canaliculi and ducts. Not specific to liver but an indicator of cholestasis (e.g., obstruction, infiltration, cirrhosis).

Gamma-glutamyl transferase (GGT)

- Present in bile canaliculi
- Raised levels with cholestasis, other liver diseases and with drug and alcohol intake.

DIFFERENTIAL DIAGNOSIS OF JAUNDICE

Differentiating jaundice due to acute hepatocellular damage from extrahepatic obstruction on routine LFTs can only be suggested in the early stages according to the following guideline.

	Acute hepatitis	Obstruction
ALP	Normal to <3 times normal	>3 times normal
ALT/AST	10-100 times normal	<10 times normal

ALCOHOL ABUSE

The following test indicators point to the diagnosis of alcohol excess:

- GGT-limited sensitivity and specificity
- Mean corpuscular volume-macrocytosis, also limited sensitivity and specificity
- Carbohydrate deficient transferrin

THYROID FUNCTION TESTS (TETS)

The key first-line TFT is the serum thyroid stimulating hormone (TSH) level, which has to be interpreted with care and though. Because of its high sensitivity it can miss the occasional case of thyroid disorder, especially in the presence of underlying pituitary disorder, treated thyrotoxicosis and non-thyroidal illness. The next screening tests are serum free tri-iodothyronine (T_3) and thyroxine (T_4) tests. If there are discrepancies, the anti-thyroid antibody tests can be valuable in finding the cause of thyroid disorders. These include anti-thyroid peroxidase antibodies (especially), anti-thyroglobulin antibodies and anti-TSH receptor antibodies. Other tests include thyroxine-binding globulin and thyroglobulin. Follow-on tests may include nuclear medicine scanning and ultrasound. It is advisable to seek expert help in the interpretation of these tests, especially in patients with systemic illness.

SERUM ELECTROLYTE LEVELS

An understanding of serum electrolyte levels is very important for the clinical implications of very ill patients, disorders of fluid loss and retention, and the use of cardiovascular drugs, especially diuretics. The key ions are **potassium (K^+), sodium (Na^+), chloride (Cl^-),** and bicarbonate **(HCO_3^-).** Normal intracellular and extracellular levels of sodium and potassium are fundamental for good health.

The anion gap

The anion gap is a useful clinical calculation to assess in general acid-base problems. It is calculated from the serum electrolyte values as the difference between the cation Na^+ and the serum of the two main anions Cl^- and HCO_3^-. The charges on the other cations (e.g., K^+) and anions (e.g., phosphate, PO_4^-) tend to balance out. Negatively charged plasma proteins account for most of the anion gap.

Anion gap = (Na^+) - $(Cl^- + HCO_3^-)$
In a healthy person the anion gap is around 8-16.

An increased anion gap infers metabolic acidosis. Metabolic acidosis with a normal anion gap is called '***hyperchloremic acidosis'*** because the reduction in HCO_3^- is balanced by an increased Cl^- (e.g., chronic diarrhoea, kidney tubular necrosis).

Hypernatraemia

Na^+ > 145 mmol/L

Causes

- Water depletion **(e.g., diabetes insipidus)**
- Water and sodium depletion **(e.g., diarrhoea)**
- Corticosteroid excess (**e.g., Cushing syndrome, Conn syndrome**)
- Excess IV hypertonic **Na** solutions

Clinical features

- Thirst, confusion, oliguria
- Orthostatic hypotension
- Muscle twitching or cramps
- Severe: seizures, delirium, hyperthermia, coma.

Hyponatraemia

Na^+ < 135 mmol/L

Causes

- Water retention **(e.g., CCF, hypoalbuminemia)**
- Kidney failure to conserve salt (e.g., nephritis, diabetes mellitus)
- Gastrointestinal losses of **Na^+** (e.g., diarrhoea, vomiting)
- Drugs (e.g., diuretics, ACE inhibitors)

Clinical features

- **Lethargy,** confusion, mental changes (e.g., in personality)
- **Severe:** convulsions, coma, death

Hyperkalaemia

K^+ > 5 mmol/L

The first sign of **hyperkalaemia (e.g., > 6)** may be a cardiac arrest.

Causes

- Kidney failure
- Acidosis (especially metabolic)
- Mineralocorticoid deficiency: **Addison disease** (page 219), aldosterone antagonists.
- Excessive intake of **K^+** (e.g., high IV fluids with **K**)
- Drugs (e.g., spironolactone, ACE inhibitors, NSAIDs)

Consider artefact, for example, haemolysis sample

Clinical features

- Muscle weakness, flaccid paralysis (rare)
- May be asymptomatic until cardiac toxicity
- May cause cardiac arrest-asystole versus fibrillation
- **ECG:** peaked **T** weaves, low **QT**, high **PR** interval, arrhythmias

Hypokalaemia

K^+ < 3.5 mmol/L

Causes

- Kidney disease
- **Gastrointestinal loss:** vomiting, diarrhoea
- Alkalosis
- **Mineralocorticoid excess: Cushing** syndrome, high aldosterone, **Conn** syndrome (page 220).
- Loss in extracellular fluid to intracellular (e.g., burns, other trauma).
- Low intake of **K^+**
- Drugs (e.g., diuretics-furosemide, thiazide)

Clinical features

- Lethargy, muscle weakness and cramps, mental lethargy and confusion
- Severe flaccid paralysis, tetany, coma
- **ECG:** prominent **U** waves, depressed **ST segment**, low **T waves**, arrhythmias.

LABORATORY REFERENCE VALUES

The reference values and ranges for these blood tests are given in the system of **international units (SI)** and may vary from laboratory to laboratory. An **asterisk (*)** indicates that paediatric reference ranges differ from the adult range given.

Electrolytes/kidney	
Sodium	(135-145 mmol/L)
Potassium*	(3.5-5.0 mmol/L)
Chloride	(95-107 mmol/L)
Bicarbonate	(23-32 mmol/L)
Urea	(3-8.0 mmol/L)
Creatinine	(**M** 0.04-0.13; **F** 0.04-0.1 mmol/L)
eGFR	(>60 ml/min/1.72 m^2)
Calcium* (total)	(2.10-2.60 mmol/L)
Phosphate	(0.90-1.35 mmol/L)
Magnesium*	(0.65-1.00 mmol/L)
Uric acid*	(**M** 0.17-0.45; **F** 0.12-0.40 mmol/L)
Liver function/pancreas	
Bilirubin (total)*	(<20 µmol/L)
Bilirubin (direct)*	(<3 µmol/L)
AST*	(<40 U/L)
GGT*	(F<45: M<65 U/L)
Alkaline phosphatase*	(<120 U/L)
Latic dehydrogenase	(110-230 U/L)
Total protein	(60-80 g/L)
Albumin	(38-50 g/L)
Amylase	(30-110 U/L)
Lipase	(<80 U/L)
Therapeutic drugs	
Digoxin*	(Ther. 1.3-2.6 nmol/L)
Phenytoin*	(Ther. 40-80 µmol/L)
Valproate*	(Ther. 300-700 µmol/L)
Carbamazepine*	(Ther. 10-50 µmol/L)
Gentamicin (pre)	(<2.0 µg/mL)
Gentamicin (post)	(<12.0 µg/mL)
Lithium	(Ther. 0.5-1.0 mmol/L)

Cardiac/lipids	
Troponin I or T	(<0.1 µg/L)
AST*	(<40 U/L)
CK (total)	(**F**<200: **M**<300 U/L)
CK-MB	(<25 U/L)
Cholesterol *	(<5.5 mmol/L)
Triglycerides*	(<2.0 mmol/L)
HDL cholesterol	(>1.00 mmol/L)
LDL cholesterol	(<3.5 mmol/L)

Thyroid tests	
Free T4	(10.0-20.0 pmol/L)
Ultra-sensitive **TSH***	(0.4-4.5 mU/L)
Free T3	(3.3-8.2 pmol/L)

Other endocrine tests	
s Cortisol 8 am	(130-700 nmol/L)
s Cortisol 4 pm	(80-350 nmol/L)
FSH adult	(4-12 IU/L)
FSH ovulation	(10-30 IU/L)
FSH post-menopausal	(4-200 IU/L)
Oestradiol menopausal	(<200 pmol/L)
Testosterone	(**M** 10-35: **F**<3.5 nmol/L)

Tumour markers	
PSA	(0.4.0 µg/L)
CEA	(<7.5 µg/L)
AFP	(<10 µg/mL)
CA-125	(<35 U/mL)

Iron studies	
Ferritin	(20-250 µg/L)
Iron	(14-30 µmol/L)
Iron-binding capacity	(45-80 µmol/L)
Transferrin	(2-3.5 g/L)
Transferrin saturation	(**F** 20-55%**: M** 20-60%)

Blood gases/arterial	
PH*	(7.38-7.43)
PO_2*	(85-105 mmHg)
PCO_2*	(36-44 mmHg)
Bicarbonate*	(20-28 mmol/L)
Base excess*	(-3 to +3 mmol/L)

Glucose	
Glucose (fasting)	(3.5-6.0 mmol/L)
Glucose (random)	(3.5-9.0 mmol/L)
HbA1c	**(**4.7-6.1%)

Coagulation	
Bleeding time	(2.0-8.5 min)
Fibrinogen	(2.0-4.0 g/L)
Prothrombin time	Seconds
Prothrombin ration (INR)	(1.0-1.2)
APTT	(25-35 seconds)
D dimer	(<500 ng/mL)

Haematology	
Hb*	(F 115-165: M 130-180 g/L)
PCV*	(**F**37-47: **M** 40-54%)
MCV*	(81-98 fl)
Reticulocytes	(0.5-2.0%)
Leucocytes*	(4.0-11.0x10^{9}/L)
Platelets	(150-400 x 10^{9}/L)
ESR	(<20 mm)
Band neutrophils*	(0.05 x 10^{9}/L)
Mature neutrophils*	(2.0-7.5 x 10^{9}/L)
Lymphocytes*	(1.0-4.0 x 10^{9}/L)
Monocytes*	(0.2-0.8 x 10^{9}/L)
Eosinophils*	(0.0-0.4 x 10^{9}/L)
s Folate	(>630 nmol/L)
s Vitamin B_{12}	(150-700 pmol/L)

Others	
s Creatine (phosphor) kinase	(<90 U/L)
s Lead	(2 µmol/L)
s C-reactive protein	(<10 mg/L)

SYMPTOMOLOGY
SIGNS AND SYMPTOMS

(From Wikipedia, the free encyclopedia)

Signs and symptoms are the observed or detectable signs, and experienced symptoms of an illness, injury, or condition.

A sign

- a higher or lower temperature than normal,
- raised or lowered blood pressure or an abnormality showing on a medical scan.

A symptom

- as feeling feverish,
- a headache or
- other pain or pains in the body

A medical sign is an objective indication of a disease, injury, or abnormal physiological state that may be detected during a physical examination. These signs are visible or otherwise detectable such as a rash or bruise. Medical signs assist in arriving at an accurate diagnosis. Examples of signs include elevated blood pressure, nail clubbing of the fingernails or toenails, staggering gait, and arcus senilis and arcus juveniles of the eyes. A sign is distinguished from an indication which is a specific reason for using a particular treatment. A symptom is something felt or experienced, such as pain or dizziness. Signs and symptoms are not mutually exclusive, for example a subjective feeling of fever can be noted as sign by using a thermometer that registers a high reading.

Signs and symptoms are often non-specific, but some combinations can be suggestive of certain diagnoses, helping to narrow down what may be wrong. A particular set of characteristic signs and symptoms that may be associated with a disorder is known as a syndrome. In cases where the underlying cause is known the syndrome is named as for example Down syndrome and Noonan syndrome. Other syndromes such as acute coronary syndrome may have a number of possible causes.

The CDC lists various diseases by their signs and symptoms such as for measles which includes a high fever, conjunctivitis, and cough, followed a few days later by the measles rash.

Terms

Prodrome

Many diseases have an early prodromal stage where a few signs and symptoms may suggest the presence of a disorder before further specific symptoms may emerge. Measles for example has a prodromal presentation that includes a hacking cough, fever, and Koplik's spots in the mouth.

Nonspecific symptoms

Nonspecific symptoms are very general that can be associated with a wide range of conditions. They are also known as constitutional symptoms when they affect the sense of well-being. The symptoms include weight loss, headache, pain, fatigue, loss of appetite, night sweats, and malaise. A constitutional symptom may be primary or secondary.

Vital signs

Vital signs are the four signs that can give an immediate measurement of the body's overall functioning and health status. They are temperature, heart rate, breathing rate, and blood pressure. The ranges of these measurements vary with age, weight, gender and with general health.

Syndromes

Many conditions are indicated by a group of known signs, or signs and symptoms. These can be a group of three known as a triad: a group of four known as a tetrad, and a group of five known as a petrad. Some syndromes such as nephrotic syndrome may have a number of underlying causes that are all related to diseases that affect the kidney

Positive and negative

Sensory symptoms can also be described as positive symptoms, or as negative symptoms depending on whether the symptom is abnormally present such as tingling or itchiness, or abnormally absent such as loss of smell. The following terms are used for negative symptoms – hypoesthesia is a partial loss of sensitivity to moderate stimuli, such as pressure, touch, warmth, cold. Anesthesia is the complete loss of sensitivity to stronger stimuli, such as pinprick. Hypoalgesia (analgesia) is loss of sensation to painful stimuli. Symptoms are also grouped in to negative and positive for some mental disorders such as schizophrenia.

Neuropsychiatric symptoms are present in many degenerative disorders including dementia, and Parkinson's disease. Symptoms commonly include apathy, anxiety, and depression. Neurological and psychiatric symptoms are also present in some genetic disorders such as Wilson's disease. Executive dysfunction is an often-found symptom in many disorders including schizophrenia, and ADHD.

Radiologic

Radiologic signs are abnormal medical findings on imaging scanning. These include the Mickey Mouse sign and the Golden S sign. When using imaging to find the cause of a complaint, another unrelated finding may be found known as an incidental finding.

Cardinal

Cardinal signs and symptoms are those that may be diagnostic, and pathognomonic – of a certainty of diagnosis. Inflammation for example has a

recognized group of cardinal signs and symptoms, as does exacerbations of chronic bronchitis, and Parkinson's disease.
In contrast to a pathognomonic cardinal sign, the absence of a sign or symptom can often rule out a condition. This is known by the Latin term sine qua non. For example, the absence of known genetic mutations specific for a hereditary disease would rule out that disease. Another example is where the vaginal pH is less than 4.5, a diagnosis of bacterial vaginosis would be excluded.

Reflexes
A reflex is an automatic response in the body to a stimulus. Its absence reduced (hypoactive), or exaggerated (hyperactive) response can be a sign of damage to the central nervous system or peripheral nervous system. In the patellar reflex (knee-jerk) for example, its reduction or absence is known as Westphal's sign and may indicate damage to lower motor neurons. When the response is exaggerated damage to the upper motor neurons may be indicated.[citation needed]

Facies
A number of medical conditions are associated with a distinctive facial expression or appearance known as a facies.

Anamnestic signs
Anamnestic signs (from anamnēstikós, ἀναμνηστικός, "able to recall to mind") are signs that indicate a past condition, for example paralysis in an arm may indicate a past stroke.

Asymptomatic
Some diseases including cancers, and infections may be present but show no signs or symptoms and these are known as asymptomatic. A gallstone may be asymptomatic and only discovered as an incidental finding. Easily spreadable viral infections such as COVID-19 may be asymptomatic but may still be transmissible.

History
Symptomatology
A symptom (from Greek σύμπτωμα, "accident, misfortune, that which befalls",[36] from συμπίπτω, "I befall", from συν- "together, with" and πίπτω, "I fall") is a departure from normal function or feeling. Symptomatology (also called semiology) is a branch of medicine dealing with the signs and symptoms of a disease. This study also includes the indications of a disease. It was first described as semiotics by Henry Stubbe in 1670 a term now used for the study of sign communication. Prior to the nineteenth century there was little difference in the powers of observation between physician and patient. Most medical practice was conducted as a co-operative interaction between the physician and patient; this was gradually replaced by a "monolithic consensus of opinion imposed from within the community of medical investigators". Whilst each noticed much the same things, the physician had a more informed interpretation of those things: "the physicians knew what the findings meant, and the layman did not".

Development of medical testing
Further information: Medical test
A number of advances introduced mostly in the 19th century, allowed for more objective assessment by the physician in search of a diagnosis, and less need of input from the patient. During the 20th century the introduction of a wide range of imaging techniques have made a huge impact on diagnostic capability. Other developments in the field of genetics, medical biochemistry, and molecular diagnostics have also played major roles.
In 1761 the percussion technique for diagnosing respiratory conditions was discovered by Leopold Auenbrugger. This method of tapping body cavities to note any abnormal sounds had already been in practice for a long time in cardiology. Percussion of the thorax became more widely known after 1808 with the translation of Auenbrugger's work from Latin into French by Jean-Nicolas Corvisar.
In 1819 the introduction of the stethoscope by René Laennec began to replace the centuries old technique of immediate auscultation – listening to the heart by placing the ear directly on the chest, with mediate auscultation using the stethoscope to listen to the sounds of the heart and respiratory tract. Laennec's publication was translated into English, 1821–1834, by John Forbes [citation needed]
The 1846 introduction by surgeon John Hutchinson (1811–1861) of the spirometer, an apparatus for assessing the mechanical properties of the lungs via measurements of forced exhalation and forced inhalation. (The recorded lung volumes and air flow rates are used to distinguish between restrictive disease (in which the lung volumes are decreased: e.g., cystic fibrosis) and obstructive diseases (in which the lung volume is normal, but the air flow rate is impeded, e.g., emphysema).)[Citation needed]
The 1851 invention by Hermann von Helmholtz (1821–1894) of the ophthalmoscope, which allowed physicians to examine the inside of the human eye.
The (c. 1870) immediate widespread clinical use of Sir Thomas Clifford Allbutt's (1836–1925) six-inch (rather than twelve-inch) pocket clinical thermometer, which he had devised in 1867.[45]
The 1882 introduction of bacterial cultures by Robert Koch, initially for tuberculosis, being the first laboratory test to confirm bacterial infections.

The 1895 clinical use of X-rays which began almost immediately after they had been discovered that year by Wilhelm Conrad Röntgen (1845–1923).
The 1896 introduction of the sphygmomanometer, designed by Scipione Riva-Rocci (1863–1937), to measure blood pressure.

DIAGNOSIS

The recognition of signs and noting of symptoms may lead to a diagnosis. Otherwise a physical examination may be carried out, and a medical history taken. Further diagnostic medical tests such as blood tests, scans, and biopsies, may be needed. An X-ray for example would soon be diagnostic or not of a bone fracture. A noted significance detected during an examination or from a medical test may be known as a medical finding.

APPROACH TO COMMON SYMPTOMS

PAIN

Pain is a usually symptom of injury or disease.

EXAMINATION OF PAIN

(SOCRATES)
Site: Where is the pain? Or the maximal site of the pain.

Onset: When did the pain start, and was it sudden or gradual? Include also whether it is progressive or regressive.
(1) Acute onset
(2) Insidious onset

Character: What is the pain like?
- Aching
- Stabbing
- Throbbing
- Burning
- Constricting/gripping
- Distending
- Colic

Radiation: Does the pain radiate anywhere?
- Extension of pain to another site whilst the initial pain persists

Association: Any other signs or symptoms associated with the pain?
Time course: Does the pain follow any pattern?
(1) Continuous severe pain
(2) Slowly increased pain, then relief slowly

Exacerbating and Relieving Factor: Does anything change the pain?
Exacerbating factors
- Abdominal pain after meal
- Musculoskeletal pain is affected by joint movement, muscle exercise and posture

Relieving factors
- Position/movement
- Hot water bottle
- NSAIDs
- Food
- Antacids
- Severity: How bad is the pain?

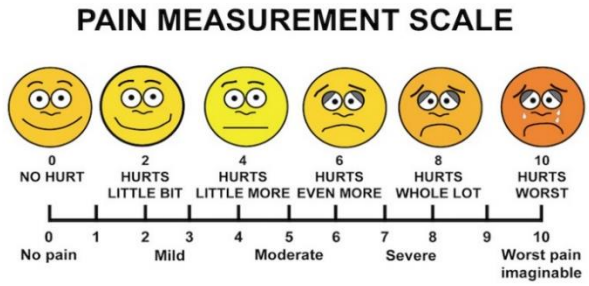


Figure - Pain Measurement Scale (Allinahealth.org, n.d.)

Figure – Universal Pain Scale (NHS, n.d.)

TREATMENT

Never leave the patient with severe pain without a diagnosis of the underlying cause of pain. Only relieving the pain is not enough. Try to find and treat the cause of pain.

Step I	Step II
Paracetamol (Consider Amitriptyline for nerve pain)	NSAIDs: Ibuprofen or Diclofenac AND Paracetamol

Step III (Opioids are controlled drugs.)	**Step IV** (Opioids are controlled drugs.)
Weak opioid: Tramadol AND Paracetamol AND/OR Ibuprofen	Strong opioid: Morphine

Warnings:

- Aspirin is contraindicated in children below 12 years.
- NSAIDs can exacerbate an asthma attack.
- Never use pain killer higher dose than maximum recommended dose.

Treatment examples:

- Moderate headache, muscle, joint or bone pain: paracetamol. If moderate muscle or joint pain does not improve with paracetamol, start anti-inflammatory drugs like ibuprofen or diclofenac if not contraindicated.
- Amitriptyline low dose (high doses are used for treatment of depression) could be used for tingling pain in feet, leg or arms (commonly from diabetes mellitus or trauma) and for prophylaxis of migraine headache. Amitriptyline can make patients drowsy, very good to take at night.
- The controlled drugs are not available at the clinic, please consider for referral.

APPROACH TO ABDOMINAL PAIN

(Hannes Steinberg)

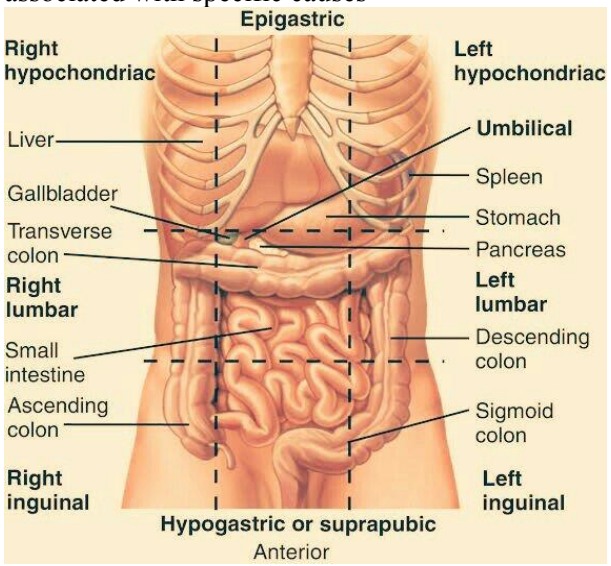
The following patients may need urgent attention if they present with abdominal pain (Adapted from PACK: Knowledge Translation Unit, University of Cape Town Lung Institute and Western Cape Government, 2015):

- **Peritonitis** suggested by guarding rebound tenderness or rigidity of the abdomen, for example, guarding, rebound tenderness or appendicitis, perforation
- **Jaundice**, for example, gallstones, hepatitis
- **Fever > 38 °C** suggests significant sepsis, for example, pelvic inflammatory disease, pyelonephritis
- No stool or flatus for last 24 hours with nausea or vomiting suggests bowel obstruction
- In a patient on antiretroviral treatment (ART), the combination of abdominal pain, nausea, vomiting, fatigue, sore muscles or difficulty breathing may suggest lactic acidosis
- No urine passed for the last 12 hours and swelling suggest acute urinary retention
- A pregnant woman may have serious problems such as pregnancy induced hypertension or pyelonephritis
- A patient with chest pain may have referred pain to the abdomen and a serious problem in the chest such as myocardial infarction or pneumonia, lower abdominal pain with recent TOP/miscarriage/ delivery or vaginal bleeding.

Gathering information

Have the patient indicate the site of the pain and relate to the anatomy and function of the organs that are found in the abdominal cavity, where they are situated and their nerve supply.

Location of acute abdominal pain may be associated with specific causes



Likely pathology with abdominal pain at different locations

Location	Likely pathology
Right upper quadrant	Gallbladder disease, lower lobe pneumonia, hepatic disease
Epigastrium	Dyspepsia, peptic ulcer, perforation, pancreatitis, referred pain (for example, myocardial infarction, pneumonia)
Left upper quadrant and umbilical area	Small bowel obstruction, early appendicitis, mesenteric ischaemia, mesenteric adenitis (TB), gastro-enteritis, lower lobe pneumonia
Right or left flank	Ureteric colic, pyelonephritis, leaking abdominal aortic aneurysm
Suprapubic	Cystitis, acute urinary retention, pelvic appendicitis
Right iliac fossa	Appendicitis, carcinoma of caecum, mesenteric adenitis (TB), Crohn's disease of terminal ileum, ovarian cyst, salpingitis, ectopic pregnancy
Left iliac fossa	Diverticulitis, carcinoma of sigmoid colon, ulcerative colitis, constipation, ovarian cyst, salpingitis, ectopic pregnancy
Groin	Irreducible hernia

Source: Kontoyannis A, Conway K (2008) *Surgery*. Edinburgh: Mosby-Elsevier

The mnemonic **PQRST** can help recall further key information in the history:

P: **Precipitating/palliating/provoking factors**. Peritonitis is worse with movement, so the patient lies still. Ureteric colic is unaffected by movement and the patient may move about trying to relieve the pain. Food may relieve a duodenal ulcer but worsen a gastric ulcer. Fatty foods may worsen biliary colic, hot and spicy foods may worsen dyspepsia and peptic ulcers, and milk may relieve dyspepsia, but worsen biliary colic due to the fat content. Pain on swallowing may be related to esophageal pathology, while pain 30−60 minutes after eating may be related to gastric pathology. Likewise, pain with defecation may be related to the lower gastrointestinal tract, pain on micturition to the Genito-urinary tract and pain with menses to the reproductive tract.

Q: **Quality/quantity of pain**. Burning sensation is usually felt if there is pathology within the gastrointestinal tract or on the skin. A stabbing pain may indicate peritoneal irritation (including free blood/fluid), a cramp-like and 'colicky' pain indicates pathology of a hollow viscus, whereas a dull and constant aching pain may indicate a tumour or space occupying lesion. e pain may appear to radiate to another place. For example, pain in retroperitoneal structures such as the pancreas or aorta may be experienced as back pain. Pain from the diaphragm may radiate to the shoulder tip and from the gallbladder to the tip of the scapula. Ovarian pain may radiate to the Sacro-iliac region.

R: Related factors. Ask about other symptoms of the gastrointestinal tract (for example, vomiting, diarrhoea, constipation, worms, hematemesis, melena, dysphagia) or Genito-urinary tract (for example, dysuria, menses, vaginal discharge). In a patient with weight loss, fever, night sweats and HIV, consider abdominal TB. In a patient with unexplained weight loss, consider cancer. In a patient with difficulty breathing and leg swelling, consider heart failure. It needs to be kept in mind that referred pain may present as abdominal pain. Cardiac pathology or pneumonia may present as upper abdominal pain. It is common for patients to present with vague lower abdominal pains when they would like to discuss issues of infertility, sexuality or relationship difficulties.

S: Severity of the pain. Ask the patient to rate the severity on a scale of one to ten and also watch how they react during the consultation and examination.

T: Time course and treatment. Consider the duration and whether it is intermittent or persistent pain and the use of or response to any medication. Abdominal pain may change over time. For example, appendicitis starts as a colicky central pain that later localizes to the right iliac fossa with the onset of peritonitis. Colic may last seconds (intestinal), minutes (ureteric), or 20 minutes (gallbladder). Dyspepsia may be caused by aspirin or NSAIDs.

EXAMINATION

Examination includes attention to the patient's general appearance (sweating, pallor, position, behaviour), vital signs (temperature, pulse, blood pressure, respiratory rate), abdomen (nine quadrants), and may include a rectal and vaginal examination.

INVESTIGATIONS

Investigations will depend on the hypothesis being considered but may include:

- Full blood count – anaemia, infection
- Urea and electrolytes – renal function, dehydration

- Liver function tests – gallbladder, biliary or hepatic problems
- Amylase – pancreatitis
- Urinalysis – haematuria in ureteric colic and infection, leucocytes and nitrites in infection
- Pregnancy test
- Erect chest X-ray to look for free gas under the diaphragm or lower lobe pneumonia; note that 30% of acute perforations are not visible on the erect chest X-ray
- Abdominal X-ray for signs of obstruction, free gas, calculi or gas in the biliary tree
- Abdominal ultrasound can examine most organs
- Scopes of upper or lower GIT
- CAT scanning, barium or gastrogram studies, laparotomy and laparoscopy may have a place at the referral hospital.

Dyspepsia

Epigastric pain or discomfort is one of the commonest presentations of abdominal pain in primary care. Although no specific diagnosis is made in a large number of patients, the following pathology should be considered:

- Duodenal ulcer
- Gastric ulcer or gastritis
- Gastric cancer
- Hiatus hernia, esophagitis and gastro-esophageal reflux
- Gall bladder disease
- Irritable bowel syndrome (colicky pain, abdominal bloating and alternating bowel habit).

The majority of patients with dyspepsia will recover spontaneously or with a course of antacids or acid suppression. A number of **red ag signs** and symptoms suggest the need for further investigation:

- Objective weight loss
- Loss of appetite
- Early fullness
- Anaemia or evidence of bleeding (occult blood, melaena or hematemesis)
- Lymphadenopathy (Virchow's node)
- Age > 55 years when cancer becomes more likely
- Persistent vomiting – gastric out ow obstruction due to duodenal ulcer or gastric cancer
- Jaundice
- Abdominal mass
- Poor response or recurrence after a course of empirical treatment.

In a patient with dyspepsia, it is always important to enquire about medication and lifestyle factors that may be causing or worsening it:

- Non-steroidal anti-inflammatory drugs and corticosteroids
- Cigarette smoking
- Excessive alcohol intake
- Psychosocial stress
- Spicy, hot or acidic foods, or carbonated drinks.

The best investigation is endoscopy to exclude peptic ulcer disease, cancer, esophagitis and hiatus hernia. Gallbladder disease will require liver function tests and ultrasound. Reflux may require manometry and pH testing to con rm. If peptic ulcer disease is suspected, tests for Helicobacter pylori should be considered. Tests include histology, urease testing of biopsies at endoscopy, antibodies in the blood and breath tests.

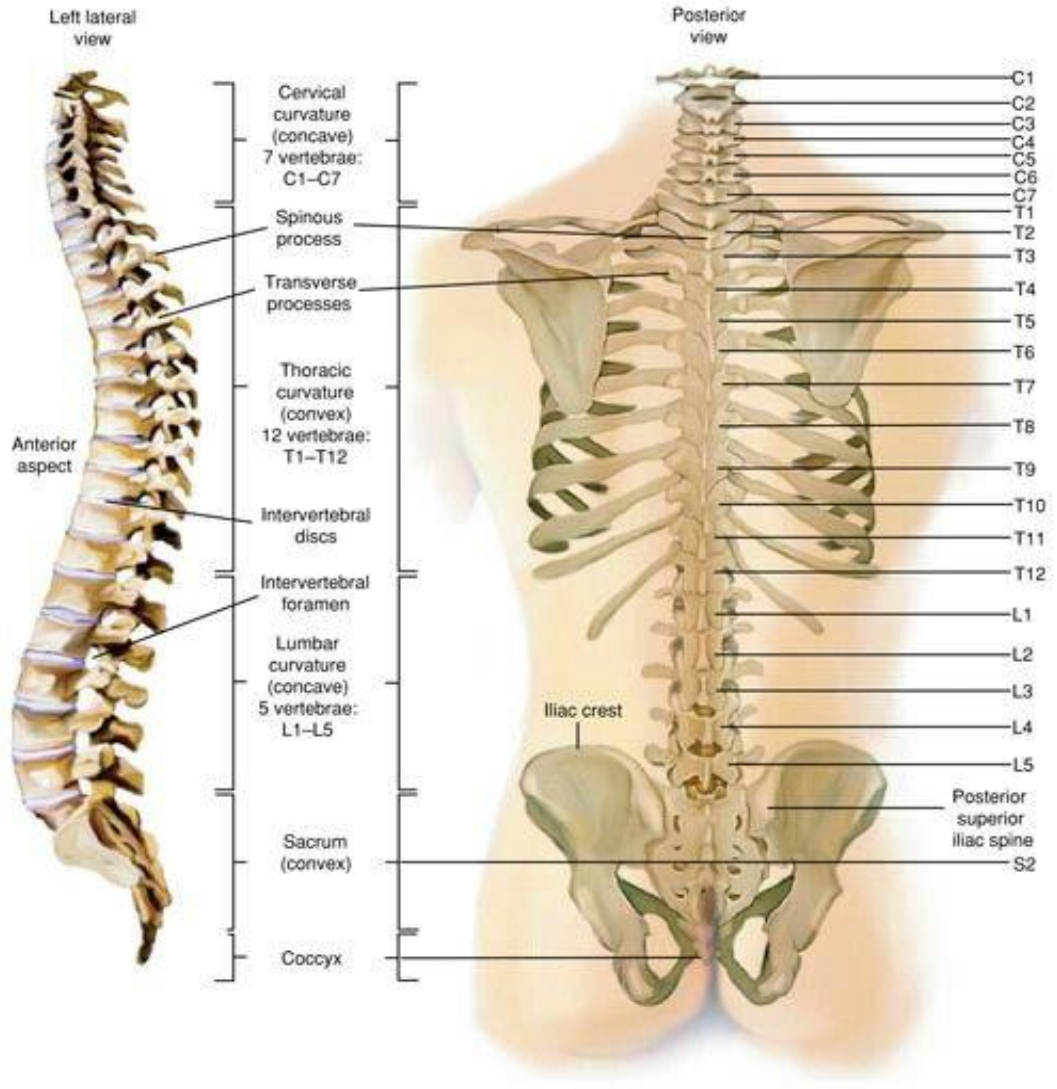
APPROACH TO BACK PAIN

(**Don O'Mahoney**) Low back pain (LBP) is defined as pain that occurs posteriorly in the area between the bottom of the rib cage and the buttock creases. e initial evaluation should (**Mash, Blitz-Lindeque, 2006**):

- Attempt to place patients with LBP into one of the following categories:
  - Non-specific LBP
  - LBP associated with radiculopathy or spinal stenosis
  - LBP associated with serious spinal pathology
  - LBP referred from a non-spinal source

NATURAL HISTORY AND AETIOLOGY

- Most LBP (80%) is non-specific and derives from the structural components of the lower back: bones, muscles, joints, discs, tendons, ligaments or nerves associated with lumbar vertebrae or pelvis. e exact structure causing the pain cannot be determined for most patients. It affects men and women equally, with onset usually between the ages of 30 and 50 years. e prognosis is favorable, as two thirds of patients with acute LBP substantially improve within six weeks .
- the prognosis of LBP with radiculopathy (4%) caused by herniated discs is also favorable. More than 90% of symptomatic lumbar disc herniations occur at the L4/L5 and L5/S1 levels. Only about 10% of patients have so much pain after six weeks that surgery is considered.
- In contrast, spinal stenosis (3%) caused by hypertrophic degenerative changes of the facets and thickening of the ligamentum flavum, usually remains stable or gradually worsens.
- LBP is due to a specific spinal pathology in a minority of cases. They are important to detect because they often require aggressive evaluation and management (**Deyo, 2001**). In South Africa, spinal tuberculosis is more common due to the HIV epidemic. Back pain referred from a non-spinal source, such as abdominal or pelvic pathology, comprises about two percent of low back pain causes.



CAUSES OF LOW BACK PAIN

Classification of cause	Examples
Structural	Non-specific Facet joint arthritis or dysfunction Prolapsed intervertebral disc Annular tear Midline disc herniation (Cauda equina syndrome) Spondylolysis or spondylolisthesis Spinal stenosis
Infection	Discitis Osteomyelitis, for example staphylococcal Tuberculosis of the spine Paraspinal abscess
Inflammatory	Spondylo-arthropathies (for example, ankylosing spondylitis, psoriatic and reactive arthritis) Sacro-ilitis or sacro-iliac dysfunction
Neoplasm	Primary (for example multiple myeloma) or secondary (for example prostate and breast)
Metabolic	Osteoporosis and vertebral collapse Paget's disease Osteomalacia Hyperparathyroidism
Referred/non-spinal	Major viscera, for example, kidneys and pancreas Retroperitoneal structures, for example, dissecting aorta Urogenital system, for example, pelvic inflammatory disease Hip, for example, osteoarthritis

History

the onset and characteristics of the pain are important in differentiating non-specific from other categories of LBP. It is important to inquire about:

- Impact on physical function (sleep, work, dressing, sexual activity, recreation) and factors that improve or worsen the pain
- the tasks the patient performs at work and their level of physical activity off the job
- Radiating leg pain (sciatica) is suggestive of radiculopathy and disc prolapse and may be exacerbated by coughing, sneezing or straining during the Valsalva manoeuvres

Spinal stenosis occurs usually in older patients and is characterized by pain in the legs on walking, which mimics ischaemic claudication; the pain is relieved by sitting down or bending forward

Red flag for low back pain

- **Cancer**
  - History of cancer with new onset of LBP
  - Pain is progressive
  - Unexplained weight loss
  - Failure to improve after one month
  - Age < 18 years or >50 years
- **Vertebral infection**
  - Fever and systemic upset such as night sweats and weight loss
  - HIV
    Intravenous drug abuse
  - Recent infection
- **Cauda equina syndrome**
  - Urinary retention
  - Motor deficits at multiple levels
  - Faecal incontinence
  - Saddle anaesthesia
- **Vertebral compression fracture**
  - History of significant trauma
  - History of osteoporosis
  - Use of corticosteroids
  - Older age
- **Severe/progressive neurological deficits**
  - Progressive motor weakness
- **Inflammation (ankylosing spondylitis)**
  - Early morning stiffness
  - Improving with exercise
  - Alternating buttock pain
  - Nocturnal awakening in early hours
  - Younger age
- **Referred pain from abdomen or pelvis**
  - Dysuria, fever, nausea/vomiting, abdominal pain, abdominal mass, localized tenderness on examination, genito-urinary symptoms

Assess psychosocial factors and emotional distress because they are stronger predictors of chronic disabling non-specific LBP than either physical examination findings or severity and duration of pain:

- Patient's perspective – beliefs, concerns, expectations, feelings
- Psychosocial stress – relational, financial, health, living situation, work related
- Mental health – depression, anxiety, substance abuse
- Secondary gain from potential compensation or disability grant.

EXAMINATION

- A focused examination is adequate in patients with LBP whose history does not suggest serious spinal pathology or non-spinal causes, with particular emphasis on the following (Mash, Blitz-Lindeque, 2006):
- Palpate spine: Vertebral tenderness has sensitivity for infection, but not specificity. Tenderness may also indicate neoplasia or osteoporotic vertebral collapse
- Movements: Limited spinal motion is not strongly associated with any specific diagnosis, but suggests the degree of functional limitation
- A positive result on the straight-leg-raising test (defined as reproduction of the patient's sciatica between 30 and 70 degrees of leg elevation) has a relatively high sensitivity but modest specificity for diagnosing herniated disc
- Thee crossed straight-leg-raising test is more specific for a herniated disc but less sensitive.
  Tests for sensation (light touch or pin prick), motor strength and re exes are useful in localizing the level of a disc herniation (see Table 5.4).

When to investigate or refer?

Because non-specific acute LBP typically does not have a serious Aetiology and resolves with conservative treatment, most patients do not need investigations (Chou et al., 2009).

Patients with radiculopathy and suspected spinal stenosis should be investigated and referred if symptoms do not resolve in four to six weeks. Typical investigations in primary care include a full blood count, ESR and plain radiograph. CAT scans and MRI scans are often required at the referral hospital. Cauda equina syndrome and severe progressive neurological deficits must be referred as an emergency.

Physical examination findings in nerve root impingements

Level of disc herniation	Nerve root impinged	Sensory loss	Motor weakness	Screening examination	Reflex
L3–L4	L4	Medial foot	Knee extension	Squat and rise	Knee/ patellar
L4–L5	L5	Dorsal foot	Dorsiflexion ankle/great toe	Heel walking	None
L5–S1	S1	Lateral foot	Plantar flexion ankle and toes	Walking on toes	Ankle/ Achilles

APPROACH TO BREAST SYMPTOMS

(**Ramprakash Kaswa**) Breast tissue is composed of adipose tissue, glandular tissue and suspensory ligaments. e primary symptoms of breast disease are classified into three categories:

1. Breast pain (mastalgia)
2. Breast lump (mass)
3. Discharge from nipple.

HISTORY

In a patient with breast pain or a lump, determine its location, duration and whether it is related to the menstrual cycle. Breast cancer rarely presents with pain and usually there is a benign cause. Bilateral breast lumps are more likely to be benign and cyclical in nature. A unilateral breast lump is more suspicious of cancer, especially if the patient is an older patient (> 35 years) or has a family history of breast cancer. Breast cancer may also be associated with recent nipple inversion and skin changes.

A patient complaining of nipple discharge should be asked to describe its appearance and if it is blood stained. Bilateral discharge is more likely to be associated with pregnancy or hormonal changes, while a unilateral discharge is more sinister, especially in an older woman. A nipple discharge in a man should be investigated.

Breast enlargement can be due to obesity as well as certain medications (for example, efavirenz, nifedipine, amlodipine, fluoxetine). Gynecomastia in a man is usually due to hormonal changes with estrogenic stimulation. is may being due to physiological changes during puberty and old age or can be due to pathogenic causes such as cirrhosis, testicular disease, alcohol abuse, marijuana or anabolic steroids.

Hormonal contraception and medication therefore may be related to breast symptoms and should be queried.

Breast changes may also be due to pregnancy, and this should be excluded where appropriate. Breastfeeding women are also more likely to have breast symptoms. Painful or cracked nipples due to poor latching may occur, breasts may be painful with engorgement or mastitis, and painful breast lumps may be due to a blocked duct or breast abscess.

Risk factors for breast cancer include:

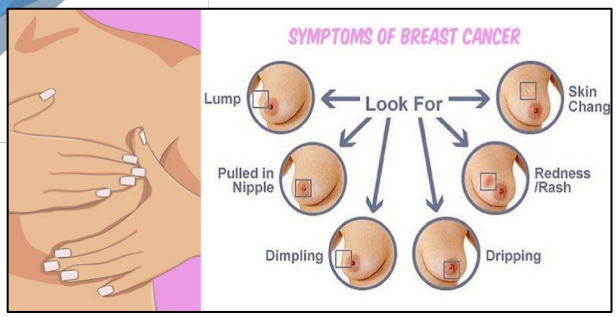
- Being female
- Increasing age
- Personal history of previous breast cancer
- Family history of breast cancer in first degree relatives
- Inherited specific genes that increase risk, for example, BRCA1 and BRCA2
- Radiation exposure
- Obesity
- Starting periods at a young age (< 12 years)
- Stopping periods later than usual (> 55 years)
- Having first child at an older age (> 30 years)
- Never being pregnant
- Postmenopausal hormonal therapy
- Harmful alcohol use.

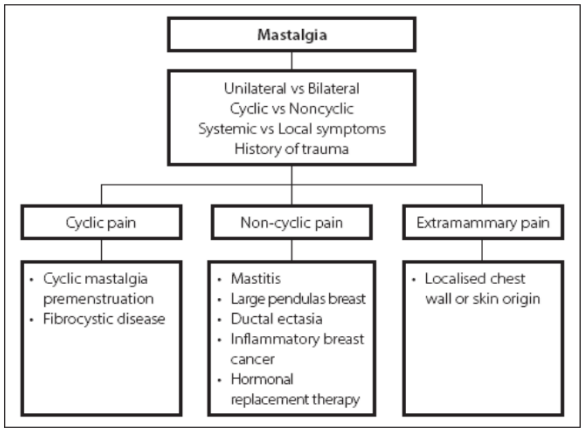
CLINICAL BREAST EXAMINATION

Inspect the breasts in three different postures while standing or sitting on the edge examination couch, arms relaxed at the sides, arms raised with hands behind the head and with hands on the hips. Look for breast symmetry, skin changes (dimpling, retraction, oedema or ulceration) and at the nipples (symmetry, inversion/retraction or discharge).

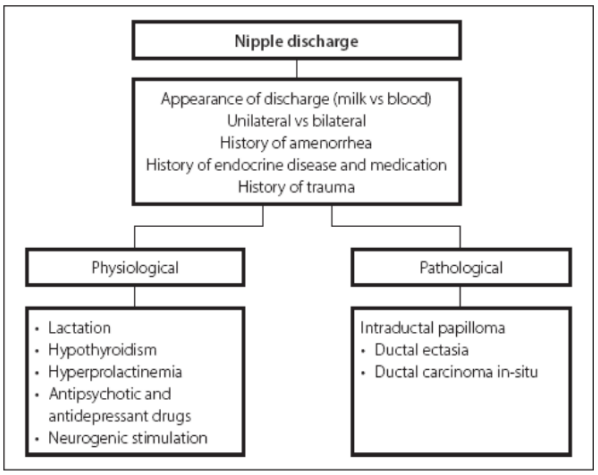
Palpate the breast with the patient lying down, with the ipsilateral arm raised and the palm behind the head, and contralateral arm by her side. Use four fingers to compress breast tissue against the rib cage with a circular motion. Squeezing tissue may create the false impression of a lump. Examine systematically in quadrants or using the approach of a clock-face to go around the breast. If any lumps are identified, note the position, size, shape, consistency, tenderness, fixation and whether single or multiple. A hard, irregular single nodule that is not tender and may be fixed to surrounding tissue is typical of cancer.

Always examine the tail of the breast as well as the axillary and supraclavicular lymph nodes.

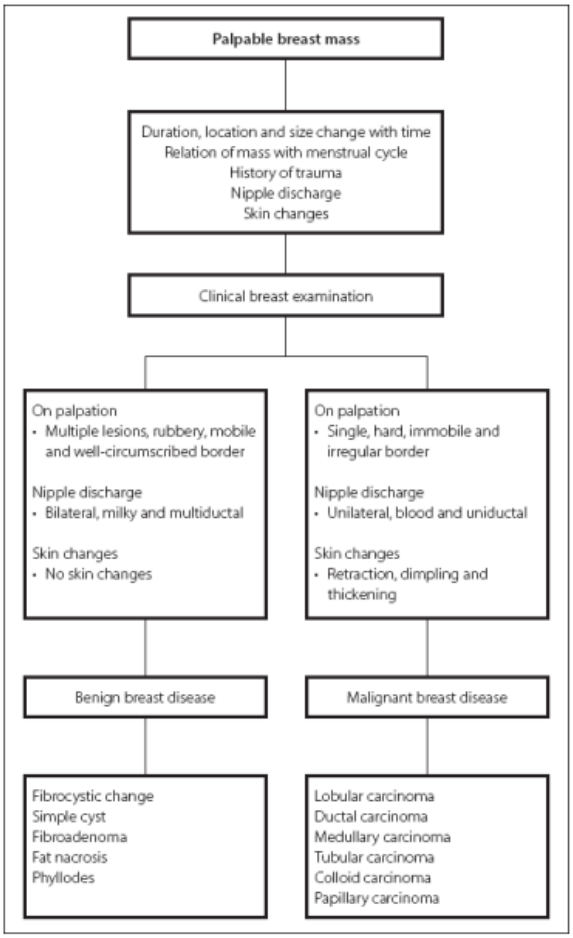




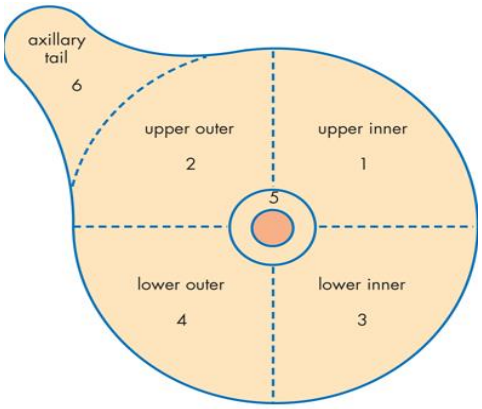
Assessment of mastalgia



Assessment of nipple discharge



Assessment of breast lump



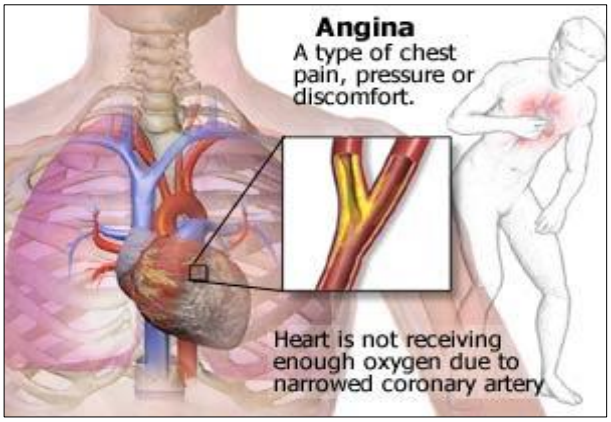
APPROACH TO CHEST PAIN

(Klaus von Pressentin)

The initial priority is to exclude life-threatening causes of chest pain, whilst respecting the patient's experience of a very distressing symptom. Start by excluding the cardiorespiratory causes as they represent the most significant morbidity and mortality. Afterwards, focus on the other structures in and around the chest and upper abdomen (such as the esophagus, chest wall, head and neck).

Symptoms suggestive of life-threatening causes of chest pain

Respiratory rate ≥ 30 breaths/minute (dyspnea)	Pain spreads to the neck, jaw, arm (left > right) or back (thoracic back pain)
BP ≥ 180/100 or < 90/60 (with associated syncope)	Sweating, nausea, vomiting
Pulse irregular, > 100/min or < 50/min (palpitation or syncope)	Pallor
Severe pain	At risk of heart attack (diabetes, smoker, hypertension, known cardiovascular disease risk > 20%)
New onset of central chest pain	Known with ischaemic heart disease



Step 1: Emergency care

Ideally, the extensive work-up of a patient with chest pain should be performed in a suitable health facility with resuscitative equipment and diagnostic facilities. Primary care providers outside these settings should limit their initial first-contact assessment to determining the severity of the chest pain and whether urgent interventions or referral are indicated. Patients presenting with chest pain and one or more of the symptoms in following table require urgent attention. The initial management of these patient includes a focused clinical assessment, assessing level of consciousness, sitting the patient up, providing supplemental oxygen (40% face mask) and 200 ml sodium chloride 0,9% if the blood pressure is less than 90/60 mmHg.

Step 2: Exclude life-threatening conditions and determine appropriate level of care

Chest pain is assessed as myocardial Ischaemia or an acute coronary syndrome (ACS) until proven otherwise. ACS includes myocardial infarction (MI), with or without ST-segment elevation, as well as unstable angina. Other life-threatening causes of chest pain are:

- Dissecting aortic aneurysm (aortic dissection)
- Tension pneumothorax
- Pulmonary embolism
- Severe infections: pneumonia, mediastinitis, pericarditis.

The main differential diagnoses to consider with ACS are dissecting aortic aneurysm, pericarditis, gastro-esophageal reflux and esophageal spasm, biliary colic and anxiety-related hyperventilation.

The history represents the cornerstone of your assessment of whether this patient is experiencing ACS or not. Angina is likely if the symptoms of central chest pain (burning or crushing) are reproducible with exertion and relieved with rest. Remember that angina may present atypically (or 'silently') in females, elderly patients and patients with co-morbid conditions such as diabetes. e pain of an ACS usually starts more gradually, compared to the sudden onset of intense pain with a pneumothorax or vascular event (aortic dissection or acute pulmonary embolism). e combination of syncope and chest pain should make you consider aortic dissection, pulmonary embolism or critical aortic valve stenosis.

The focused physical examination should center on the cardiorespiratory system and vital signs in order to exclude the life-threatening causes of chest pain. In the absence of pyrexia, perform an ECG (electrocardiogram).

The combination of pyrexia (temperature ≥ 38 °C) and chest pain should point you towards a respiratory infection, especially if there are

associated symptoms of coughing and if the chest pain is pleuritic in nature (sharp pain, worse on breathing).

Unstable angina or MI is likely and urgent management is indicated when (Adapted from PACK: Knowledge Translation Unit, University of Cape Town Lung Institute and Western Cape Government, 2015):

- Angina type chest pain occurs at rest or with minimal effort
- Angina type chest pain lasts more than 10 minutes
- Pain is worsening, lasting longer than usual, or is not relieved with sublingual nitrates in a patients known to have ischaemic heart disease
- There is evidence of sympathetic nervous system activation: sweating, nausea, vomiting, or breathlessness
- There is ST-segment depression or elevation on the ECG (remember: a normal ECG does not exclude ACS)
- The BP < 90/60 mmHg.
- In primary care, a patient with ACS should be stabilized and referred urgently by ambulance for further treatment .
- Administer oxygen via 40% face mask
- Give 200 ml sodium chloride 0,9% bolus IV if BP < 90/60 mmHg
- Give aspirin 150 mg orally (single dose)
- Give isosorbide dinitrate 5 mg sublingually every 5−10 minutes until pain relieved to a maximum of 5 tablets
- Dilute Morphine 15 mg with 14 ml of water for injection or sodium chloride 0,9%; give 1ml/min IV until the pain is relieved
- Communicate/liaise with the receiving clinician at your referral center (according to agreed interfacility referral policies and protocols)
- Streptokinase 1.5 million (or similar thrombolytic treatment) may be indicated prior to transfer – this depends on your setting, proximity to a referral center and local treatment protocol
- Clearly communicate and hand over to emergency medical services staff responsible for the transfer.

Step 3: Treating conditions appropriate to the primary care setting

In primary care, the commonest causes of chest pain are musculoskeletal/chest wall pain and psychogenic disorders. However, angina is also common and must always be considered. Common pitfalls to avoid, include:

- Not being ‘coronary aware’
- Not thinking of referred pain from spinal disorders (especially dysfunction of the facet joints of the lower cervical spine and upper thoracic spine)
- Labelling chest pain as psychological
- Being unaware that up to 20% of ACS are silent, especially in the elderly
- Pulmonary embolism is often painless.
- Once you have excluded ACS and the life-threatening causes of chest pain, you may continue to focus on the following systems (with examples):
- Musculoskeletal chest pain (costochondritis, rib fracture, trauma)
- Dermatological (herpes zoster causing shingles)
- Neurological (neuropathic pain)
- Breast (infiltrating breast cancer)
- Gastrointestinal (reflex esophagitis with spasm or rupture, gastritis, biliary/gall bladder-related problems, pancreatitis) Pulmonary (infections, obstructive airway disease, pleuritic, lung cancer)
- Psychiatric (anxiety/panic attack, depression, unexplained somatic symptoms).

Arrange a follow-up evaluation if indicated and discuss safety netting arrangements (how to access help during and after hours).

APPROACH TO A CHILD WITH DANGER SIGNS

(Selma Smith) All children presenting to a health-care facility should immediately be assessed or triaged for serious conditions indicating that emergency treatment or prioritization is needed. Asking for symptoms possibly indicating serious conditions can take place while looking for emergency signs.

HISTORY

All care-givers should be asked whether the child is drinking and or breastfeeding as normal or if she/he may be vomiting all feeds. Other symptoms indicating possible serious problems are a history of convulsions, loss of consciousness or general lethargy.

EXAMINATION

Whilst asking about symptoms, the following should be evaluated for signs of emergency. Any signs found should be addressed before evaluating the child further. The **ABC-C-C-D** mnemonic is helpful to remember what to look for (Emergency Triage Assessment and Treatment South Africa working group (ETAT-SA), 2014).

- **Airway:** Any obstruction, presence of stridor
- **Breathing**: Breathing, cyanosis (O2 saturation < 92%), chest indrawing, increased respiration rate of > 50/minute in a child between 2 months and one year or > 40/minute in child older than one year
- **Circulation:** Signs of possible shock are cold hands, capillary refilling time of more than 3 seconds and a weak or fast pulse
- **Coma:** Level of consciousness (alert, responsive to verbal stimuli, responsive to pain stimuli, unresponsive), bulging fontanel, and stiff neck
- **Convulsion:** Convulsing at the moment
- **Dehydration:** If the caregiver reports diarrhoea or vomiting, assess ability to drink, look for sunken eyes, abnormal skin turgor (> 2 seconds). If dehydration is present, note whether the child is malnourished as it affects how the child will be resuscitated.

In a child with danger signs or symptoms, assess urgently, give prereferral treatment as appropriate, consider the need for oxygen, check blood glucose, and refer.

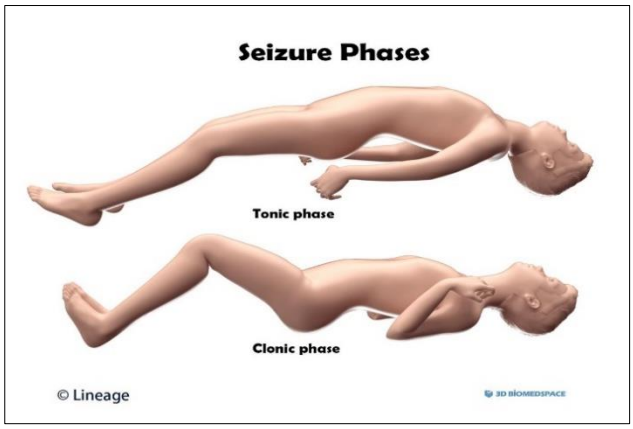
After emergency symptoms or signs are excluded, look for other indications that the child should be given priority in the queue (mnemonic 3TPR-MOB) (ETAT-SA, 2014):

- Tiny infant: Less than three months of age
- Temperature: Fever of > 38 °C
- Trauma: Such as head injuries, abdominal trauma or fractures
- Severe pallor: If the palms are pale, the child is severely anaemic
- Poisoning: Possible ingestion of toxic agents
- Severe pain: Must be relieved and may be an indication of an acute abdomen or meningitis
- Respiratory distress: Very serious level of distress should be excluded by now, but now also look for wheezing or other signs of distress such as nasal flaring
- Restlessness or lethargy: Coma has been excluded, but is the child drowsy, uninterested and only responsive to voice or pain or does s/he cry continuously
- Urgent referral: If the child was referred from a clinic or doctor, read the note to see if there is an urgent problem
- Severe malnutrition: Severe wasting
- Oedema: Oedema of both feet may indicate kwashiorkor

Major burns: Children with major burns can deteriorate rapidly.

The presence any of the above signs indicate that the child needs to be given priority in the queue.

APPROACH TO COLLAPSE AND SEIZURE



(Klaus von Presenting)

The initial priority is to support the vital functions of the patient (airway, breathing and circulation) and commence cardiorespiratory resuscitation (CPR) if indicated (pulseless and non-responsive). Consider life-threatening causes of collapse or seizures and implement life-saving manoeuvres (such as airway support) as indicated. Care should be taken to understand the precise nature of collapse: are you dealing with a pulseless cardiac arrest victim, a fitting patient (seizures), or someone experiencing syncope or vertigo?

Step 1: Emergency care

Ideally, the extensive work-up of a patient collapsing or with seizures should be performed in a suitable health facility with resuscitative equipment and diagnostic facilities. Primary care providers outside these settings should limit their first-contact assessment to initiating life-saving manoeuvres, excluding reversible causes (such as hypoxia and hypoglycaemia) and deciding whether urgent interventions (such as CPR or intravenous medication) or referral are indicated. In the unresponsive patient.

- Assess the airway, breathing (respiratory rate) and circulation (pulse and blood pressure)
- If there is no breathing or pulse, commence cardio-pulmonary resuscitation
- If there is no breathing but the pulse is present, support the airway and breathing
- Obtain intravenous access
- Check capillary blood glucose to exclude hypoglycaemia
- If the patient is breathing and the pulse is present, assess the Glasgow coma score (GCS) (eye opening, best motor response and best verbal response).

An advanced/definitive airway is indicated if the GCS is less than 8/15, in order to protect the airway from gastric contents.

Manage according to the likely cause (Adapted from PACK: Knowledge Translation Unit,

University of Cape Town Lung Institute and Western Cape Government, 2015):

- Pyrexia (temperature > 38 °C): central nervous system or severe systemic infection
- Oedema of face or airways, bronchospasm: treat as anaphylaxis
- Constricted pupils, history of overdose: consider opiate overdose
- Signs of trauma: stabilize cervical spine, stop bleeding, splint fractures
- History of seizure: possibly post-ictal state.

In the unconscious patient with seizures:
Place in the recovery position (lateral lying), assess airway, provide supplemental oxygen

- Assess blood glucose and correct hypoglycaemia intravenously
- If more than 20 weeks pregnant or in puerperium, treat as eclamptic seizure
- If less than 20 weeks pregnant or not pregnant, attempt to terminate seizure with intravenous lorazepam, 4mg IV or IM (or diazepam, 10mg slow IV infusion over 5 minutes)
- Repeat lorazepam (or diazepam) dose after 10 minutes if the seizure continues.
- Treat as status epilepticus if:
- No response of seizure activity to first two doses of anticonvulsant (lorazepam/diazepam)
- Seizures last longer than 30 minutes
- There is no recovery of consciousness between seizures.
- If the patient has status epilepticus:
- Give phenytoin 20 mg/kg IV (through different line to diazepam) over 60 minutes
- If it continues, repeat phenytoin 10 mg/kg IV (through a different line to diazepam) over 30 minutes.
- Intubate patient to protect airway
- Refer urgently to the hospital.

If there is no status epilepticus and seizures have stopped, decide on the urgency of referral to hospital for further management. Urgent referral (same day) would be indicated in (Adapted from PACK: Knowledge Translation Unit, University of Cape Town Lung Institute and Western Cape Government, 2015):

- Central nervous system infection (fever, meningism)
- Known HIV-positive status
- Reduced level of consciousness more than 1 hour after seizure
- Blood glucose level less than 3.5 mmol/l in a patient on sulfonylurea or insulin diabetic medication
- New weakness or focal neurology
- Recent headaches
- BP ≥ 180/110 one hour after seizure stopped
- Substance abuse history: overdose or withdrawal
- Head injury during last 6 weeks

Pregnant or one week postpartum.
The collapsed patient who is conscious and had no seizure requires urgent referral to a hospital should one or more of the following symptoms be present (with possible underlying conditions):

- **Neurological:**
  - Sudden onset of weakness or focal neurology (cerebrovascular/TIA)
  - Loss of consciousness more than 2 minutes (could also be cardiac related)
  - Recent head trauma (space-occupying lesion, such as a subdural Haematoma)
- **Cardiac:**
  - Difficulty breathing (cardiovascular arrhythmia, infective endocarditis)
  - Chest pain (aortic stenosis)
  - Bradycardia (heart rate less than 40 beats per minute
  - Hypotensive (BP < 90/60 mmHg)
  - Family history of collapse or sudden death (cardiovascular arrhythmia or myocardial pathology)
  - Abnormal ECG
  - Known cardiac problem.

Step 2: Excluding life-threatening conditions to determine appropriate level of care
Consider these red flags, when assessing 'faints, fits and funny turns', as they may point to a serious condition that should not be missed (cardiovascular arrhythmias, aortic stenosis, cerebrovascular accidents, space-occupying lesions such as neoplasms or subdural hematomas, severe infections and hypoglycaemia):
Onset in the older person

- Neurological symptoms and signs
- Headache
- Tachycardia
- Irregular pulse
- Fever
- Drugs: alcohol or illicit
- Cognitive impairment
- Confusion.

The management steps as described above are aimed at stabilizing the patient for referral. Remember to communicate clearly with the receiving clinician at your referral center (according to agreed interfacility referral protocols).

Step 3: Treating conditions appropriate to the primary care setting
The commonest cause for a 'faint' or 'dizzy spell' in primary care is light-headedness, often as a result of psychogenic factors such as anxiety, panic and hyperventilation. Another common cause for faints is vasovagal syncope episodes (especially during prolonged standing or hot conditions). Potential

pitfalls which are often missed include atypical migraine, cardiac arrhythmias/long QT syndrome, unusual or atypical seizure disorders, drugs, electrolyte disturbances and sleep disorders. Severe cervical spondylosis may cause vertebro-basilar Ischaemia by causing pressure on the vertebral arteries, especially when turning the head or looking up.

The following patients may be assessed at primary care level (depending on access to resources and support):

- The stable, conscious patient who presented with seizure which stopped spontaneously or as a result of initial anticonvulsant treatment and with no indication for urgent referral:
  - Confirm that the client indeed had a seizure: jerking movements of part of or the whole body, with/without tongue biting, incontinence, post-seizure drowsiness and confusion
  - If it sounds like a true seizure, exclude a history of epilepsy and enquire about previous tuberculous meningitis, CVAs or head trauma, as they may result in recurrent seizures
  - If the episode is unlikely to be a true seizure, consider a CVA/TIA (weakness/slurred speech), vasovagal syncope (simple faint or blackout) or panic attack
  - Consult a specialist physician if the diagnosis remains unclear.
- The stable, conscious patient who had no seizure or any red ag symptoms to warrant urgent referral:
  - Ensure ECG normal.
  - Exclude postural hypotension (do BP lying and repeat after standing for 3 minutes; a drop in systolic BP of more than 20mmHg is positive – check hydration status and review medication use).
  - If no postural hypotension, ask patient to hyperventilate for 2–3 minutes: if symptoms are reproduced, the patient may be educated on how to manage hyperventilation by re-breathing into a brown paper bag and review of stress management.
  - If not unwell after hyperventilation, enquire about preceding symptoms of flushing, light-headedness or nausea before collapsing; if these symptoms were present, a simple faint (vasovagal episode) is likely.
  - If these symptoms were absent, consider work-up for epilepsy or autonomic dysfunction in consultation with a specialist physician.

Refer patients older than 70 years with possible heart disease, repeated episodes of collapse (or 'frequent falls'), or where no obvious cause for collapse could be identified.

Remember to make appropriate follow-up arrangements and to communicate safety netting strategies clearly.

APPROACH TO CONSTIPATION

(Thierry Ngoyi)

Constipation is generally defined as straining to pass hard and infrequent stools. Common causes of constipation are a change in diet, lack of fluid intake or immobility. Make sure the patient is not pregnant. Chronic overuse of enemas and laxatives can ironically contribute to constipation. Painful conditions of the anus or rectum, such as anal fissures, may also result in constipation. Medications may also be a common cause of constipation, for example, codeine, amitriptyline, antacids, or diuretics. More serious medical causes of constipation:

- Disorders of the anorectum and pelvic floor (for example, rectocele, descending perineum syndrome, rectal prolapse, decreased rectal sensation)
- Systemic disorders such as hypothyroidism, diabetes mellitus, Hypercalcaemia, hyperparathyroidism, sarcoidosis, malignancy
- Neurological disorders, for example, loss of conscious control, Parkinson disease in which there is a defect of the neurons of the enteric nervous system, multiple sclerosis, spinal cord lesions.
- Structural disorders of the colon, rectum and anus such as obstruction, disorders of the smooth muscles, disorders of the enteric nerves
- Psychological disorders such as eating disorders, depression, denied bowel movement.

A history and focused physical examination are usually sufficient and further investigations are rarely necessary unless an underlying medical disorder is suspected. e combination of no stools for 24 hours with abdominal pain, nausea or vomiting suggests bowel obstruction and requires urgent referral. A change in bowel habit in an adult over 40 years of age should make one suspicious of colon cancer.

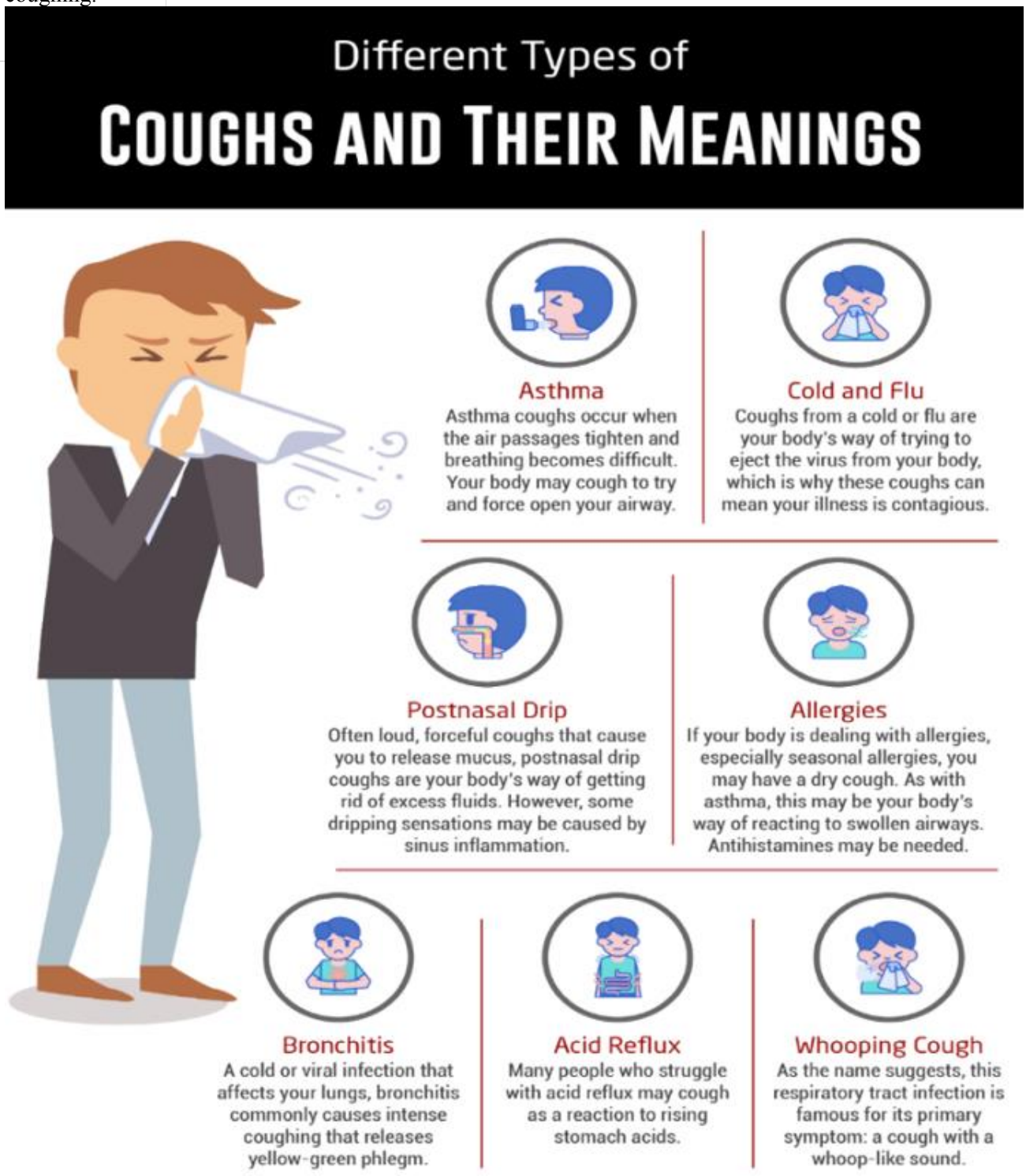
Constipation may respond to lifestyle changes such as more fiber, fruit, vegetables and fluids in the diet and physical activity. If no response, a stimulant laxative can be used such as **Senna** or bisacodyl. Investigate further if there is no response to treatment after 1 week.

APPROACH TO COUGH

INTRODUCTION

Cough is one of the five most common symptoms presenting in family medicine and it is the most common respiratory symptom. Cough is a protective re ex which occurs when something blocks or irritates the airway. Vagal afferent nerves regulate involuntary coughing. Coughing as a visceral re ex has higher cortical control. Cortical control can manifest as cough inhibition or voluntary cough. Psychological factors (including a

placebo effect) can thus influence the extent of coughing.



HISTORY

Important aspects of the history are listed in Table .two most critical diagnostic issues are the duration of the cough and whether it productive or not.

History	Relevance
Duration of cough	• Acute causes < 3 weeks • Sub-acute causes 3-8 weeks • Chronic causes > 8 weeks
Nature of the cough	• Productive or non productive • How does the cough sound
Age of patient	• Differential diagnosis is influenced by age. For example, lung cancer is more likely in the older adult, croup in the pre-school child
Onset of cough	When the cough starts or what precipitates it may be helpful. For example: • A cough worse in the morning suggests post nasal drip, bronchiectasis or chronic bronchitis • If a child has a non productive cough at night it suggests asthma • Exercise-induced cough suggests asthma
Amoung of sputum	• How much sputum is coughed up each day – a spoonful, an egg cupful or a tea cup?
Sputum colour	• Mucoid (clear or white) or yellow/green/brown sputum suggests a viral or bacterial infection • Haemoptysis/altered blood suggests more serious pathology and needs investigation or referral • Rust-coloured sputum suggests pneumonia • Pink-tinged aputum suggests left ventricular failure
Nature of sputum	Apart from colour, other aspects may be helpful: • Thin and frothy suggests left ventricular failure. • Offensive foul-smelling sputum suggests bronchiectasis or lung abscess
Periodicity	The pattern of cough may be helpful. For example: • Persistent dyspnea and early morning cough suggests COPD • Intermittend cough and variable dyspnea with atopy suggest asthma
Associated symptoms	Associate symptoms will be important. For example: • Fever in acute infections • Weight loss and night sweats in PTB • Wheeze in asthma and COPD • Ankle swelling in cardiac failure
Smoking history	• Tobacco smoking is linked to an increased likelihood of infection, chronic bronchitis, • COPD, PTB, Lung cancer and uncontrolled asthma • Marijuana smoking may also be linked to the development of COPD • Indoor ari pollution and the burning of biomass may also be linked to COPD and asthma
Past medical history and medication	Past medical history will influence the differential diagnosis, For example: • Diagnosis of HIV will increase chance of opportunistic infections • Atopic conditions will increase the chance of asthma • Hypertension will increase the chance of cardiac failure • Adverse drug reactions should be considered • Response to cough to previous treatments
Occupational history	• Pneumoconiosis is relatively common in South Africa due to the large mining industry • Asthma is linked to certain occupational exposures, for example bakeries, spray painters

Source: Truter (2008) A therapeutic approach to coughing. *Professional Nursing Today*

ASSESSMENT OF TYPE OF COUGH

- Productive
  - URTIs
  - Postnasal drip (UACS)
  - Pneumonia
  - PTB
  - COPD
  - Lung cancer
  - Heart failure
  - Bronchiectasis
  - Nocardiosis
  - Lung abscess

- Haemoptysis
  - PTB
  - Lung cancer
  - Bronchiectasis/post-TB damage
  - Cancer of upper airways
  - Pulmonary infarction
  - Lung abscess
  - Acute/Chronic bronchitis
  - Mitral valve stenosis

- Non-productive
  - Laryngitis
  - Asthma
  - GORD
  - Medicine induced cough or wheeze, for example, angiotensin converting enzyme (ACE) inhibitors
  - Allergy-related cough
  - Acute bronchitis
  - Croup

Acute cough lasting less than 3 weeks is most common and is often associated with an upper respiratory tract infect (URTI). here are at least 200 viruses that may cause URTIs. ese cause hypersecretion of mucous by goblet cells and vasodilatation and nasal congestion, sneezing, nasal discharge and post nasal drip which leads to throat clearing and cough.

In South Africa any cough lasting more than 2 weeks must be investigated for pulmonary TB, especially is associated with symptoms of weight loss, night sweats, tiredness or loss of appetite. If the patient is HIV positive, the risk of TB is increased further.

The HIV epidemic in South Africa has increased the likelihood of a number of opportunistic infections such as pneumocystis pneumonia.

Sub-acute cough lasting 3 to 8 weeks, may be post-infectious (for example, following pneumonia, pertussis, bronchitis, upper airway cough syndrome (UACS)) or be due to exacerbation of an underlying medical condition (for example, chronic obstructive pulmonary disease, asthma, cardiac failure, bronchiectasis). All the other causes of chronic cough listed below are also possible.

In chronic cough lasting more than 8 weeks, the following factors should be considered:

- Tuberculosis
- Chronic bronchitis and chronic obstructive pulmonary disease (COPD)
- Chronic uncontrolled asthma
- Lung cancer and neoplastic conditions
- Cardiac failure
- Adverse drug reactions (for example, ACE inhibitors, methotrexate)
- Exposure to environmental irritants, pneumoconiosis
- Non-asthmatic eosinophilic bronchitis (NAEB)
- Interstitial lung disease, connective tissue disorders, sarcoidosis.
- Gastro-esophageal reflux disease (GORD).

Psychogenic cough should only be diagnosed once other conditions are excluded. It is important to note that the patient with chronic cough may have more than one disease.

Table; shows the typical characteristics of common conditions in terms of whether the cough is productive or not or may cause haemoptysis.

EXAMINATION

Note the general appearance of the patient, vital signs, use of accessory muscles, respiratory rate and nature of breathing, cough, wheeze, stridor or abnormality in voice. Look for cyanosis, anemia, polycythaemia, peripheral oedema, raised JVP, finger clubbing and cervical lymphadenopathy. Inspect the upper airway, whole chest and upper abdomen. Palpate the chest for tenderness, localized skin or bony lesions, and determine the cardiac apex and position of trachea. Percuss and compare the degree of resonance over equivalent areas on the two sides of the chest. Auscultate for the type and amplitude of breath sounds (either vesicular breathing or bronchial breathing, diminished or absent breath sounds), type and number of any added sounds (wheezes, crepitations, pleural friction rub) and their position in the respiratory cycle, quality and amplitude of the conducted voice sounds.

INVESTIGATIONS

Investigations are more often performed in sub-acute and chronic cough and according to the differential diagnosis being considered:

- To exclude PTB send two sputum samples, one for Gene Xpert and one for a smear. If the patient has completed TB treatment in the last 2 years, send two sputum, one for smear and one for culture and drug susceptibility testing.
- Consider the need for a chest X-ray.

- Blood tests may show signs of infection (for example, FBC, ESR, CRP, blood cultures), or HIV.
- Spirometry (or peak expiratory ow) may be useful for testing of obstructive or restrictive lung function in certain conditions (for example, COPD, asthma, interstitial disease or fibrosis).
- ECG if cardiac failure is considered.

Further investigations may be available at the referral hospital, such as lung biopsy.

Referral

Consider referral for further investigation or treatment if:

- Diagnostic uncertainty
- Severe disease (consider for hospitalization with dyspnoea).
- Haemoptysis
- Suspected lung cancer or other neoplasm
- Persistent hoarseness in a patient who requires expert laryngeal examination.

Children

Children with chronic cough require careful and systematic evaluation for the presence of specific diagnostic indicators, usually require chest radiographs and spirometry if age appropriate. Productive purulent cough should always be investigated to document the presence or absence of bronchiectasis and to identify underlying and treatable causes such as cystic fibrosis, PTB and immune deficiency. Children with exposure to tobacco smoke should be identified and interventional options for cessation of the exposure advised or initiated. Different diagnostic possibilities should be considered:

- Early months of life – milk inhalation/reflux, viral-induced wheeze, bronchiolitis, PTB, HIV and lymphoid interstitial pneumonitis
- Toddler/preschool – asthma, bronchitis, whooping cough, cystic fibrosis, croup, foreign body inhalation, TB, chronic HIV-associated lung disease including bronchiectasis
- Early school years – asthma, bronchitis, mycoplasma pneumonia, PTB
- Adolescence – asthma, PTB, smoking, psychogenesis.

HIV and cough

In patients with immune deficiency, the initial diagnostic algorithm for patients with acute, sub-acute, and chronic cough is the same as that for immunocompetent persons taking into account an expanded list of differential diagnosis that considers the type and severity of immune defect and geographic factors (Rosen, 2006). CD4 counts should be used in constructing the list of differential diagnostic possibilities potentially causing cough. Those with a CD4 count of < 200 cells/µml (or those with CD4 > 200 cells/µml with unexplained fever, weight loss or thrush who have unexplained cough) should be suspected of having pneumocystis pneumonia, tuberculosis or other opportunistic infections and should be evaluated accordingly:

- Pulmonary TB (PTB)
- Bacterial pneumonia
- Pneumocystis jirovecii pneumonia
- Pulmonary cryptococcus
- Bacterial empyema
- Pulmonary Kaposi's sarcoma
- Post-tuberculous lung disease
- Cytomegalovirus infection
- Disseminated histoplasmosis.

APPROACH TO DYSPNOEA

(**Indiran Govender, Henry Okonta**) Dyspnoea is a term used to characterize a subjective experience of shortness of breath that is comprised of qualitatively distinct sensations that vary in intensity. e experience derives from interactions among multiple physiological, psychological, social and environmental factors and may induce secondary physiological and behavioral responses. Patients may describe this as 'hungry for air' or 'cannot breathe deeply enough'. Shortness of breath is a common symptom and typically affects patients with disturbance of either the respiratory or cardiovascular systems.

Less commonly, the disturbance of other systems may also cause dyspnoea. For example, dyspnoea may be a presentation of mental problems in anxiety disorders or hyperventilation. Patients with HIV on antiretroviral medication may develop lactic acidosis which also causes dyspnoea. Less commonly neuromuscular disorders affecting the respiratory muscles may lead to dyspnoea (for example, myasthenia gravis, Guillain-Barre syndrome, **kypho-scoliosis**).

Dyspnoea is considered acute when it develops over hours to days (for example, pneumonia, anaphylaxis, exacerbation asthma, foreign body inhalation, pulmonary embolism) and chronic when it has been for more than 4 weeks (for example, asthma, COPD, interstitial lung disease). Some patients present with acute worsening of chronic dyspnoea that may be caused by new problem or a worsening of underlying disease such as asthma, COPD or heart failure.

The assessment and management of the patient is based on a quick initial assessment and if necessary immediate emergency management.

Gather information

Once the patient is stable, the family physician can pursue a definitive diagnosis and management. Shortness of breath has many different causes that can be related to the upper airways, lungs, heart and

a variety of other problems. Specific information that may be useful includes:

Duration and pattern of dyspnoea, for example, asthma may be intermittent and recurrent, COPD persistent and progressive, or pneumonia of an acute onset. Paroxysmal nocturnal dyspnoea due to cardiac failure is typically improved on standing or sitting up and may necessitate sleeping with multiple pillows, whereas nocturnal asthma is not improved by these factors.

- Associated symptoms, for example, cough, chest pain, wheeze, ankle swelling, fever, weight loss, night sweats, trauma, and anxiety.
- Severity of the dyspnoea, for example, the New York classification of dyspnoea was developed to assess cardiac disease:
  - I – No dyspnoea from ordinary activity
  - II – Comfortable at rest, dyspnoea with ordinary activities
  - III – Less than ordinary activity causes dyspnoea, which is limiting
  - IV – Dyspnoea at rest, all activity causes discomfort.
- Past medical history such as respiratory (for example, asthma, COPD, previous severe pneumonia and TB), cardiovascular (for example, myocardial infarction, hypertension, cardiac failure or diabetes mellitus), HIV.
- A history of smoking, substance use, medication and occupation may also be useful.

Algorithm for the differential diagnosis in shortness of breath (See Figure)

Clinical examination explores the differential diagnosis, the presence of stridor, wheeze and crepitations can help categorize the possibilities. The absence of key signs may also have useful negative predictive value.

Additional investigations may be performed depending on the differential diagnosis. These could include a chest radiograph, peak ow rate, electrocardiogram, sputum microscopy and culture, full blood count, urea and electrolytes, glucose, urinalysis, blood culture, pulse oximetry and arterial blood gases.

In South Africa, causes of dyspnoea associated with HIV are common and are related to different stages of the diseases and CD4 counts. Causes include recurrent pneumonia and TB and with a CD4 count less than 200, pneumocystis pneumonia, Kaposi's sarcoma as well as viral and fungal infections are all possible.

Does the patient need admission to hospital?

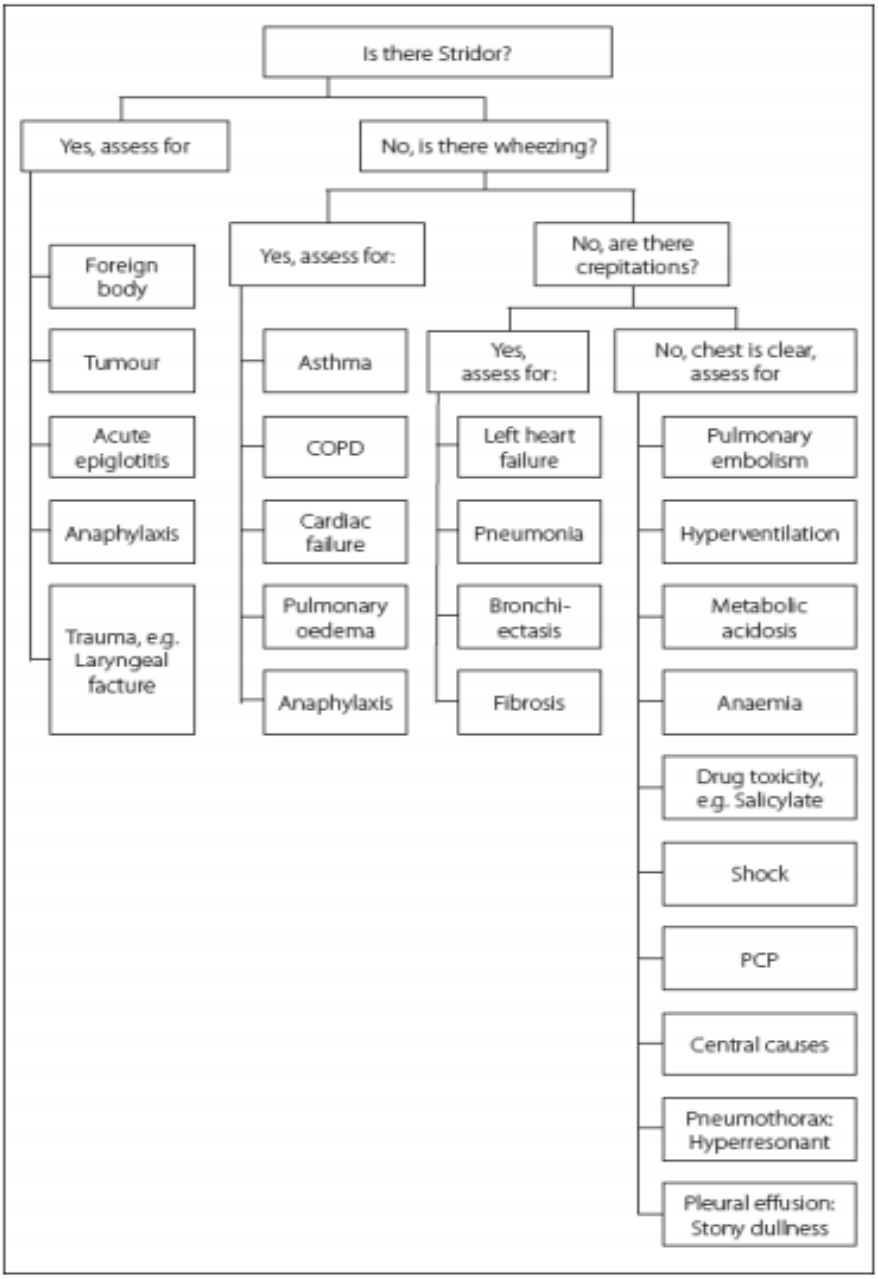
A patient presenting with any of the following signs should be referred to hospital:

- Temperature > 38 °C
- Systolic blood pressure < 90 mmHg or diastolic < 60 mmHg
- Pulse: > 110/minute or < 60/minute
- Respiratory rate > 30 breaths/minute
- Oxygen saturation < 90%/PaO2 of 60 mmHg.

The mnemonic CURB-65 has been used to identify patients with community-acquired pneumonia that requires admission and stands for:

- Confusion: Any altered mental state
- Urea > 7 mmol/l
- Respiratory rate > 30/min
- Blood pressure: Systolic < 90 mmHg and diastolic < 60 mmHg
- Age > 65 years.
- Make a specific diagnosis
- Table shows the typical features of specific conditions that may help you make a diagnosis. Once a specific diagnosis has been made, you can manage the patient accordingly. Key diagnostic symptoms and signs in a patient with shortness of breath.

Algorithm for the differential diagnosis in shortness of breath



Clinical assessment	In favour: clinical symptoms and signs	
	Symptoms	**Signs**
1. Upper airway obstruction		
Foreign body/choking	Occurred while eating History of foreign body inhalation Very sudden onset Grasping neck	Cyanosed Stridor
Anaphylaxis	History of previous anaphylaxis Exposure to food or medication prior to attack	Swollen neck/tongue Wheeze and stridor Urticaria Angio-oedema
Upper airway trauma	History of trauma to neck	Evidence of trauma
Severe upper airway infection (pharyngeal abscess, diphtheria, peritonsillar abscess, epiglottitis)	• Sore throat • Barking cough	• Difficulty swallowing/drooling • Stridor • Fever
Inhalation burns	• History of exposure to fire or smoke • Hoarseness, raspy cough	• Difficulty swallowing secretions • Burns around mouth and nose
2. Asthma	• Younger age group • History of atopy (eczema, allergic rhinitis) • Family history of atopy • Intermittent dyspnoea, wheeze, cough (often nocturnal), sputum • Ask about triggers: cold air, exercise, emotions, allergens (house dust mite, pollen, animal fur), drugs (aspirin, NSAIDS), viral infection, acid reflux, occupation	• Reversible airway obstruction • Wheeze • Hyperinflated
3. COPD	• Older age group > 40 years often • History of prolonged smoking/TB • Persistent and progressive dyspnoea • Chronic productive cough	• Irreversible airway obstruction • Wheeze • Hyperinflated • Fever with exacerbation • Right-sided heart failure
4. Cardiac failure	• Cough is non-productive or frothy • Orthopnoea, paroxysmal nocturnal dyspnoea • Swollen ankles • History of hypertension, ischaemic heart disease, valvular heart disease, rheumatic fever or other underlying cause	• Signs depend on ventricle most affected: • RVF: Raised JVP, peripheral oedema, ascites, tender hepatomegaly • LVF: Bilateral basal fine crepitations, gallop rhythm, cool peripheries, hypotension, narrow pulse pressure, wheeze, displaced apex beat (LV dilatation), RV heave (pulmonary hypertension)
5. Pneumonia		
Bacterial/ viral	• Cough • Pleuritic chest pain • Rigors • Malaise • Purulent sputum • Haemoptysis • HIV positive	• Fever • Tachycardia • Bronchial breathing • Localised crackles • Consolidation • Pleural rub

***Pneumocystis jiroveci* pneumonia (PJP)**	• Dry cough • HIV positive	• Fever • Hypoxia • Chest mostly clear
Tuberculosis	• History of TB contact • Cough > two weeks duration • Weight loss, night sweats • HIV positive	• Signs of consolidation or cavitation, typically in upper lobes
Bronchiectasis	• Cough productive of copious yellow or green sputum • History of TB, recurrent infections • Worsening symptoms associated with infections	• Finger clubbing • Coarse crepitations
6. Pulmonary embolism	• Abrupt onset • Pleuritic chest pain, haemoptysis, dizziness, syncopy • Past or family history of thrombo-embolism • History of risk factors for thrombosis such as immobilisation and surgery	• Pyrexia, cyanosis, tachypnoea, tachycardia, hypotension • Increased JVP • Pleural rub or pleural effusion
7. Metabolic acidosis Diabetic ketoacidosis, lactic acidosis	• History of diabetes mellitus or renal failure • Prolonged use of antiretroviral drugs especially stavudine (D4T) or ddI • Salicylate poisoning	• Rapid, deep and sighing respiration
8. Panic attack	• Sudden onset • No obvious underlying disease • Often young patient • Associated symptoms of anxiety such as numbness, tingling, light-headedness, nausea, palpitations, trembling, chest pain	• No localising signs
9. Pneumothorax	• Trauma, • Abrupt onset • Chest pain	• Unilateral increased resonance • Decreased breath sounds • Tracheal deviation • Displaced apex beat • Hypotension or weak pulse
10.Cardiac tamponade	• History of HIV/TB/malignancy	• Distant heart sounds • Distended neck veins • Tachycardia, weak pulse, pulsus paradoxis • Peripheral oedema (right heart failure)

APPROACH TO DIARRHOEA

(Hanneke Brits) Diarrhoea is the passage of three or more loose or liquid stools per day, or more frequently than is normal for the individual. Diarrhoea in infants and small children is a major contributor to mortality and therefore most of this section refers to their assessment and management. e approach is largely based on the Integrated Management of Childhood Illness (IMCI) (National Department of Health, 2014a). Most cases of diarrhoea are self-limiting and oral rehydration or prevention of dehydration is the only management necessary.

Clinics using the IMCI will refer the following children for assessment:

- Any child with severe dehydration
- Any child with persistent diarrhoea plus dehydration or weight loss present
- Any child with blood in the stool plus dehydration present or below 1 year of age to exclude intussusceptions.

Red flags

Patient with diarrhoea accompanied by shock require urgent attention and can be clinically diagnosed by:

- Drop in blood pressure with rapid pulse
- Decreased level of consciousness
- Capillary refill time of > 3 seconds.

Patients with diarrhoea, abdominal distention and ileus also require urgent attention.
These patients will need resuscitation with intravenous or intraosseous fluids to restore circulation. Give a fluid bolus (0,9% sodium chloride) of 20 ml/kg to restore kidney function. Repeat twice if necessary. Then continue with 20 ml/kg/hr for 4 hours and monitor regularly. Refer urgently.

Gathering information
The mnemonic **PQRST** can help recall key information in the history:
- **P:** Precipitating/palliating/provoking factors, for example, what do they think is the cause, what is making it better and what is making it worse
- **Q:** Quality/quantity of diarrhoea, for example, the number of stools and the presence of blood or mucus
- **R:** Related factors, for example, vomiting, fever or abdominal pains
- **S:** Severity, for example, the ability to drink and keep fluids down
- **T:** Time course and treatment, for example, the duration (more or less than 14 days) and any self-medication, other medication or traditional medication.

On examination
Assess the following:
- Degree of dehydration.
- Nutritional status using z-scores and mid-arm circumference.
- Any other condition, for example, pneumonia, meningitis, acute abdomen.

See table for assessment of degree of dehydration

In an adult, postural hypotension may be another useful sign of dehydration (systolic blood pressure drops by more than 20 mmHg between lying and standing) as well as poor urine output.

The use of side-room- and special investigations
Consider the following factors:
- Blood glucose if child is not fully awake or drinking well
- Urinalysis to exclude urinary tract infection and ketosis
- If shocked: sodium, potassium, urea and creatinine; blood gas if available for blood acid base assessment
- If dehydrated: sodium, potassium, urea and creatinine
- HIV testing.

In the case of prolonged diarrhoea (two weeks or more), send the stool for microscopy (ova, cysts, parasites) and culture and indicate if the patient is HIV positive. Typical causes in HIV immunosuppressed patients would be **Isospora** belli or cryptosporidium. In HIV negative patients, giardiasis may be a common cause.

Principles in the management of diarrhoea
- Rehydration: If there is some dehydration, give 20 ml/kg/hour of ORS for 4 hours and then reassess. Give ORS in frequent small sips. If the child vomits, wait for 10 minutes and then continue more slowly.
- Replace losses with oral rehydration solution or sugar and salt solution (SSS). Estimate 50−100 ml for each loose stool up to 2 years of age and then 100−200 ml for 2 years or more. One teacup is approximately 200 ml.
- Maintenance Fluid: Give as breast milk or milk according to age requirements as soon as the child is rehydrated.
- Give elemental zinc: Up to 10 kg weight 10 mg a day for 2 weeks, 10 kg or more, give 20 mg a day for 2 weeks.
- Continue feeding.
- Follow up.

Table: Assess the degree of dehydration

Shock (one sign)	Moderate to severe (two signs)	Some dehydration (two signs)	No visible dehydration
Decreased level of consciousness	Lethargic	Restless or irritable	Alert
Decreased BP and rapid thready pulse	Drinks poorly, unable to drink	Thirsty	Drinks normally
Capillary filling time of > 3 seconds	Sunken eyes	Sunken eyes	Wet mucous membranes
	Decreased skin turgor; skin pinch > 2 seconds	Normal skin turgor; skin pinch < 2 seconds	Normal skin turgor

Information to patients

- Diarrhoea causes dehydration and therefore the main treatment is rehydration and prevention of dehydration
- Continue to feed the patient during diarrhoea
- Teach the patient or caregiver how to mix homemade sugar and salt solution (SSS): half a level teaspoon of table salt plus eight teaspoons of sugar mixed with one liter of clean water.

The place of medication

- No routine antibiotics unless there is an indication, for example, bloody diarrhoea, underlying bacteremia or a specific infection
- No antiemetics in children
- No antidiarrheal medication in children
- The place of probiotics is uncertain
- Vitamin A for persistent diarrhoea
- Zinc for two weeks
- In adults, you may consider the use of anti-diarrhoeal drugs such as loperamide.

Follow-up

- Advise the patient or caregiver to return immediately if the patient vomits everything, is not drinking, or has bloody diarrhoea
- Advise on follow-up for malnutrition, HIV, or any other underlying conditions.

APPROACH TO DIZZINESS

(**Thierry Ngoyi**) e history gives the most valuable information, and it is helpful to initially categorize the patient into one of four possible diagnostic groups. History and examination can then proceed in a more focused way:

- **Syncope:** the patient feels as if they are going to faint
- **Vertigo:** the patient feels the world is spinning or rotating around them
- **Disequilibrium:** the patient feels as if they have lost balance in their legs
- **Light-headedness:** Often ill-defined and cannot be clearly placed in one of the other categories.

Syncope

Typical symptoms usually precede a faint such as dizziness, unsteadiness, pallor, nausea, sweating, closing in of visual field or blurred vision. is leads to a collapse with brief loss of consciousness and then rapid spontaneous recovery. Syncope is due to insufficient cerebral blood ow. Occasionally syncope may lead to a brief tonic-clonic seizure that starts after the loss of consciousness. Specific causes include:

- Simple faint due to a vasovagal reaction to some trigger such as pain, emotion, prolonged standing, heat and excess sweating, or insufficient fluid intake. e majority of people will experience a simple faint at some point, and it does not indicate a serious disease. Some people also react to nausea and vomiting, micturition, defecation or coughing. A few people may have oversensitive carotid sinuses that react strongly to pressure such as a tight collar when turning the head.
- Drug-induced syncope should always be considered. A wide variety of medication may induce syncope due to hypotension (for example, antihypertensives), bradycardia (for example, beta blockers) or pre-disposing to arrhythmia (for example, erythromycin).
- Orthostatic syncope is due to loss of the re ex maintenance of blood pressure when standing up from a lying or sitting position. It can be due to prolonged bed rest, medication, diabetic autonomic neuropathy, or fever and dehydration. There is a more than 20 mmHg drop in systolic blood pressure on standing.
- Cardiac syncope is dangerous and typically presents during exercise with preceding palpitations or chest pain. It may be due to an arrhythmia (brady- and tachycardias), acute coronary syndrome, severe aortic stenosis, hypertrophic cardiomyopathy or cardiac tamponade. Patients need urgent investigation and usually referral. Cardiac syncope is more common in the older adult or elderly.
- Hypovolaemia from any cause such as diarrhoea, diuretics or bleeding may present with syncope.

Vertigo

Vertigo presents with a strong sense of rotation, spinning and falling. Vertigo may be accompanied by ear-related symptoms such as tinnitus or deafness. Look for evidence of nystagmus and perform examination of the ear and neurological system:

- Vertigo arising from disease of the inner ear, for example, benign positional vertigo, Meniere's disease and vestibular neuronitis fall into this category
- Vertigo arising from disease of the acoustic nerve, for example, acoustic neuroma falls into this category
- Vertigo arising from disease of the brain stem or cerebellum, for example, transient ischaemic attack or circulatory disturbance, multiple sclerosis and chronic alcohol abuse fall into this category
- Vertigo related to medication, for example, toxicity from phenytoin or carbamazepine falls into this category.

Vertigo in the elderly is often multifactorial as degenerative disease of the vestibular system and other senses, circulatory disturbances and polypharmacy may coexist.

Disequilibrium
Dizziness is actually experienced as a loss of balance and may be felt more in the legs than the head. Typical causes would be Parkinson's disease, peripheral neuropathy, following a stroke, loss of proprioception or cerebellar disease. A full neurological examination is required.

Light-headedness
Dizziness which is difficult to define is often related to psychological causes and is a common feature of anxiety disorders. Panic attacks may also include dizziness as an acute symptom. Look for hyperventilation, mental disorders and psychosocial stressors.

APPROACH TO DYSURIA

(Werner Viljoen) Dysuria is defined as pain, burning, or discomfort on urination, often accompanied by frequency or urgency and presents more commonly in women than in men. Dysuria results from irritation of the bladder trigone or urethral area. Inflammation or stricture of the urethra causes difficulty in starting urination, thereby causing a burning sensation on urination, while irritation of the trigone causes bladder contraction, leading to frequent and painful urination.
Urinary tract infection is the most frequent cause of dysuria, but empiric treatment without a sensible diagnostic approach is not always appropriate or advisable.
A good history and a sound diagnostic approach using inexpensive laboratory testing are often sufficient to determine the cause of dysuria.

Red flags
Dysuria with any of the following findings should be further investigated:
- Fever
- Loin pain or tenderness in the renal angle
- Recent instrumentation involving the urethra
- Immunocompromised patients with HIV, diabetes, or on corticosteroids
- Recurrent episodes (including frequent childhood infections)
- Known urinary tract abnormality.

Causes
Dysuria can be caused by any of the following factors:
- Infections: pyelonephritis, cystitis, prostatitis, urethritis, cervicitis, epididymo-orchitis, vulvovaginitis. Sexually transmitted infections that present with vaginal discharge and male urethritis syndrome are discussed in section 5.40. Urinary tract infection is also more common in pregnancy, and this should be remembered in women of childbearing age. Patients with possible immune suppression (with HIV or diabetes mellitus) or on immune-suppressing medication may present with vulvovaginitis and dysuria due to candidiasis.

See Figure for Diagnostic Algorithm for dysuria

Hormonal conditions: hypo-estrogenism (postmenopausal), endometriosis.
- Malformations: bladder neck obstruction (with additional symptoms such as a weak stream, dribbling, hesitancy, intermittent stream or nocturia; especially in older men with benign prostatic hyperplasia (BPH)), urethral strictures or diverticula.
- Neoplasms: renal cell tumour; bladder, prostate, vaginal/vulvar and penile cancers.
- Inflammatory conditions: spondyloarthropathies (associated with backache, joint pain or eye irritation) and reactive arthritis (associated with joint pain, skin rash and mucosal lesions), drug side effects, autoimmune disorders.
- Trauma: catheter placement, honeymoon cystitis after sexual intercourse.
- Psychogenic conditions: somatization disorder, major depression, stress disorders or anxiety, hysteria.

History taking
History taking should be aimed at discovering:
- Duration, timing, frequency, severity, and location of dysuria. Dysuria at the start of urination points to urethral pathology. Suprapubic pain after voiding is usually of bladder origin. Longer duration and more gradual onset of symptoms should prompt investigation for C. trachomatis or M. tuberculosis infection. A sudden onset of dysuria with haematuria usually suggests a bacterial infection.
- If the urine is bloody, cloudy, or malodorous.
- The presence of any red Flags.
- Any urethral or vaginal discharge (amount, colour, and consistency). Urethral discharge has a high association with urethritis and, in men, is the most common symptom of a sexually transmitted infection. In sexually active patients, urethritis or vulvovaginitis is a likely cause of dysuria. A history of sexually transmitted infection can point to urethral scarring causing out ow obstruction with stream abnormalities and a predisposition to repeated infections, especially in patients with high-risk sexual behavior.
- The use of medications, herbal remedies and topical hygiene products. Dysuria may be caused by medications such as penicillin G, pyrazinamide, Rifater, amlodipine, hydrochlorothiazide, Cardura Xl, isosorbide-5-mononitrate and some combination common

cold/allergy medications. Dysuria can also occur with the use of, among others, saw palmetto, pumpkin seeds, dopamine, or cantharidin, and with the use of a number of topical hygiene products, including vaginal sprays, vaginal douches, and bubble baths.

Physical examination

When doing the physical examination, pay attention to the following:

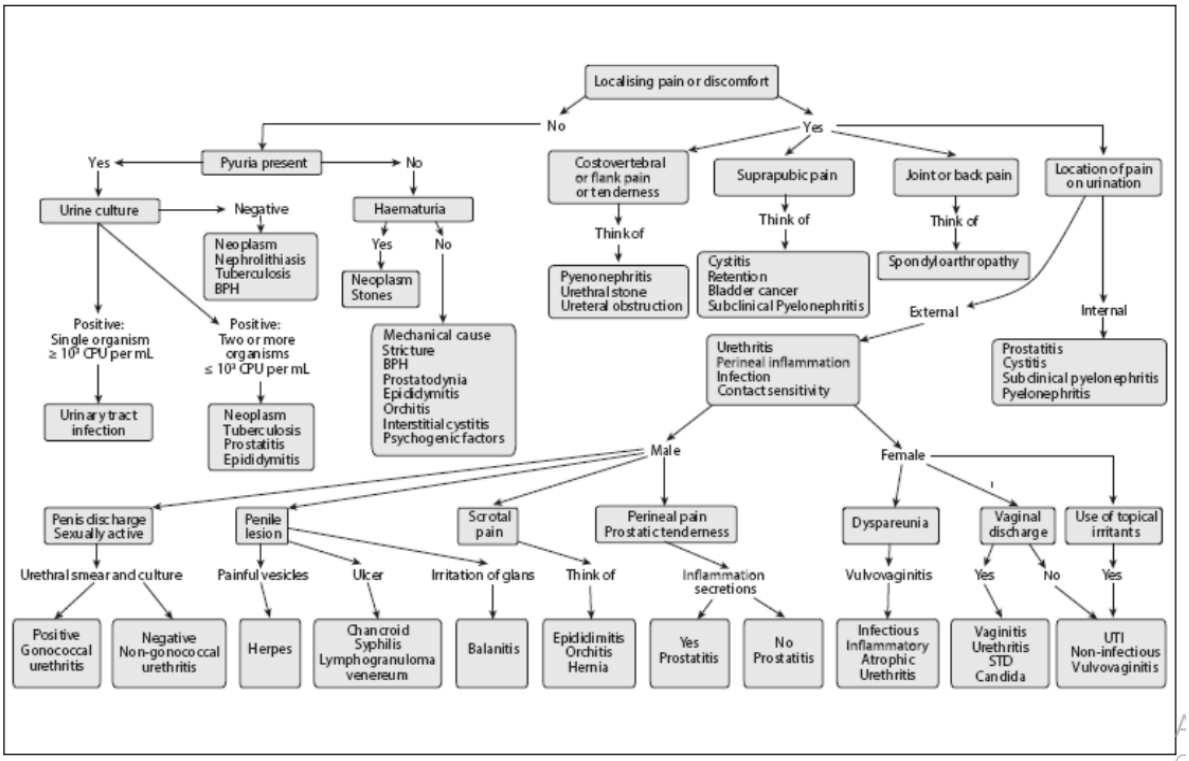
- Temperature
- Tenderness over the kidneys (renal angles) or bladder
- A vaginal examination may be needed to identify discharge, trauma, sexually transmitted infections or vaginal atrophy
- Male genitalia should be examined for lesions, discharge, tenderness or swelling
- Other signs associated with suspected underlying causes such as skin rash, mucosal lesions and reactive arthritis; rectal examination to evaluate the size, consistency, and tenderness of the prostate in suspected obstruction.

Laboratory testing

Laboratory testing is directed at the most probable diagnosis and may include:

- Urine dipstick tests for identifying haematuria and pyuria. Leukocyte esterase is a marker for white blood cells and has a sensitivity of 75% for the detection of infection. Pyuria has a sensitivity of 96% for urinary infection. Positive testing for nitrites suggests a probable infection; however, it is not ruled out by a negative test.
- Microscopic examination of a spun, clean-catch, midstream urine sample. Pyuria is diagnosed by the presence of three to five white blood cells per high-power field and haematuria is diagnosed by the presence of three to five red blood cells per high-power field. Pyuria detected on urinalysis is associated not only with bacterial UTI, but also with T. vaginalis, C. trachomatis and other infections. Sterile pyuria may be present in patients with prostatitis, nephrolithiasis, urologic neoplasms and fungal or mycobacterial infections (TB).
- Urine cultures are not essential in young women when clear-cut signs and symptoms of acute dysuria indicate a high probability of uncomplicated cystitis.
- Vaginal and urethral smears with gram staining (although in primary care STIs will be dealt with syndromically and without specific tests).
- Radiologic studies and other diagnostic tests are indicated when the diagnosis is in doubt, when patients are severely ill or immunocompromised or do not respond to antibiotic therapy, and when complications are suspected.

Figure: Diagnostic algorithm for dysuria



APPROACH TO EAR SYMPTOMS

(Louis Jenkins) is section deals with symptoms related directly to the ear (pain, discharge, deafness), while other related symptoms (dizziness, vertigo) are dealt with elsewhere.

Ear pain

The main causes include:

- Local infection – pustule/furuncle
- Otitis externa – acute or chronic, sometimes itching
- Acute otitis media
- Trauma, for example lacerations, barotrauma and perforation of the tympanic membrane
- Foreign body

Referred pain from teeth, temporo-mandibular joint or throat. Normal ear canal and tympanic membrane.

Otitis externa

Otitis externa is generalized inflammation involving the external auditory canal and the tympanic membrane. e main contributing factors are trauma, for example, by scratching with a finger or earbud, and moisture in the ear. The external canal is acutely inflamed, tender and weeping freely, it is extremely painful to handle, and nothing can be seen of the interior of the canal without causing the patient pain. Glands in front and behind the ear may be inflamed. In the case of a more chronic otitis externa, pruritis dominates with some discharge. Give pain relief, clean the ear, use topical treatment (for example, 1% acetic acid in alcohol 4 drops in ear 4 times a day for 5 days) or if severe antibiotics. Eczema needs treatment with a topical corticosteroid.

Acute otitis media (AOM)

Findings include pain and hearing loss, with a red and inflamed tympanic membrane. If the membrane perforates, pus may be discharged from the ear. Diagnosis in infants and young children may be difficult because they are unable to articulate symptoms and a screaming child may also develop a red tympanic membrane. Infants may simply be unwell and pyrexia. AOM is usually preceded by an upper respiratory tract infection.

Refer if there is no response to treatment (amoxicillin) after five days, a bulging drum is not responding to treatment, incomplete resolution of AOM, or a complication of AOM:

- Persistent middle ear effusion, especially if it is lasting longer than three months (70% of children will have an effusion present two weeks from the time of diagnosis, 40% at four weeks, with 10% having persistent effusions for three months or more) may lead to impaired hearing and delayed speech and language development in pre-school children
- Persistent deafness
- Mastoiditis: Painful swelling and tenderness behind the ear over the mastoid process.
- Perforation of the tympanic membrane not healed in six weeks.

Discharging ear

This could be due to AOM as discussed previously, or due to a chronic suppurative otitis media with a perforated tympanic membrane (symptoms > 2 weeks). Most importantly is to clean the ear via dry mopping with cotton wool wick, followed by 1% acetic acid drops (to eradicate pseudomonas) four times a day. A wet ear cannot heal. Antibiotic ear drops may help; oral antibiotics are not indicated. Consider taking swabs for tuberculosis and testing for HIV (stage 2 disease) if not healing despite optimal treatment for four weeks. A central perforation is less worrying, but a large perforation will not easily heal, and an atticoantral perforation carries the risk of a cholesteatoma and mastoiditis. These must be referred.

Deafness

Conductive and sensorineural hearing impairment can only be defined by audiometry if both air and bone conduction thresholds are measured. Tuning fork tests are often highly valuable. In a conductive hearing impairment, the Weber test is lateralizing towards the defective ear and the Rinne test is abnormal (negative). Causes of conductive hearing impairment:

- Wax in the canal
- Acute otitis media
- Persistent middle ear effusion (‘glue ear’)
- Perforation of the tympanic membrane and chronic otitis media
- Otosclerosis.
- Causes of sensorineural hearing impairment:
- Presbyacusis
- Noise-induced hearing loss
- Ménière’s disease (with tinnitus and vertigo)
- Rupture of round window if the symptoms have started suddenly
- after, for example, diving, blowing one’s nose, physical exercise, or air travel, the patient may have a rupture of the round window
- Chronic otitis media (or cholesteatoma) may have a cochlear complication requiring urgent treatment
- Certain medications, particularly aminoglycosides for tuberculosis
- Hypothyroidism in neonates
- Acoustic neuroma (tumour of the 8th cranial nerve) − slowly progressing, unilateral.

APPROACH TO FEVER

Fever

Fever means increase in body temperature. Axillary and tympanic (ear) temperature more than 37.5ºC is considered as fever.

Different kinds of body temperature and dangers

1. Normal temperature = **37ºC +/- 0.5°C**
2. Hypothermia **< 36.4ºC**
3. High fever
   - Moderate pyrexia (fever) > 37.6°C
   - High pyrexia (fever) > 38.5°C
   - When body temperature is more than 41 ºC: the body will lose abilities of temperature control, decease sweating. Cells and tissue are damaged and lose their function.
   - When body temperature is more than 42 ºC, the patient will get seizure and die in few hours.

Different kinds of fever and diseases

Constant fever: patient body temperature always increases. This kind of fever is usually found in typhoid, TB, or pneumonia patient.

Remittent fever: patient body temperature will increase and then decrease by itself, but still high than normal body temperature. This kind of fever is usually found in fever of unknown origin, Scrub typhus, etc.

Intermittent fever (swinging fever): patient body temperature will increase very high and in 24 hours will decrease below the normal body temperature. The body temperature will continuously alternate between very high and low temperature. This kind of fever usually found in sepsis or bone infection patient.

Relapsing fever = Patient will get fever and then the fever will disappear by itself. The fever appears again in 2-3 days. This kind of fever is usually found in malaria or meningitis.

Irregular fever = Fever cannot follow one kind of fever above. This kind of fever is usually found when the patient takes antibiotic or antipyretic drug.

Causes of fever

1. Infection: bacteria, virus, fungus, protozoa, or parasitic infection
2. Malignancy: lymphoma, leukemia.
3. Reaction: immediate after surgery.
4. After receiving routine immunization: DPT, BCG, measles
5. Extreme sunburn.

Symptoms associated with fever

- Chills: feeling cold even though body temperature is high.
- Rigor: a severe chill with chattering of the teeth and severe shivering.
- Rashes: A rash is a noticeable change in the texture or color of your skin. Your skin may become scaly, bumpy, itchy, or otherwise irritated.
- Cough: Coughing is your body's way of getting rid of an irritant. When something irritates your throat or airway, your nervous system sends an alert to your brain. Your brain responds by telling the muscles in your chest and abdomen to contract and expel a burst of air. A cough is an important defensive reflex that helps protect your body from irritants like mucus, smoke, and allergens such as dust, mold, and pollen. Coughing is a symptom of many illnesses and conditions. Sometimes, the characteristics of your cough can give you a clue to its cause.
- Headache: A headache is a very common condition that causes pain and discomfort in the head, scalp, or neck.
- Dysuria: Painful urination
- Arthralgia: Joint stiffness
- Arthritis: Inflammation of a joint
- Myalgia: Muscle aches

Signs of serious illness

- Sepsis and shock
- Systemic illness: Meningism, seizures, confusion, photophobia, persistent vomiting, rigid abdomen, rash, difficult breathing, chest pain, etc.
- Special general condition: Pregnancy, malnutrition, immune suppression, splenectomy, chronic disease, very young aged or very old aged

How to measure the temperature

- Axilla (+1°F or +0.5°C): Proper measurement of axillary temperature takes 5 minutes.
- Orally
- Per rectally

TREATMENT

** Look for the signs of serious illness and provide appropriate treatment (E.g., Antibiotic, Anti-malaria) **

If fever over 38°C:

- Remove any unnecessary clothing
- Remove blankets
- Start tepid sponging
- Give Paracetamol P.O (Adult: 1g QID (Max 4 g/day), Child: 15 mg/kg (Max 2g/day)
- If fever is still high, consider to use ibuprofen P.O. (Black box warnings: All NSAIDs have cardiovascular risks and gastrointestinal risks)
- Hydrate patient (Drinking a lot, IV fluid infusion if cannot drink.)

COMPLICATION

A rapid rise or fall in temperature may cause a febrile seizure in a small percentage of children younger than age 5.

Common causes of fever in special population

- **Pregnant women**
  - Malari
  - Urinary and pelvic infection
  - Respiratory infection
- **During delivery**
  - Uterine infection
  - Placenta retenti
  - Phlebiti
  - Urinary Tract Infectio
  - Malaria
- **Aging people**
  - Urinary Tract Infection (UTI)
  - Pneumonia
  - Peritonitis
  - Cholecystitis
  - Appendicitis

** If fever is longer than 2 weeks, think for **Tuberculosis (TB)** and **scrub typhus.** **

(Hanneke Brits) Fever is defined as a temperature of 37.8 °C or more, without the use of fever-reducing medications. Fever is a normal physiological response and usually beneficial to the individual. It is therefore not necessary to reduce all elevated temperatures. However, it is important to distinguish fever from hyperthermia where the body is unable to control or reduce core temperature.

Causes of fever

Fever is usually seen as a sign of infection, but can also be caused by a variety of non-infectious conditions:

- Infections: bacterial, viral, spirochetal, protozoal, fungal, Rickettsial
- Neoplasms
- Allergic reactions
- Collagen disorders
- Drugs
- Granulomatous disorders or sarcoidosis
- Heat stroke
- Factitious fever.

Red flags

A patient with fever accompanied by (Adapted from PACK: Knowledge Translation Unit, University of Cape Town Lung Institute and Western Cape Government, 2015):

- Decreased level of consciousness or confusion
- Respiratory rate > 30 breaths/minute in an adult
- Unable to walk or drink
- Jaundice
- Renal angle tenderness
- Convulsions
- Shock
- A non-blanching rash, easy bleeding, bruising, blood in urine.

Gathering information

Fever is often a diagnostic clue accompanying a more specific symptom such as sore throat, cough or diarrhoea. Occasionally however and more frequently in infants and small children the main presenting problem is fever, and the family physician needs an approach to investigating the cause. Ask the following about the fever:

- P: Precipitating/palliating/provoking factors, for example, recent travel, response to antipyretics, TB contacts, HIV status
- Q: Quality of the fever, for example, the pattern over time (spiking, low grade)
- R: Related symptoms, for example, sore throat, earache, dysuria, cough
- S: Severity of fever, for example, measurement at home
- T: Time course/treatment, for example, the duration and treatment used.

Examination

In the case of an unexplained fever, a full examination will be required:

1. General impression: unable to walk, unable to drink, confused, agitated
2. Vital signs: temperature, respiratory rate, pulse and blood pressure
3. General: jaundice, anaemia, cyanosis, lymphadenopathy, petechiae, oedema
4. Look for a focus of infection:
   - Ear, nose and throat infections − otitis media, tonsillitis, pharyngitis
   - Chest infection − pneumonia, bronchitis, pleural effusion
   - Skin infection and rashes − impetigo, tick bite fever, measles, chickenpox, rubella
   - Abdominal infection – appendicitis, gastro-enteritis, cholecystitis
   - Genito-urinary – pyelonephritis, cystitis, pelvic inflammatory disease
   - Neurological infection – meningitis.
   - Look for associated clinical signs such as:
   - Hepatomegaly − malaria, enteric fever, hepatitis
   - Splenomegaly − malaria, enteric fever, infectious mononucleosis, lymphoma, infective endocarditis
   - Meningeal signs − neck stiffness, Kernig and Brudzinski signs
   - Lymphadenopathy − tuberculosis, HIV, lymphoma, toxoplasmosis, infectious mononucleosis, brucellosis
   - Jaundice − Hepatitis
   - Side-room investigations:
   - Urinalysis.

Special investigations

Special investigations should be focused and assist with management.

- Total and differential white blood cell count
- Urine culture and sensitivity only if urinary tract infection is suspected
- Chest radiograph if signs of pneumonia, empyema, pleural effusion or tuberculosis
- Rapid malaria test if in a malaria zone (or patient has recently visited one in past four weeks)
- Special immunological tests like ANA (antinuclear antibody), DsDNA (double-stranded DNA) should be done if one suspects disorders like systemic lupus erythematosus, polyarteritis nodosa or other connective tissue disorders
- Polymerase chain reaction tests if indicated, for example, HIV infection, swine u
- IgM, IgG antibodies against tick bite fever, rubella, measles, herpes, and so on
- Lumber puncture for meningitis if raised intracranial pressure was excluded
- Blood cultures per indication.

Management principles

Divide into a category:

- Children < 3 months: Treat as a severe bacterial infection. Give an immediate dose of systemic antibiotic (for example, IM ceftriaxone), admit to hospital, and investigate fully for infection.
- Serious infection indicated by meningeal irritation, respiratory distress, purpura, surgical abdomen or shock: Resuscitate, give an immediate dose of intravenous antibiotic and refer as an emergency.
- Acute infection with focus of infection identified: Manage according to normal guidelines.
- Fever > 1 week or not responding to treatment: Repeat history, examination and more specialized special investigations or referral.

Treatment of fever

Fever has an antimicrobial action and therefore the treatment of fever per se is not indicated unless it causes discomfort. Fever does not cause convulsions (as previously believed). Tepid sponging and evaporative cooling is not indicated for fever.

- Paracetamol and ibuprofen are safe in children
- Paracetamol, aspirin and non-steroid anti-inflammatory drugs are safe in adults
- Do not let the use of antipyretics distract you from the cause of the infection
- Fever does not always require an antibiotic and if more than two sites are affected, for example, runny nose, coughing, sore throat, ear ache, the infection is often caused by a virus infection.

APPROACH TO GENITAL SYMPTOM

(Indiran Govender, Henry Okonta)

The syndromic approach is used to assess and manage patients with genital symptoms from sexually transmitted diseases (STIs). An approach to vaginal discharge is described in section 5.40 (Sexually transmitted infections, National management guidelines, 2015).

Assessment

Ask about (Adapted from PACK: Knowledge Translation Unit, University of Cape Town Lung Institute and Western Cape Government, 2015):

- Symptoms such as dysuria, pain, discharge, rash, itch, lumps, and ulcers.
- Sexual health: sexual orientation, sexual activities (oral, vaginal or anal intercourse), partners, condom use, substance use and any sexual problems.
- Abuse: ask about coercion, sexual assault or rape or if there is any intimate partner violence.
- Family planning: exclude pregnancy, use of or need for contraception.

In a woman, examine the abdomen for masses or lower abdominal pain, look for inguinal lymphadenopathy, inspect the perineum for pubic lice or scabies, discharge, ulcers, rash or lumps (genital warts, molluscum contagiosum), perform a bimanual palpation for cervical tenderness or masses and a speculum examination if necessary.

In a man, inspect for pubic lice or scabies, urethral discharge, ulcers, inguinal lymphadenopathy, scrotal swelling or masses.

Categorize the patient into one of the syndromes: vaginal discharge syndrome (VDS), lower abdominal pain (LAP), male urethritis syndrome (MUS), genital ulcer syndrome (GUS), scrotal swelling syndrome (SSW), balanitis (BAL), pubic lice (PL), bubo or RPR positive.

Management

Treat according to the latest guidelines for the syndromic approach (Knowledge Translation Unit, University of Cape Town Lung Institute and Western Cape Government, 2015). In addition, counsel the patient to:

- Complete the treatment, even if symptoms improve, and abstain from sex during treatment
- Test for HIV and RPR
- Notify the partner (issue a notification letter) and ensure treatment for the partner
- Practice safer sex
- Offer or provide condoms
- Consider medical male circumcision.

APPROACH TO HEADACHE

(Claire van Deventer)

History

When asking about a headache, you should consider the following factors:

- Time issues:
  - Why has the patient consulted now?
  - When did it start?
  - How frequent is it and what is the pattern (episodic, daily, or unremitting)?
  - How long does it last (minutes, hours, days)?
- Character of the pain:
  - How severe is the pain?
  - What is the quality of the pain (dull, pressure, tight, pulsating, stabbing)?
  - What is the site and spread of the pain (unilateral or bilateral)?
  - What are the associated symptoms (for example, aura, nausea, vomiting, photophobia, phonophobia, fever)?
- Cause questions:
  - What is the patient's perspective ('What do you think is causing your headache?' – this question often reveals psychosocial or mental problems)?
  - Are there predisposing or trigger factors (for example, stress, foods, analgesic use)?
  - Are there aggravating or relieving factors (for example, exercise, rest)?
  - Is there a family history of similar headaches?
- Response questions:
  - What does the patient do during the headache?
  - How much is normal activity limited or prevented
  - What medication have they used?
- State of health between attacks:
  - Are they completely well or do they have residual or persisting symptoms?
  - Are there concerns, anxieties, or fears about recurrent attacks or their cause?

Classification of headaches

A simplified classification of headaches is shown in Table 5.16 and the features of some common primary headaches are outlined below. Despite popular belief hypertension is not a common cause of headaches. A headache diary may help with diagnosis in some patients. e history is almost always the most useful diagnostic tool.

See Table **Classification of headache disorders, cranial neuralgias and facial pain**

Primary headaches

Tension-type headache (TTH)

- Bilateral
- Band of pain, tight or pressure-like in nature
- Can last from several hours to several days
- Tends to worsen during the course of the day
- Tightening of scalp and pericranial tenderness
- Normal neurological examination
- Associated with psychosocial stress.

Migraine

- Unilateral and severe pain
- Pulsating/throbbing in nature
- Associated nausea and sensitivity to light and sound
- Physical activity exacerbates it
- Aura present in 15−33%
- Recurrent and lasts four to 72 hours
- Made worse by psychosocial stress
- More common in women
- Positive family history
- Uncommon, but often missed in children. Children may have bilateral headache and gastrointestinal complaints.

Cluster headache

- Unilateral in trigeminal area, over the eye and forehead
- Severe and stabbing in nature
- Rapid onset, shorter duration than migraine (one to three hours)
- Restless, may wake the person from sleep
- Lacrimation from one eye, nasal congestion, eyelid oedema, temporary ptosis
- Episodic, every one to two years, then recurrent daily for 6 to 12 weeks, often in the same season
- More common in men.

Medication overuse headache

- May have features like migraine or tension headache but is caused by patients using analgesics too often.

Secondary headaches

Headaches may be secondary to an underlying medical condition. Think about the possibility of a secondary headache when taking a thorough history and performing the examination.

Primary	1	Migraine, including:
	1.1	Migraine without aura
	1.2	Migraine with aura
	2	Tension-type headache, including:
	2.1	Episodic tension-type headache
	2.2	Chronic tension-type headache
	3	Cluster headache and chronic paroxysmal hemicrania
	4	Miscellaneous headaches unassociated with structural lesion
Secondary	5	Headache associated with head trauma, including:
	5.1	Acute post-traumatic headache
	5.2	Chronic post-traumatic headache
	6	Headache associated with vascular disorders, including:
	6.1	Subarachnoid haemorrhage
	6.2	Giant cell arteritis
	7	Headache associated with non-vascular intracranial disorders, including:
	7.1	Benign intracranial hypertension
	7.2	Intracranial infection
	7.3	Intracranial neoplasm
	8	Headache associated with substances or their withdrawal, including:
	8.1	Acute alcohol induced headache
	8.2	Chronic ergotamine induced headache
	8.3	Chronic analgesics abuse headache
	8.4	Alcohol withdrawal headache (hangover)
	9	Headache associated with infection, including:
	9.1	Intracranial infection
	10	Headache associated with metabolic disorder
	11	Headache or facial pain associated with disorder of cranium, neck, eyes, ears, nose, sinuses, teeth, mouth or other facial or cranial structures, including:
	11.1	Cervical spine
	11.2	Acute glaucoma
	11.3	Acute sinus headache
	12	Headache attributed to a psychiatric disorder
Neuralgias and other headaches	13	Cranial neuralgias, including:
	13.1	Herpes zoster
	13.2	Trigeminal neuralgia

Table: Classification of headache disorders, cranial neuralgias and facial pain

Red flags

Headaches are common in primary care, and most are due to benign conditions. It can therefore be easy to miss serious and even life-threatening causes of headaches. An awareness of red ag symptoms and signs should alert one to the possibility of a medical emergency.

1. Sudden-onset headache: Most patients with a benign headache have a history of the same headache occurring previously. Any patient presenting with a severe headache for the first time needs further assessment. A subarachnoid bleed, for example presents as a headache that starts suddenly and is very severe.

2. Worsening-pattern headache: is a headache that progresses over weeks or months but is characterized by continually getting worse and without periods of remission. A space occupying lesion or cancer may present in this way.

3. Headache with systemic illness: A headache in an acutely ill patient, with symptoms such as fever, rash, sweating, neck stiffness. Meningitis may present in this way.

4. Focal neurological signs or symptoms: For example, motor or sensory signs or symptoms (excluding the typical visual or sensory aura in some migraines).

5. Papilledema: Raised intracranial pressure affects the appearance of the optic disc that can be

seen during fundoscopy. e disc becomes pinker, retinal veins more dilated, and the sharp margin of the disc is blurred and indistinct.

6. Headache triggered by cough, exercise or Valsalva's manoeuvres:

- These activities raise intracranial pressure and if they precipitate headache suggest that pressure is already raised. Headaches due to raised intracranial pressure may also wake the patient from sleep.

7. Headache during pregnancy or post-partum: Headache may be difficult to treat or indicate a more serious underlying pathology.

- May be associated with imminent eclampsia.

8. New headache with history of cancer or HIV: A headache developing for the first time is more likely to be due to pathology such as a metastasis in cancer or infection in HIV (for example cryptococcal meningitis).

9. Headache following trauma: May indicate intracranial pathology.

10. Headache with jaw claudication: May be due to temporal arteritis.

Focused examination

The following should usually be assessed and recorded in the medical record:

- Blood pressure, pulse and temperature
- Examine head and neck for tenderness, neck stiffness or sinus pain
- Neurological examination, including funding.

Investigations

No investigations are useful in primary care for primary headaches. Investigations may be considered in specific patients with suspected secondary headache. For example:

- ESR in suspected inflammation (temporal arteritis)
- Skull radiograph in trauma
- Sinus radiograph or ultrasound in suspected sinusitis
- Tonometry in suspected glaucoma
- Urine test for illicit substances.

Some investigations, such as lumbar puncture, CAT scan or MRI scan, would only be performed in hospital after referral.

APPROACH TO THE INJURED PATIENT

(Emmanuel Ajudua)

The initial assessment and management of the polytrauma patient determines to a large extent the final outcome of the patient. e following principles highlight how to conduct the immediate assessment and management and can be divided into the:

- Primary survey
- Secondary survey.

The primary survey

The primary survey is aimed at immediate evaluation of life-threatening injury and adequate management to improve chances of survival. e common mnemonic for adequate recall is ABCDE. e primary survey is repeated several times in the course of evaluating the patient to ensure the patient is not deteriorating and to intervene as necessary.

- **A – Airway** and protect the c-spine. Ensure the patient's airway is patent and that no immediate risk exists that might impair the patency. An easy way to assess very quickly is to ask a question. If the patient gives a coherent answer, it indicates that the airway is patent and that the patient is breathing. If there is no answer it may indicate a non-patent airway. In the polytrauma patient, there is the chance of cervical spine injury, to prevent further injury to the cervical spine it is better to use the jaw thrust manoeuvres to assess the airway. Ensure a cervical collar is in place.
- **B – Breathing**. Check respiratory rate. Ensure there is no obstruction to the free ow of air into and out of the lungs. Monitoring devices like the pulse oximeter can assist with this. An arterial blood gas when available is also useful for assessing effective gas exchange. Immediate threats such as an open pneumothorax, tension pneumothorax, ail chest and massive hemothorax must be addressed immediately.
- **C – Circulation.** Check pulse and blood pressure. is involves securing two large bore intravenous lines for adequate resuscitation to replace acute blood loss. In the shocked patient with a good baseline prior to trauma, it is advisable to give two liters of adequate resuscitation fluids to improve the fluid status of the patient. Smaller boluses (200–500 ml) are required in the elderly or high risk

patients, the paediatric population should have bolus doses based on weight of the patient. In situations with large volume blood loss, resuscitation with emergency blood transfusion (O negative blood) should be considered. Stop all external bleeding by splinting fractures, applying pressure to external wounds. In patients with an open fracture of the pelvis, a bed sheet can be used to close the fractured pelvis to reduce the volume of blood loss in the pelvis.

- **D – Disability**. is essentially looks at the neurologic status of the patient. It entails assessing level of consciousness using the Glasgow coma scale (and record this to compare with the score in the repeated evaluation), checking the pupillary size and the reaction to light, gross motor

functioning. If after correcting for all possible metabolic causes for decreased level of consciousness the patient is still unconscious, it is traumatic brain injury until proven otherwise.

- **E – Exposure.** Remove all clothing to evaluate adequately while keeping the patient warm to prevent hypothermia.
- Consider insertion of urethral catheter (if no signs of urethral injury) or nasogastric tube (if no signs of base of skull fracture).
- Immediate diagnostic tools:
  - Blood investigations: Haemoglobin, creatinine, crossmatch, venous blood gas
  - X-rays
  - Chest (AP), Pelvis (AP), c-spine (Lat)
  - Focused assessment sinology in trauma (FAST) is now preferred over diagnostic peritoneal lavage (DPL)
  - 12 lead ECG.

The primary survey ends only after the patients, vitals are returning to normal and the ABCDE has been reassessed to ensure nothing has been missed.

Secondary survey

The secondary survey involves a detailed history and physical examination of the polytrauma patient.

- History (may be from family members) - Allergies, medication use, past illnesses, last meal before accident, events that led to injury with details of mechanism of injury
- Examination - is will include a detailed head to toe evaluation of the patient, remember to inspect, palpate, percuss (where appropriate) and auscultate
- Head - Palpate for fractures in the skull, scalp lacerations
- Face - Maxillo facial, mandibular injuries, orbital injuries
- Neck - Check for blunt vs penetrating trauma, there may be a delay in development of signs
- Chest - Check for blunt vs penetrating trauma, inspect, palpate, percuss, auscultate
- Abdomen - Inspect, palpate, percuss, auscultate, evaluate need for special studies
- Rectum, vagina and perineum - Assess for injuries, contusions, hematomas, check sphincter tone, peri-anal sensation, etc.
- Pelvis - Assess for pain, limb length, crepitus, instability suggesting fractured pelvis
- Musculoskeletal system for limb and spinal injuries - Log roll the patient with assistance to protect the spine and check for injuries to the spine
- Neurological assessment - For a complete examination of the nervous system, note deficits such as lateralizing signs, unequal pupillary reaction, note that you will need frequent re-evaluation of the Glasgow coma scale (GCS), prevent secondary brain injury, and assess the spine thoroughly for injury and evaluate with special diagnostic tests as necessary.

If the patient deteriorates at any point during the course of the secondary survey, stop the secondary survey and reassess the primary survey.

If transfer to a referral center is required, ensure that transfer is organized without delay as this impacts on the outcome for the patient.

APPROACH TO JAUNDICE

(Febi Ajudua)

A patient presenting with a complaint of yellow skin or jaundice will often need to be referred for further investigation and management. e following features should prompt urgent assessment or referral (Adapted from PACK: Knowledge Translation Unit, University of Cape Town Lung Institute and Western Cape Government, 2015):

- Pregnant
- Temperature > 38 °C
- Confusion
- Early bruising or bleeding
- Persistent vomiting
- Severe abdominal pain
- Fingerpick Hb < 10
- On any medication, for example, TB medication.

Initial assessment is directed at deciding what broad category of jaundice the person ts into:

- Pre-hepatic causes
- Hepatic causes
- Hepatocellular causes
- Obstructive causes.

Ask the patient about the colour of their stools and urine. Test the urine for urobilinogen and bilirubin. Test the blood for conjugated and unconjugated bilirubin and for liver function tests. Check the Haemoglobin.

See Table Interpreting the cause of jaundice

The patient may have other signs or symptoms that point towards a particular cause. For example, alcohol abuse, intravenous drug use, travel abroad or TB medication will point towards a hepatocellular cause. Colicky right upper quadrant pain may suggest gallstones. A family history may point towards genetic or congenital causes. Look also for signs of chronic liver disease or cirrhosis.

Type of jaundice	Symptoms	Urine	Blood	Causes
Pre-hepatic	Normal stool and urine	Urobilinogen No bilirubin	Anaemia Raised unconjugated bilirubin Normal liver function tests	Haemolysis
Hepatic	Normal stool and urine	Normal	Raised unconjugated bilirubin Normal liver function tests	Congenital enzyme defects
Hepatocellular	Normal or pale stools and dark urine	No urobilinogen Bilirubin	Raised conjugated bilirubin Abnormal liver function tests (ALT ≥ 120)	Hepatitis from viral, drug, alcohol or other causes
Obstructive	Pale stools and dark urine	No urobilinogen Bilirubin	Raised conjugated bilirubin Abnormal liver function tests (ALP/GGT ≥ 3 times upper limit)	Gallstones Pancreatic cancer

Table:Interpreting the cause of jaundice

AN APPROACH TO LYMPHADENOPATHY

(Febi Ajudua) Assess the:

- Location of the lymph nodes. Is the enlargement involving just a particular group of lymph nodes or are there several groups of lymph nodes involved?
- Size of the lymph node.
- Consistency of the lymph nodes. Stony hard painless lymph nodes are more likely to indicate malignancy while rm tender lymph nodes are more likely to indicate infection. Is the node fluctuant suggesting an abscess?
- Skin changes. Is there redness of overlying skin or break down with a chronic draining sinus?
- Mobility of the enlarged lymph nodes. Is the particular group of lymph nodes matted or fixed to underlying structures. Matted fixed lymph nodes are seen in both chronic infections like tuberculosis and malignancy. Enlarged freely mobile lymph nodes are seen in infection and also in collagen vascular diseases.
- Associated pain and tenderness. is feature is often associated with infection.

If the patient has generalized lymphadenopathy (usually < 2 cm in size), check for HIV and syphilis (RPR). Secondary syphilis may also have mouth ulcers and a skin rash, particularly on the palms and soles, and genital wart-like lesions. If the patient is well and these tests are initially negative, repeat in 3 months after the window period. If the patient is unwell, investigate further.

If the patient has localized lymphadenopathy (usually > 2 cm in size), check for infection in the drainage area. Other conditions such as neoplasms may also present in this way. In HIV patients, check for a Kaposi's sarcoma lesion. If there is no obvious cause, you may need to aspirate the lymph node for TB and cytology to make a diagnosis. Ask about other symptoms of TB. If the lymphadenopathy is in the groin or inguinal area and in inflamed or painful, consider treating for bubo, a sexually transmitted infection.

APPROACH TO MOUTH- AND THROAT SYMPTOMS

(Indiran Govender, Henry Okonta)

Pharyngitis

Pharyngitis presents with sore throat, difficulty swallowing, fever, malaise and an erythematous oropharynx. Odynophagia, anterior cervical lymphadenopathy and fever are suggestive of bacterial pharyngitis. Suspected streptococcal pharyngitis should ideally be confirmed with a rapid streptococcal antigen test followed by a throat culture if the rapid test is negative. Viral pharyngitis is more likely if the sore throat is accompanied by rhinorrhea, conjunctivitis, cough, or hoarseness. Pharyngitis from herpes simplex virus manifests with painful vesicles on the lips, mouth or oropharynx. Very often it is not possible to clinically exclude bacterial infection as cause of the pharyngitis. To prevent complications from infection with betahaemolytic streptococcus, all children between the ages of 3 to 15 years with pharyngitis should be treated as having a streptococcal infection unless they have clear evidence of viral pharyngitis.

Tonsillitis

Tonsillitis presents like pharyngitis with sore throat, difficulty swallowing, fever and malaise. e tonsils are enlarged, erythematous and there may be anterior cervical lymphadenopathy. e presence of pus or white patches on the tonsils makes bacterial tonsillitis more likely. Treatment of bacterial tonsillitis is with benzathine penicillin injection or penicillin V for 10 days (azithromycin if penicillin allergy). Early treatment can prevent rheumatic fever complications but does not alter the risk of post-streptococcal glomerulonephritis. Indications for tonsillectomy include:

- Recurrent tonsillitis more than four episodes a year
- Peritonsillar abscess
- Obstructive sleep apnoea
- Unilateral enlarged tonsil in an adult.

Oropharyngeal candidiasis

Patients with oropharyngeal candidiasis complain of dryness of the mouth, loss of taste and pain. Cheese-like white patches are seen on the cheeks, gum, tongue, palate and oropharynx. Removal of the patches with a spatula reveals an area of punctate erythema or haemorrhagic spots on an erythematous background. Involvement of the corners of the mouth results in angular cheilitis and the concurrence of odynophagia is indicative of esophageal candidiasis. e diagnosis is usually clinical but if in doubt, the white patches could be collected for potassium hydroxide preparation and light microscopy which will con rm the presence of yeasts and pseudomycelia. Consider immunosuppression due to HIV or locally due to inhaled corticosteroids. Treat with nystatin suspension.

Aphthous ulcers

The precise Aetiology and pathogenesis of aphthous ulcers are not yet known. e following factors are however associated with and may underlie the development of this condition:

- Stress and anxiety
- Medications such as ACE inhibitors, beta blockers, NSAIDs
- Vitamin or mineral deficiencies-iron, folate, B12, zinc
- Food and chemical sensitivities
- Oral trauma
- Systemic diseases such as HIV, coeliac disease, Crohn's disease, reactive arthritis, Behcet's syndrome.

Aphthous ulcers present with a painful lesion in the mouth. e pain is exacerbated by movement of the affected areas or eating .ere may be a history of recurrent episodes, onset related to use of medications, or symptoms indicative of other underlying risk factors. Oral examination will reveal solitary or multiple ulcers covered by a yellowish-white pseudo-membrane surrounded by an erythematous halo. ese aphthae are typically distributed on the labial and buccal mucosae and on the ventral aspect of the tongue. Laboratory investigations such as full blood count, ESR, HIV and vitamin testing may be helpful in recurrent or persistent cases.

Apply tetracaine ointment until healed and investigate further if the ulcer is not healed within 2 weeks or is larger than 1 cm in diameter.

Herpes simplex

Presents with painful blisters that become ulcers on the lips (cold sores) and mouth. Consider the possibility of HIV especially in those with extensive, recurrent or persistent lesions. Give tetracaine for pain and consider the need for acyclovir in those with HIV.

TableDifferences between inflammatory and non-inflammatory joint pain

	Inflammatory	Non-inflammatory
Early morning stiffness	> 30 minutes	< 15 minutes
Stiffness and pain	Increase with rest and are relieved by exercise	Increase with use and relieved by rest
Swelling	Often present	Not present
Microscopy of synovial fluid	Translucent, white cell count > 75 000 cells/mm^3 with polymorphonuclear cells > 50%	Translucent, white cell count < 2 000 cells/mm^3 with polymorphonuclear cells < 25%

(Mosedi Namane) e two most common chronic joint conditions seen in the family physician's office are osteoarthritis (OA) and rheumatoid arthritis (RA). e most common chronic widespread soft tissue pain seen is fibromyalgia syndrome (FMS). At times, patients may present with regional musculoskeletal acute or chronic pain affecting for example just the neck, arm, leg, or foot. Chronic refers to conditions lasting for more than eight weeks. Acute may mean a recent onset of a new condition or in other instances it may refer to a are up of a chronic condition. With acute pain, one should first exclude a history of trauma before exploring other causes. Urgent attention should be given to unwell patients with a temperature, a history of weight loss, systemic features and/or comorbidities like HIV infection or diabetes. ese patients may need to be referred for in-hospital management and therefore should be discussed with a senior clinician.

Do a rapid musculoskeletal screening for a patient presenting with widespread pain (Mash, 2015d). If the patient is able to do all actions comfortably and the symptoms are of an acute onset, exclude common conditions such as viral infections (for example, influenza) or post exercise myalgia. If the patient is not able to do all actions of a musculoskeletal screening comfortably, do a detailed musculoskeletal assessment. Beyond establishing whether the pain is acute or chronic, the following five concepts should be considered when evaluating joints (Baer, 2014).

Is the joint pain really arthritis?

There are a variety of painful structures that can be interpreted as pain in the joint by patients.

- Periarticular causes of pain can originate from a bursitis (for example, in the case of knee pain, an anserine bursitis could be the cause), tendonitis (for example, inflammation of some tendons of the anatomical snuff-box may cause wrist pain), and perceived regional joint pains may be caused by myofascial pain or FMS
- Non-articular causes of pain may come from adjacent tumours of the bone, vascular pathology, osteomyelitis, or radiculopathy
- Articular pain arises from involvement of the joint itself. e signs of articular inflammation are swelling, tenderness, warmth and redness.

Is the problem inflammatory or non-inflammatory?

Differentiating between inflammatory or non-inflammatory conditions helps in narrowing the differential diagnoses.

See TableDifferences between inflammatory and non-inflammatory joint pain

It is critical to identify an inflammatory arthritis as, when present, disease-modifying anti-rheumatic drugs should be prescribed early. ese drugs alter the progression and the course of the disease. If one is not trained in rheumatology, one should refer the patient to a rheumatologist immediately. On the other hand, all family physicians should be skilled in managing common rheumatological conditions such as gout and RA.

What is the pattern of joint involvement?

Monoarthritis and oligo-/polyarthritis have differing diagnostic probabilities. Inflammatory pain with symmetrical small joint involvement is suggestive of RA, which is the commonest inflammatory condition affecting 1% of the adult population. Inflammatory back pain may be a spondylarthritis (for example, ankylosing spondylitis).

See Table Pattern of Join Involvement

Table: Pattern of Joint Involvement

Acute		Chronic	
Monoarthritis	**Oligo-/polyarthritis**	**Monoarthritis**	**Oligo-/polyarthritis**
Infective (septic) Gout (crystals) Reactive Trauma	Systemic illness Gout (crystals) Reactive Post-streptococcal	Osteoarthritis Gout (crystals) Infective (TB) Tumour	Autoimmune (for example RA) Osteoarthritis Gout (crystals) Reactive Psoriatic

Are there associated systemic features?
Most of the rheumatic conditions are systemic illnesses. It is therefore important to review all the systems when seeing a patient. Symptoms could include loss of weight, unexplained fevers, rash, chills and new disabilities. Psoriatic arthritis may have the typical skin rash and nail abnormalities. Reactive arthritis may follow urogenital or enteric infections. Rheumatic fever may follow a streptococcal infection.

What is the patient's profile?
Age, gender, family history and past medical history may provide clues. For example, FMS is typical in younger women, polymyalgia rheumatica mainly occurs in those over 60 years of age and is usually accompanied by a strikingly raised ESR. A family history of autoimmune diseases makes rheumatoid diseases such as RA more likely. Unexplained paediatric arthralgias have been found to be associated with psychosocial stress, school absenteeism and vitamin D deficiency. HIV infection commonly predisposes to a number of rheumatological conditions.

Investigations
Targeted investigations are only useful if there is a high suspicion of a specific condition. Erythrocyte sedimentation rate and a C-reactive protein are commonly elevated in inflammatory conditions.
Arthrocentesis and investigation of synovial fluid can con rm infection and help differentiate inflammatory from non-inflammatory causes. Negative birefringent needle-like crystals in synovial fluid can clinch the diagnosis of gout. However, gout can be diagnosed on history, examination and elevated uric acid. e uric acid however is not always elevated in acute gout and may be mildly elevated in those without gout. Anti-CCP (cyclic citrullinated peptide) antibodies are used to diagnose RA (sensitivity 74%, specificity 94%) and IgM rheumatoid factor (sensitivity 75%, specificity 74%) is a predictor of disease severity. e rheumatoid factor must be highly elevated to support the diagnosis of RA.

Diagnostic imaging in the public sector primary health facilities in South Africa is usually confirmed to plain X-rays. X-rays can reveal the features of certain rheumatic diseases such as OA and RA. It is also good in showing most fractures. In tertiary institutions, ultrasound and radio nuclear bone scans can be used to detect early synovitis when there is a clinical doubt of arthritis. MRI and CAT scans provide information on soft tissue abnormalities.

Rheumatoid arthritis
Rheumatoid arthritis (RA) is a systemic disease, but with the musculoskeletal system dominating the clinical picture. e following four 'S-factors' are useful signs of early inflammatory arthritis:

- Stiffness: Early morning stiffness lasting > 30 minutes
- Swelling: Persistent swelling of 1 or more joints, particularly hand joints
- Squeeze test: Tenderness on squeezing across all 4 metacarpal phalangeal joints
- Squeeze test: Tenderness on squeezing across the metatarsal heads.

See Table: Scoring system to diagnose rheumatoid arthritis

Notes: Large joints are elbow, shoulder, hips, knees and ankles. Small joints refer, to metacarpophalangeal joints, proximal interphalangeal joints, 2nd to 5th metatarsophalangeal joints, thumb interphalangeal joints and wrists. ACPA is also known as anti-CCP. At a primary care level once a suspected or definitive diagnosis of RA is made, a prompt referral to a specialist physician or rheumatologist is required. Whilst a patient is awaiting an appointment, they can be started on ibuprofen 800 mg 8-hourly orally, prednisone 7.5 mg daily orally, chloroquine 200 mg daily (Monday–Friday) orally and paracetamol 1 g 6-hourly as required.

Criteria	Score
Joints	
1 large joint	0
2–10 large joints	1
1–3 small joints	2
4–10 small joints	3
>10 joints	5
Serology	
Negative RF and negative anti-CCP	0
Low positive RF or low-positive anti-CCP (≤ 3 times upper limit normal)	2
High positive RF or high-positive anti-CCP (> 3 times upper limit normal)	3
Acute phase reactants	
Normal C-Reactive Protein and ESR	0
Abnormal C-Reactive Protein or ESR	1
Symptom duration	
< 6 weeks	0
≥ 6 weeks	1

Table: Scoring system to diagnose rheumatoid arthritis

Osteoarthritis

Osteoarthritis (OA) is a chronic disorder of synovial joints characterized by softening and disintegration of the articular joints. e joints most commonly involved are knees, hips, hands and apophysial joints.

The non-pharmacological treatments (referral for physical therapy, referral to nutritionist for weight loss, referral for assistive devices) are the cornerstone of management of people with OA and have been given an equal weighting with pharmacological treatment in the management plan (Holliman, 2012). A specific sequence of pharmacological therapy is no longer recommended as before. Acetaminophen (paracetamol) is now only conditionally recommended amongst other pharmacological agents such as NSAIDs and weak opioids. For people over 75 years of age, topical rather than oral NSAIDs should be used whenever possible. For both knee and hip OA, nutraceuticals such as chondroitin sulphate, glucosamine and topical capsaicin are not usually recommended.

Fibromyalgia syndrome

Fibromyalgia syndrome (FMS) is a chronic diffuse soft tissue pain syndrome with patients complaining of being 'sore everywhere'. FMS is common with a prevalence of 0,5−5% in different populations. e diagnosis of FMS has changed and has moved away from palpation of tender points to a more comprehensive assessment of pain locations, core symptoms and the severity of somatic complaints (National Databank for Rheumatic Diseases, 2016). e patients should be asked about pain at the following 19 locations (to give a score out of 19) and should have a score of 7 or more to use right and left where applicable to give a diagnosis of FMS:

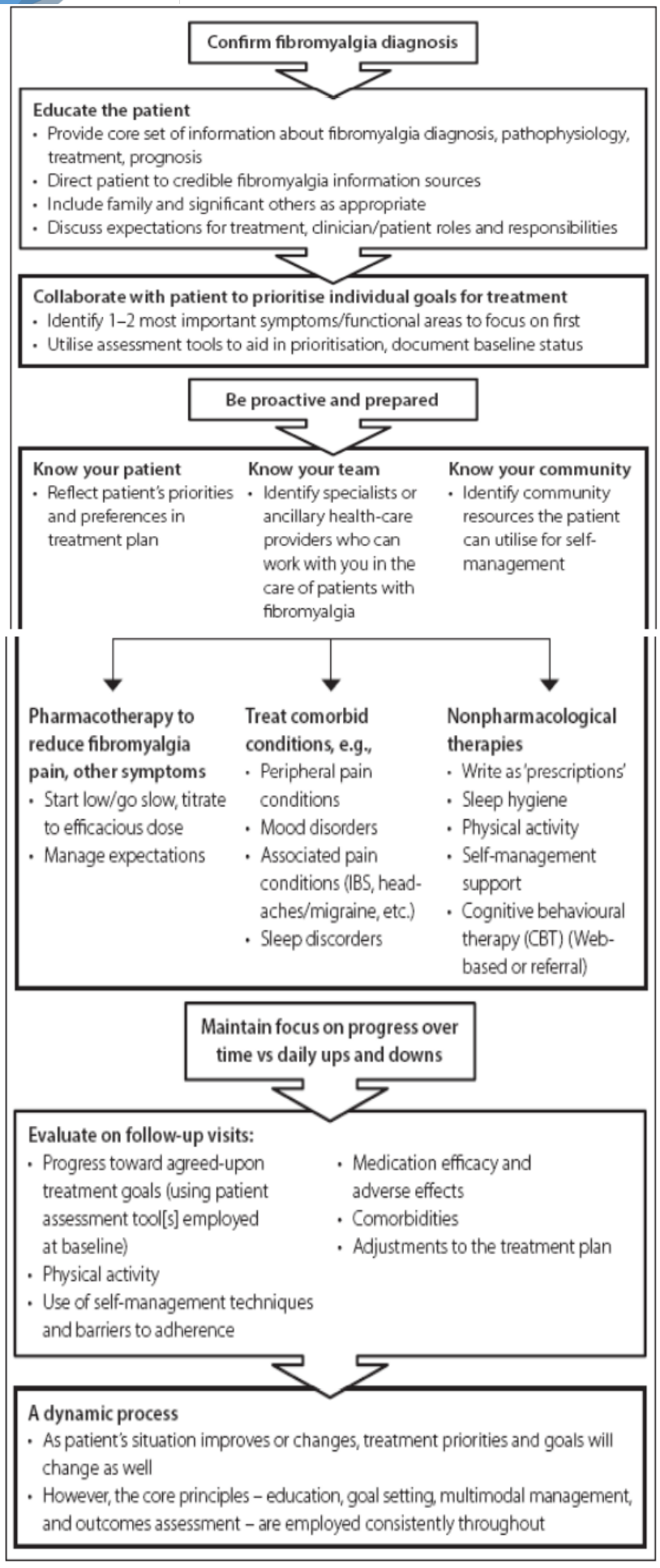
- Shoulder
- Hip
- Upper arm
- Lower arm
- Upper leg
- Lower leg
- Jaw
- Chest
- Abdomen
- Lower back
- Upper back
- Neck

In addition, patients should be asked about three core symptoms:

- Fatigue
- Waking up tired and unrefreshed
- Cognitive symptoms, such as trouble thinking or remembering.

See Figure for Fibromyalgia Diagnosis

These should be scored from 0 (no problem) to 3 (severe, pervasive, continuous and life disturbing). In addition, the severity of associated somatic complaints should also be judged on a scale of 0 (no symptoms) to 3 (a great deal of symptoms). Symptoms might include muscle pain, irritable bowel syndrome, fatigue/tiredness, muscle weakness, headache, pain/cramps in the abdomen, numbness/tingling, dizziness, insomnia, depression, constipation, pain in the upper abdomen, nausea, nervousness, chest pain, blurred vision, fever, diarrhoea, dry mouth, itching, wheezing, Raynaud's phenomenon, hives/welts, ringing in ears, vomiting, heartburn, oral ulcers, loss of/change in taste, seizures, dry eyes, shortness of breath, loss of appetite, rash, sun sensitivity,


Confirm fibromyalgia diagnosis
Educate the patient
• Provide core set of information about fibromyalgia diagnosis, pathophysiology, treatment, prognosis
• Direct patient to credible fibromyalgia information sources
• Include family and significant others as appropriate
• Discuss expectations for treatment, clinician/patient roles and responsibilities
Collaborate with patient to prioritise individual goals for treatment
• Identify 1–2 most important symptoms/functional areas to focus on first
• Utilise assessment tools to aid in prioritisation, document baseline status
Be proactive and prepared
Know your patient
• Reflect patient's priorities and preferences in treatment plan
Know your team
• Identify specialists or ancillary health-care providers who can work with you in the care of patients with fibromyalgia
Know your community
• Identify community resources the patient can utilise for self-management
Pharmacotherapy to reduce fibromyalgia pain, other symptoms
• Start low/go slow, titrate to efficacious dose
• Manage expectations
Treat comorbid conditions, e.g.,
• Peripheral pain conditions
• Mood disorders
• Associated pain conditions (IBS, head-aches/migraine, etc.)
• Sleep discorders
Nonpharmacological therapies
• Write as 'prescriptions'
• Sleep hygiene
• Physical activity
• Self-management support
• Cognitive behavioural therapy (CBT) (Web-based or referral)
Maintain focus on progress over time vs daily ups and downs
Evaluate on follow-up visits:
• Progress toward agreed-upon treatment goals (using patient assessment tool[s] employed at baseline)
• Physical activity
• Use of self-management techniques and barriers to adherence
• Medication efficacy and adverse effects
• Comorbidities
• Adjustments to the treatment plan
A dynamic process
• As patient's situation improves or changes, treatment priorities and goals will change as well
• However, the core principles – education, goal setting, multimodal management, and outcomes assessment – are employed consistently throughout

hearing difficulties, easy bruising, hair loss, frequent urination, painful urination, and bladder spasms. A final score out of 12 for somatic symptoms will be based on the sum of three core symptoms (0 to 3) and the overall severity score (0–3). A score of five or more is needed to make the diagnosis of FMS. Alternatively, a pain score of 3−6 and a somatic symptom score of 9 or more can also be diagnostic. Symptoms should be present for at least three months and there must not be another disorder that could explain the symptoms.

A framework for multifaceted management of FMS for primary care providers has also been developed. At primary level, non-pharmacological management can be offered by a team comprising of an occupational therapist, physiotherapist, nurse, social worker or doctor. A patient who takes an active role in managing their condition and/or family member/s are also important. A healthy lifestyle (no tobacco smoking, healthy diet and appropriate physical activities that stretch and strengthen muscles) should be maintained. Medicines include low-dose amitriptyline, paracetamol, tramadol, methylsalicylate ointment and /or other antidepressants (fluoxetine/citalopram).

APPROACH TO NASAL SYMPTOMS

(Indiran Govender, Henry Okonta)

Common cold

The common cold is a viral upper respiratory tract infection that presents with sore throat, runny nose, sneezing, conjunctivitis and cough. Constitutional symptoms include fever, headache, myalgia and malaise. e nasal and oropharyngeal mucosa are erythematous. e common cold is self-limiting but can be complicated by secondary bacterial infection or exacerbate asthma and COPD. Rest, avoid contact with others, use tissues for sneezing/coughing, take paracetamol regularly and drink plenty of fluids. Antibiotics are not necessary. Symptoms improve in 3−7 days.

Influenza

Symptoms are similar to the common cold, but with more myalgia or chills. If necessary, a diagnosis can be definitively made by a nasopharyngeal swab for rapid antigen detection and reverse transcription PCR tests. Neuraminidase inhibitors (zanamivir and oseltamivir) decrease both symptom duration and severity if given with 48 hours of onset but are not routinely used. Routine annual vaccination against influenza is recommended in at-risk patients such as the immunocompromised, elderly, or patients with chronic respiratory and heart conditions.

Sinusitis

Nasal obstruction or purulent nasal (or postnasal) discharge is combined with headache (worse on bending forward) or pain/pressure over the sinuses. Give paracetamol and nasal decongestants. Steam inhalation or salt water washes may also help. Antibiotics should be given if nasal discharge has persisted for more than 6 days. Recurrent sinusitis should make you consider underlying HIV. Complications include spread of infection into adjacent tissues leading to localized swelling or even meningitis.

Allergic rhinitis

Allergic rhinitis can be seasonal or perennial. It manifests with recurrent episodes of sneezing, nasal obstruction with itchiness, runny nose, itchiness of the eyes with lacrimation and frontal headache or pressure. An environmental or occupational history may identify the implicated allergens such as pollen or house dust mite. ere may be an atopic family and past medical history. Nasal speculum examination usually shows swollen turbinate and nasal mucosa. An elevated blood eosinophil count and nasal smear with eosinophils are supportive, but not diagnostic of allergic rhinitis. A food and inhalant allergy test may help identify or con rm offending allergens. Skin testing is reserved for patients with chronic rhinitis and patients who are not controlled by allergen avoidance and medication. It can also help identify allergens to be included in immunotherapy. The management of rhinitis is by avoidance of exposure to identified allergens, oral antihistamines and intranasal corticosteroids. Immunotherapy is reserved for cases which do not respond to allergy avoidance and medication.

Epistaxis

The commonest site of epistaxis is Little's area in the anterior nose. e cause of epistaxis may be local, systemic or idiopathic. e local causes include trauma, nasal dryness, chemical use (for example, nasal sprays or cocaine), benign and inflammatory tumours, inflammation (allergic or infective rhinitis). Systemic causes include the coagulopathies (anticoagulants, haemophilias, hematological malignancies, liver failure and uremia), vascular diseases (atherosclerosis, hypertension, hereditary haemorrhagic telangiectasia).

An approach to epistaxis is outlined in the following steps:

Lean patient forward and pinch the alae nasi continuously for 10 minutes.

- Meanwhile assess vital signs. If there are signs of hemorrhagic shock, resuscitate patient with IV normal saline and crossmatch blood. If BP is

elevated, risk strati cation and manage accordingly.
- If still bleeding, clear out clot by blowing the nose or syringing the nose with saline.
- Determine site of bleeding by speculum examination (anterior or posterior bleed) and look for any obvious local causes.
- Control bleeding initially by topical vasoconstrictors (cotton wool soaked in adrenaline or xylometazoline) or bismuth iodoform paraffin paste (BIPP) stripping. If bleeding is not controlled and the bleeding point is adequately visible, cauterize with silver nitrate. Do not cauterize both sides of the septum and no more than an area of 4 mm diameter.
- If bleeding is still not controlled, or the bleeding site was not adequately visible, proceed to anterior packing for anterior bleeds and posterior packing for posterior bleeds.
- Investigate for systemic causes (prothrombin time, liver function, renal function, full blood count).
- Protect against toxic shock syndrome with antibiotics (Co-amoxyclavulcanic acid) for posterior packs and any anterior packs to be left for over 48 hours.
- Treat any underlying cause and refer to a specialist as necessary.

APPROACH TO SKIN PROBLEMS

(Louis Jenkins)

Skin complaints and rash

In assessing skin complaints, it may be more practical to take a brief history and then move immediately to examine the patient. The examination may provide an immediate diagnosis (by pattern recognition) or provide useful information, which will guide further history taking.

History

- The duration and temporal sequence of the rash is important:
  - Date of initial onset and duration.
  - How the skin lesions have evolved and changed over time. For example, they may have started as painful vesicles that then develop into pustules or ulcers. e lesion may have started in one part of the body and spread elsewhere.
  - The speed of onset, that is, did the lesions develop suddenly or slowly.
  - A history of previous episodes at the same or different sites
- Consider any associated symptoms or features:
  - Pruritus (for example, papular pruritic eruption or drugs), pain (for example, herpes).
  - Presence of systemic illness or high fever.
  - Any medication, topical or systemic, prescribed or over the counter.
  - Relationship to recent travel, stress, work or activities.
  - Recent exposure to someone with a similar skin condition.
- **Associated diseases:** diabetes mellitus, HIV, tuberculosis, atopic conditions such as allergic rhinitis or asthma.
- **Previous treatment:** strengths of medication (be aware of the four groups of steroid potency), duration of treatment (often too short), and whether it worked or not.
- **Type of work:** hands in water and detergents all the time, exposure to other chemicals or irritants.
- **Lifestyle and habits:** washing with antiseptic soap will irritate already sensitive skin, exposure to chemicals such as cosmetics, hair products, perfumes, plants.

It is important to note the individual patient's expectations. It is not uncommon to find a patient who has been to several different health practitioners and who has had various combinations of steroids, antihistamines, antifungals, antibiotics, and advice. The patient is often very anxious to know what the definitive diagnosis is, whether there is definitive treatment that will cure the rash, and why they have this problem.

Examination

Take a look at the patient. Make sure the patient undresses enough to ensure adequate examination. Note the morphology of the lesions:

- Circumscribed, at, non-palpable, changes in skin colour: macule, patch
- Palpable elevated solid masses: papule, nodule, plaque, wheal
- Circumscribed superficial elevations of the skin formed by free fluid in a cavity between the skin layers: vesicle, bulla, pustule, cyst
- Loss of skin surface: fissure, erosion, ulcer
- Material on the skin surface: crust, scale, peel
- Vascular: petechiae, purpura, telangectasia
- Other: lichenification, atrophy, excoriation, scarring
- Eczema is a complex morphology but is very common and may be:
  - **Acute:** wet, red, vesicles, erosions, crusting
  - **Chronic:** dry, lichenified, excoriations.

Note the distribution of the lesions: Scalp, face, lips, mouth, trunk, body folds, limbs, hands and feet, nails. Some lesions also occur in particular arrangements such as:

- Ring shaped (annular), for example, tinea infection (ringworm), syphilis, urticaria
- Clustered together, for example, herpes simplex, shingles, insect bites
- Linear (in a line), for example, scars, warts, insect bites

- Reticulate (in a network), for example, **erythema ab Igne**, lichen planus.

If a diagnosis is not immediately apparent, the combination of history, morphological appearance, distribution and particular arrangements should enable a differential diagnosis to be made. For example:

- Tender, reddish nodules on the anterior surface of the lower legs suggests erythema nodosum, of which the two most common causes to exclude are tuberculosis and streptococcal infection
- Involvement of the palms of the hands and soles of the feet suggests syphilis, tick-bite fever, or psoriasis.

Investigation

- Take a blood test. Only two are generally needed: VDRL and HIV. All the allergy tests, such as IgE, RAST, eosinophil counts, are expensive and generally do not help one clinch a diagnosis.
- Take a skin scraping. If considering a fungus infection, especially in persistent skin rashes, it is best to con rm a diagnosis prior to treatment. Scrape some of the scales from the rash with a glass slide onto another slide and send it to the laboratory. If scabies is considered, the scraping must be made of the deeper layers of the skin, until bleeding points appear.
- Take a photograph. Any average cell phone camera will do. Natural light is best, without an ash. Remember to get the patient's consent. Send it via MMS or email attachment to a dermatologist associated with your work place, accompanied by a short history.
- Take a skin biopsy. Is not for every rash, but certainly in persistent cases where everyone is guessing, lots of treatments have been tried, and the patient is losing hope and spending money, simple skin biopsy aids tremendously in making a proper diagnosis. e easiest method is a punch biopsy.

Assessment

The clinical diagnosis can quite often be placed into one of five major areas:

1. **Infectious:** bacterial, viral, fungal, parasitic, spirochetes
2. **Eczema:** atopic, contact, nummular, photosensitive, Seborrhoeic, stasis
3. **Drug related:** drug hypersensitivity syndrome, urticaria, Stevens-Johnson syndrome, fixed drug eruption, lichenoid reaction
4. **Psoriasis:** plaque, erythrodermic, pustular, guttate, flexural (inverse)
5. **Other:** acne, erythema nodosum, erythema multiforme, lichen planus, lupus erythematosus, vitamin deficiencies, tumours (such as Kaposi's sarcoma) or melanoma.

Is not an exhaustive list, but from the history and examination, it is very useful to think in big categories and make sure one quickly sifts through these major areas and then pursues a management plan according to the most likely diagnosis while awaiting blood or biopsy results.

Management

1. Treat a specific diagnosis, not a rash.
2. Remove any offending agents (tight boots, perfume), deal with stress, reassure and discuss skin hygiene (use basic soaps).
3. Arrest pruritis. Use high enough dosages of antihistamines for a long enough time period. Sometimes a month of high dosages is needed.
4. Use steroids in sufficient amounts and adequate potency for short periods of time, expecting results and then taper down.
5. Be kind to the skin. Use liberal amounts of emulsifying ointment or aqueous cream, even occlusive dressings, not rubbing too hard, not scratching, and remember sunscreen. (Aqueous cream contains sodium lauryl sulphate, which can be very irritating to sensitive skins. If a patient reports worsening of symptoms, stop this cream).

AN APPROACH TO DIFFICULTY SLEEPING

(Beverley Schweitzer) Insomnia is characterized by a lack of sleep that impacts negatively on daytime functioning. These effects of insomnia include feeling of fatigue, irritability, impaired concentration and performance. Attempts to self-medicate using alcohol and other substances may occur. Insomnia has been linked to diabetes and cardiovascular disease.

History

A sleep history requires a detailed description of the problem. Is the difficulty with falling asleep, staying asleep or early waking? When did it start and how often does it occur? Does it cause problems in daytime functioning?

Consider whether lifestyle, life cycle or environmental issues may be responsible:

- Did the onset coincide with a psychosocial stressor such as a change in work situation, loss of a relationship, shift work?
- Is the bedroom environment quiet, dark, comfortable, safe?
- Are their physiological changes associated with pregnancy or menopause?
- Consider whether there are medical or neurological conditions that could cause insomnia:
- Are there symptoms that interfere with sleep: pain, a need to pass urine, diarrhoea, dyspnoea, anxiety, congested nose, cough, hot flushes or sweats?

- Are there comorbid conditions such as asthma, arthritis, Parkinson's disease, cancer, heart failure or shingles?

Consider whether there are medications that may cause insomnia, for example, corticosteroids, theophylline, methylphenidate, diuretics, beta blockers.

Consider whether there are mental problems that may cause insomnia. Is there abuse of substances such as alcohol, nicotine or stimulant recreational drugs? Are there mental problems such as anxiety, depression, dementia, attention deficit hyperactivity disorder, autism spectrum disorder?

Consider whether there are specific sleep-related disorders:

- Sleep apnoea. Does the person or their partner notice snoring and apnoeic episodes during the night?
- Restless leg syndrome. Does leg discomfort bother the person at night? Do their legs jerk at night?

When a specific cause is identified, it should of course be addressed. Patients who have insomnia associated with specific sleep disorders can be referred to a specialist sleep clinic, or to a respiratory clinic if sleep apnoea is present, depending on local protocols. Primary insomnia with no identifiable cause can be addressed through a combination of improved sleep hygiene, cognitive behavioral therapy and medication.

Basic sleep hygiene

People with insomnia should pay attention to basic sleep hygiene:

- Create a suitable environment for sleep - dark, quiet, safe. If necessary, use eye covers or ear plugs.
- The bedroom should be associated with sleep – avoid TV, computers, work and eating in the bedroom.
- Resolve concerns before going to bed. Relaxation techniques and exercises may help to calm the mind (Neff, 2016; Potter, 2016).
- Maintain routine times for going to bed and rising in the morning.
- Avoid caffeine-containing drinks in the afternoon and evening.
- A warm drink (with no caffeine or alcohol) can be calming.
- Be aware of becoming anxious about the inability to sleep - accept that you are resting even if you are not sleeping.
- Avoid smoking or other sources of nicotine.
- Avoid naps during the day.
- Ensure you do physical activity during the day.

Cognitive behavioral therapy

CBT can address insomnia that worsens or persists due to a cycle of anxious thoughts (I can't sleep, I will be tired tomorrow, I won't be able to concentrate at work, I'll make mistakes, I'll lose my job). CBT might look at replacing these thoughts with more helpful ones (While I'm not sleeping, I am still resting. I can use this time to practice my breathing and relaxation techniques).

Medication

When deciding to use sedative medication, one needs to weigh the benefits of sleep on the person's quality of life against the risks of medication. Medication for primary insomnia includes benzodiazepines and benzodiazepine-related drugs such as Zopiclone and Zolpidem. e latter group is less likely to produce dependence and withdrawal than benzodiazepines, but the risk is still present.

APPROACH TO TIREDNESS

(Mukund Bahadur Khatry-Chhetry) Tiredness is a common complaint that if persistent may prompt a medical consultation. It may be described as feeling lethargic, weak, listless, lacking energy, tired, worn out, weary, exhausted, malaise, or run down. If the patient complains of chronic tiredness, is unable to complete routine tasks that it interferes with work, social or family life then underlying causes must be considered. A holistic approach to the patient is required to explore the possibility of physical, psychological or contextual issues.

Lifestyle issues

Tiredness may be a normal response to doing too much at home or work, shift work or pregnancy.

Medical problem

Consider possible medical causes in your history and examination. For example, heart disease, lung disease, or anaemia may be associated with shortness of breath or tiring easily with minimal activity, diabetes may be associated with polyuria, polydipsia, or blurred vision, and hypothyroidism may be associated with feeling cold, dry skin and brittle hair. Investigations should be purposefully selected on the basis of the history and examination, but could include HIV, pregnancy test, GeneXpert, Haemoglobin, full blood count, electrolytes, glucose, urinalysis and/or creatinine, thyroid stimulating hormone, or tests for vitamin deficiency.

Are there any medications that might cause tiredness?

Ask the patient about prescription or over-the-counter medication that they may be taking. Many medications may cause tiredness, but common

examples include benzodiazepines, sedating antidepressants, antihistamines, or steroids.

See Table of Medical causes of chronic tiredness

Is there a mental problem or specific disorder?
Screen the patient for mental problems by asking about their mood, level of interest, sleep problems, anxiety or worry, as well as use of alcohol or other substances. Depression, anxiety disorders, bereavement, alcohol or substance abuse as well as eating disorders may be associated with tiredness. Sleep disorders should also be considered such as sleep apnoea.

Chronic fatigue syndrome
Chronic disabling fatigue or at least six months' duration that is present for at least 50% of the time which affects both physical and mental functioning and in which no other cause can be found may be due to chronic fatigue syndrome. Myalgia, sleep- and mood disturbance may be associated.

APPROACH TO VAGINAL BLEEDING

(Hannes Steinberg) A normal menstrual cycle takes 28 days, although some women may have a shorter cycle of 21 days. Bleeding may take five to seven days with total blood loss of approximately 40 ml. Deviation from normality is associated with the following terms:

- **Menorrhagia:** excessive uterine bleeding in amount and duration that occurs at regular intervals
- **Metrorrhagia:** uterine bleeding at irregular intervals
- **Menometrorrhagia:** frequent irregular excessive bleeding
- **Oligomenorrhoea:** infrequent irregular bleeding occurring at intervals of more than 45 days.

Prior to the reproductive years (before menarche) bleeding is rare. Newborn females may bleed vaginally due to an excess of maternal estrogens during pregnancy leading to a short 'withdrawal' bleed. At times infants present with urethral prolapse accompanied by bleeding. During experimentation young girls may insert foreign bodies into the vagina. When forgotten there, these are likely to become infected and may present as vaginal bleeding with a discharge. An infection such as vulvo-vaginitis could also present with vaginal bleeding.
In their reproductive period, about 20% of women will present with problems related to abnormal uterine bleeding. Causes of abnormal bleeding are listed.
After the reproductive years, post-menopausal bleeding is defined as any amount of vaginal bleed that occurs at least six months after the last normal menstrual period. Tumours of the genital tract are more common and need to be excluded. is includes mild bleeding after intercourse known as 'contact bleeding'. Atrophy of the genital tract may occur during this time leading to bleeds with minor trauma.
See Table Causes of abnormal vaginal bleeding

Table of Medical causes of chronic tiredness

Causes	Disease conditions
Metabolic or endocrine problems	Anaemia, diabetes, lactic acidosis, electrolyte imbalances, hypothyroidism, kidney disease, liver disease
Cardio-respiratory problems	Arrhythmias, asthma, chronic obstructive pulmonary diseases, congestive heart failure, coronary artery disease, pneumonia, valvular heart disease
Infections	Tuberculosis, HIV infection, Epstein-Barr virus cytomegalovirus, hepatitis, influenza (flu), malaria
Vitamin deficiencies	Folic acid, iron, vitamin B12, vitamin D
Others	Coeliac disease, cancer, fibromyalgia, obesity, chemotherapy, radiation therapy

Table Cause of abnormal vaginal bleeding

Category	Specific examples
Pregnancy related	Spontaneous or threatened abortion – early pregnancy Placenta praevia or an abruptio placenta – late pregnancy Ectopic pregnancy Gestational trophoblastic disease
Hormonally related	Anovulation Excessive oestrogen intake / production
Vulvovaginal	Condylomata Cervical polyp Cervical cancer Cervicitis Trauma / sexual assault
Uterine	Fibroids Endometrial polyp Endometrial hyperplasia / carcinoma
Ovarian	Tumours
Systemic	Coagulopathy

History

- **Age:** e probability of different conditions is age related and should guide the diagnostic process. For example, dysfunctional bleeding is more likely in younger patients and carcinoma more likely in older patients.
- **Pattern of bleeding:** What is the normal menstrual pattern and when did it change? Is the bleeding regular (cyclical), irregular in anovulatory cycles or completely irregular (non-cyclical)? How much bleeding is there? For example, is there only spotting or heavy bleeding with clots? How frequently must the patient change her sanitary wear?
- **Abdominal pain:** Is there lower abdominal pain? Is the pain bilateral or unilateral? Is there usually dysmenorrhea? Is there dyspareunia?
- **Family planning:** What method of family planning is being used or when was it stopped?
- **Sexual history:** Is the patient sexually active? Any possibility of sexual abuse or trauma?
- **Infection:** Are there any symptoms of infection? For example, a fever, vaginal discharge, dyspareunia or dysuria?

Past medical history: Previous pregnancies, previous Pap smears,

- Other medical conditions or medication that could cause bleeding (for example, Hemophilia, Warfarin use) or interfere with family planning.
- **Stress:** Is there a possible mental disorder or history of recent psychosocial stress?
- **Pregnancy:** A pregnancy test should be performed. The question of whether the pregnancy is intrauterine or extrauterine (ectopic) should be considered.

General examination

Routine observations should include temperature, pulse and assessment of anaemia. A high temperature suggests infection, a tachycardia may suggest hemodynamic instability and severe blood loss, a blood pressure should then be taken, clinical signs of anaemia can be followed up by a fingerpick Haemoglobin determination (Hb%) or full blood count. e abdomen should be examined.

Visualization of the lower genital tract

A speculum examination of the lower genital tract should be performed. Con rm that the bleeding is really coming from the genital tract. Is the lower genital tract normal? the vulva, vagina and particularly the cervix should be inspected. A Pap smear should be taken. If bleeding excessively, the blood can be gently cleaned from the cervix with a cotton swab. Macroscopic suspicion of a cervical cancer should lead to referral.

Bi-manual palpation

Is the upper genital tract normal? Consider:

- Pregnancy with enlarged uterus
- Ectopic pregnancy with unilateral tenderness, rigidity, mass and cervical excitation
- Inflammation with tenderness and cervical excitation
- Ovarian cysts or enlargement

Fibroids with enlarged uterus.

If the upper and lower genital tracts are normal on examination, other causes should be considered. ese can be considered as dysfunctional bleeding, side effects of family planning (injectable progesterone, oral contraceptives, IUCDs) or more rarely endocrinopathies (polycystic ovaries with chronic anovulation, prolactinomas, thyroid

disease, diabetes) and bleeding disorders (thrombocytopenia, liver disease, warfarin therapy).
Dysfunctional bleeding is common at the time of the menarche and menopause and occasional anovulatory bleeds can occur in all women. As a family physician do not forget the effects of psychosocial stress, weight loss and weight gain on the hypothalamic-pituitary-ovarian axis.

Assessment
Any identified species cause should be treated. Patients with severe bleeding and anaemia may need to be referred immediately. If no cause is identified, an empirical approach can be adopted. If three courses of empirical treatment are not successful, further investigation or referral should be made. e intrauterine cavity should be explored, for example, by pelvic ultrasound scan (intramural or subserosal fibroids, functional ovarium cysts, other ovarian tumours) or hysteroscopy (polyps, tumours, submucous fibroids). In older women, an Endopap, Acurette or similar intrauterine sampling device can be taken as an initial investigation of the intrauterine cavity.

APPROACH TO VAGINAL DISCHARGE

(Mukund Bahadur Khatry-Chhetry)

History and examination
The following information is important:
- Colour, any blood, smell
- Duration
- Associated symptoms such as lower abdominal pain, pruritus, fever Last menstrual period, contraception and possibility of pregnancy
- Use of tampons, douches, lubricants or other products in the vagina
- Patient's perspective on the possibility of a sexually transmitted infection or causation
- Sexual partners, for example, new partners, unfaithful partners, intimate partner violence, and use of condoms
- Previous cervical smears and results, previous treatment for vaginal discharge or diagnosis of HIV.

The patient should be examined to con rm the presence of a discharge and to observe it directly. A speculum and bimanual examination should be routine and focus on:
- The appearance and origin of the discharge
- Appearance of the cervix and opportunity for a cervical smear
- Any cervical excitation tenderness or adnexal tenderness and masses
- Any uterine abnormalities or pregnancy
- Any other pathology such as genital ulcers, carcinoma or foreign bodies.

Physiological discharge
The physiological discharge is due to normal secretions from the cervix and vagina mixed with bacteria from the normal flora and shed epithelial cells. Patients with a white physiological discharge are otherwise asymptomatic. e discharge normally has a pH of 3.8 to 4.5, a wet slide with normal saline solution would show a few white cells, no clue cells and a predominance of lactobacilli seen as long rod-shaped bacteria.
Increased physiological discharge occurs in:
- Puberty
- Pregnancy
- Women who do little physical exercise
- Menopause
- Ovulation
- Cervical ectopy
- Sexual stimulation.

Pathological discharge
Causes of pathological discharge are listed below. e ability to reach a reliable diagnosis based on the appearance of the discharge is poor.

Discharge may be due to an overgrowth of the normal flora as in:
- Bacterial vaginosis
- Candida infection.
- Discharge may be due to a sexually transmitted infection as in:
- Trichomonas vaginalis infection
- Neisseria gonorrhoea infection
- Chlamydia trichomatis.

A foreign body, such as a forgotten tampon, may present with a foul-smelling infected discharge.
Discharge that is often blood stained may be a sign of carcinoma of the cervix or other less common carcinomas.
Estrogen deficiency at the menopause may lead to a discharge from atrophic vaginitis.
A discharge may complicate pregnancy in the case of a threatened or inevitable abortion, premature rupture of membranes and in the postpartum period as lochia gradually reduces.
The commonest of the above pathological causes are bacterial vaginosis, trichomonas vaginalis and candida infection.

Bacterial vaginosis
The process seems to start with a decrease in lactobacilli, resulting in reduced production of peroxidase in the vagina thus increasing the vaginal pH. is allows the overgrowth of facultative anaerobic bacteria such as Gardnerella vaginalis, mycoplasma hominis, mobilucus species and other anaerobes. e diagnosis is confirmed if three of the following are present:

- A grey-white vaginal discharge, which is sometimes foamy
- A positive amine or Whiff test (the detection of a shy smell when a drop of 10% of potassium hydroxide is added to a drop of vaginal fluid)
- A vaginal pH > 5 (with no contamination from cervical mucus, blood or semen as they can all raise the pH)
- Clue cells (epithelial cells with a stippled appearance from being covered with bacteria) in a normal saline wet smear.

Trichomonas vaginalis infection

It is normally sexually transmitted but can also be transmitted in other ways. e organism can survive in chlorinated swimming pools, hot tubs and tap water. Perinatal transmission is also possible, but beyond infancy its presence is strongly suggestive of child sexual abuse.

The clinical features include a malodorous, frothy green-yellow discharge. e diagnosis is confirmed by microscopically examining a normal saline wet smear. e organism is recognized by its characteristic jerky movements in 50−70% of the trichomonas.

Candida vaginitis

Is caused by Candida albicans in more than 70% of all cases. e infection is often linked to a predisposing cause such as HIV infection, diabetes, steroid therapy, malnutrition, pregnancy, menstruation, oral contraceptives, prolonged broad-spectrum antibiotic use, immunosuppressive medications and coitus. Most of these suppress immunity or alter the local environment in the vagina allowing Candida to become pathological.

Clinical features include an itchy, curd-like, cheesy yellow or white discharge adherent to the vulvovaginal mucosa leaving a raw bleeding surface when detached. Superficial dyspareunia is sometimes present. The pH is 4.5 or less. Infection under the foreskin of the penis of the sexual partner may also occur.

The diagnosis is confirmed by making a wet smear of the discharge with 10% potassium hydroxide where hyphae and spores are seen microscopically. Any predisposing cause should be considered.

Pelvic inflammatory disease

Pelvic inflammatory disease results from ascending infection that causes inflammation of the uterus and adnexa. It is a sexually transmitted disease caused by a mixture of organisms of which Neisseria gonorrhoea, Chlamydia trachomatis and anaerobes such as Bacteroides are the most common.

Symptoms include lower abdominal pain, fever, and foul smelling yellow purulent vaginal discharge. Examination may reveal a sick or ill looking patient with a raised temperature, lower abdominal tenderness (or generalized tenderness due to peritonitis if a tubo-ovarian abscess has burst), and vaginal discharge from the **cervical os**. ere is positive cervical excitation tenderness and a pelvic mass may be palpable in the posterior fornix. Diagnosis is usually made clinically but can be confirmed by pelvic ultrasound or laparoscopic examination. A cervical swab should be taken for microscopy, culture and sensitivity. Blood should be taken for culture and sensitivity if the patient is febrile.

Syndromic management

In primary care it may be difficult to reliably make a specific diagnosis as infections are frequently mixed, clinical features non-specific, time is limited and laboratory services far away. A syndromic approach to the initial management has therefore been recommended, which ensures the most likely causes are all treated simultaneously at the one visit. In patients suspected of having a sexually transmitted infection it is important to manage the patient holistically and not just prescribe medication. e following issues should be considered:

- Condoms should be used during treatment
- Contact tracing is needed to also treat the sexual partner(s)
- Counselling on safer sex, condom use, testing for HIV and syphilis
- Contraception needs
- Cervical cancer screening
- Completing all the treatment even if the symptoms improve quickly.

A follow-up visit may be needed to ensure treatment is successful, continue counselling and to give the results of any investigations.

Vaginal discharge syndrome (Adapted from PACK: Knowledge Translation Unit, University of Cape Town Lung Institute and Western Cape Government, 2015):

- Treat instead for bacterial vaginosis if the patient was not sexually active in the last three months
- Give ceftriaxone 250 mg IM stat (dissolve in 0.9 ml lidocaine 1% without adrenaline) Azithromycin 1 g orally stat
- Metronidazole 2 g orally stat
- If the patient has a severe penicillin allergy, omit ceftriaxone and increase azithromycin to 2 g orally stat
- If the symptoms persist after seven days, give metronidazole 400 mg 12 hourly for seven days
- Investigate further if the symptoms persist.

Lower abdominal pain syndrome (LAP):

- Give ceftriaxone 250 mg IM stat (dissolve in 0.9 ml lidocaine 1% without adrenaline)

- Give azithromycin 1 g orally stat
- Give metronidazole 400 mg 12 hourly for seven days
- If the patient has a severe penicillin allergy, omit ceftriaxone and increase azithromycin to 2 g orally stat
- Treat pain with ibuprofen 400 mg 8 hourly with food for five days.
- Review after 2−3 days for response.

APPROACH TO VOMITING

(Hanneke Brits) Vomiting is the forceful expulsion of stomach contents through the mouth usually associated with nausea. It is an unpleasant symptom of an underlying condition and therefore the condition should be treated rather than the symptom.

Red flags

Vomiting with:
- Diarrhoea plus shock
- Peritonitis
- Altered level of consciousness
- Large amounts of blood in vomitus
- Jaundice
- Other symptoms or signs compatible with lactic acidosis (on ARVs, nausea, abdominal pain or swelling, weight loss, fatigue, shortness of breath).

Resuscitate these patients immediately and transfer urgently after stabilization.

Most common causes

- Gastrointestinal conditions, for example, gastroenteritis, obstruction, appendicitis, pancreatitis or cholecystitis
- Infections, for example, urinary tract infection, otitis media or hepatitis
- Physiological in pregnancy and motion sickness
- Metabolic and endocrine conditions causing hypoglycaemia, ketosis, uraemia or porphyria
- Neurological conditions, for example, migraine, head trauma, raised intracranial pressure or central nervous system infections
- Adverse drug reaction, for example, to TB medication, ARVs, antibiotics, analgesics, digoxin, or chemotherapy
- Psychological issues, for example, attention-seeking behavior or bulimia.

Gathering information

Explore the causes mentioned in the previous section and try to gather relevant information. Specially attend to:
- Appearance of the vomitus, particularly the presence and amount of blood
- Duration of vomiting
- Ability to keep aids and food down
- Associated symptoms, for example, diarrhoea, abdominal pain or fever
- The use of chronic or self-medication, for example, TB or ARV treatment
- The use of traditional medication
- Possibility of pregnancy.

Examination

If the cause can be established from the history, start with vital signs, a general examination and a focused systemic examination, for example, in gastrointestinal conditions, assess for dehydration and do an abdominal examination.
If the cause is not clear, a full examination as well as side-room investigations may guide you.

Side-room investigations

- Blood glucose to detect hypo or hyperglycaemia
- Urinalysis to exclude a urinary tract infection or ketosis
- Pregnancy test
- Other special investigations per indication, for example, lactic acid for lactic acidosis or amylase for pancreatitis.

Principles of management

- Ensure that the patient is well hydrated (see management of diarrhoea).
- Treat the underlying cause, for example, antibiotics for a urinary tract infection.
- Stop medication that can cause vomiting (if possible).
- If an antiemetic is indicated, use a drug appropriate to treat the mechanism or cause, for example, metoclopramide in migraine or to assist in gastric emptying, antihistamines for nausea and vomiting associated with motion sickness and vertigo, dexamethasone for raised intracranial pressure or ondansetron for nausea and vomiting associated with chemotherapy.
- Advise the patient to eat small, frequent non-greasy meals.
- Admit in hospital if the patient cannot drink or take medication.
- Follow up if there is no improvement within 24 hours or if the condition worsens.

AN APPROACH TO WHEEZE

(Arina Schlemmer)
Wheeze may be inspiratory, expiratory, localized or diffuse and of a high or low pitch. Causes of wheezing can be categorized based on their location in one of the following three areas (Irwin, 2015):
1. The intrathoracic lower airways which include airways narrower than 2 mm in diameter. Conditions here typically cause diffuse expiratory wheeze.

2. The intrathoracic central airways, including the intrathoracic trachea and bronchi at least 2 mm in diameter. Conditions here such as a foreign body, tumour or congenital abnormality typically cause a localized wheeze.

3. Extra thoracic upper airway which includes the nose, mouth, pharynx, larynx, and extra thoracic trachea. Obstruction here may cause stridor (inspiratory wheeze).

In adults, while asthma and COPD are the most common causes of wheezing, a variety of other conditions can cause air ow obstruction and thus wheezing. So, called 'cardiac asthma' is due to cardiac failure and others signs of this will be present such as oedema, crepitations or crackles in the lungs.

First step in assessing an adult patient with wheezing is to determine the severity of respiratory distress. Urgent attention should be given if the patient is breathless at rest or while talking, is using accessory muscles to help them breath, or has a respiratory rate > 30 breaths/minute. Immediate treatment of the wheeze may be necessary with oxygen, nebulized bronchodilators (or via spacer) and steroids (oral or intravenous). Monitor oxygenation with a pulse oximeter or, if available, with arterial blood gases.

Consider other causes of cough or dyspnoea as discussed earlier in this chapter. It is important to distinguish asthma and COPD from each other. Diagnostic tests such as spirometry and radiographs should be directed to the most likely cause. For example, reversibility of airways obstruction is a feature of asthma while post-TB fibrosis and bronchiectasis may be seen on a chest X-ray.

See Table: Distinguishing asthma from COPD

In children one should again start by assessing the severity of respiratory distress. A normal respiratory rate is below 60 breaths/minute for a new born up to 2 months, 50 breaths/minute for an infant up to 12 months and then 40 breaths/minute for a toddler up to 5 years. In infants, look also for chest indrawing as a sign of respiratory distress. Immediate treatment of the wheeze may be necessary with a nebulized bronchodilator (or via spacer). Oral prednisolone should be considered in those with recurrent wheeze.

In children wheezing can be caused by bronchiolitis, episodic viral wheeze, atopic wheeze/asthma, transient infant wheeze or inhaled foreign bodies (BPJ, 2013).

The history is the most important aspect of assessment of a wheeze in a young child. It is important to describe wheeze to the caregivers and check that this is their description of the child's symptoms. The clinical definition of a wheeze is a high-pitched, musical or whistling sound coming from the chest. Enquire about:

- The nature and duration of the wheeze, whether it is present constantly or intermittently
- The presence of other respiratory symptoms such as cough
- Exacerbating factors and triggers
- Previous episodes
- Smoking status of the household
- Whether the child has ever had eczema or other symptoms or signs of atopy
- Whether there is a family history of atopy.

The child's wheeze should be assessed during the examination to confirm if it is the clinical definition of wheeze. Include a general examination, respiratory rate, heart rate, and temperature and oxygen saturation. In a child with acute wheeze, the examination should assess whether concurrent respiratory infection is present. Observe for signs of hyperinflation and respiratory distress. Perform auscultation and note any wheeze, crackles and whether there are focal sounds. Some extra pulmonary findings to look out for are tonsillar hypertrophy, lymphadenopathy, thyroid enlargement, or a surgical scar (BPJ, 2013).

Table: Distinguishing asthma from COPD

Asthma likely if:	**COPD likely if:**
• Onset before 20 years of age	• Onset after 40 years of age
• Associated hay fever, eczema, allergic conjunctivitis, allergies	• Symptoms are persistent and worsen slowly over time
• Intermittent symptoms with normal breathing in between	• Cough with sputum starts long before difficulty breathing
• Symptoms worse at night, early morning, with cold or stress	• Client is or was a heavy smoker (tobacco/ marijuana) or miner
• Client or family have a history of asthma	• Previous doctor diagnosis of COPD or previous diagnosis of TB

PHYSICAL EXAMINATION CHECKLIST

CVS SYSTEM HISTORY CHECKLIST

No	Activities
1	**Preparation** Introduction Consent and Explanation
2	**Patient's Particular** Name Age Sex Occupation Registration No Address
3	**Presenting Complaint** Chest pain Orthopnoea Paroxysmal nocturnal dyspnoea Ankle swelling Palpitations Intermittent claudication High Blood Pressure Painful Joints
4	**History of Present Complaint** **Chest Pain** Site (Where) Onset (Gradual, Sudden) Character (harp / dull ache / burning) Radiation Association (All symptoms associated with pain) Time course (Worsening, Improving, Fluctuation) Exacerbating/ Relieving Factors Severity **High Blood Pressure** The initial visit How long Detail history of Life style such as diet, exercise, regular taking drugs **Painful Joints** Large Joints Small Joints Migratory Nature

CVS SYSTEM EXAMINATION CHECKLIST

No	Activities
1	**Preparation** Introduction Consent and Explanation Washing your hands
2	**Vital Signs** • BP---------- mmHg • PR---------- beat/ minute **1.** Rate **2.** Rhythm **3.** Volume (low, Moderate, High) **4.** Tension (Normal, Abnormal) **5.** Character (Normal, Bounding, Collapsing) **6.** Condition of Arterial Wall (Normal, Thickening) **7.** Equality in both sides **8.** Radio-Femoral Delay • RR---------- times/min • T---------- C (or) F
3	**General Examination** Ask the patient tenderness anywhere before examination. **Body weight** **1.** Obese **2.** Average **3.** Underweight **4.** Wasting/ Cachexic) **Conscious level** **1.** Alert **2.** Confuse **3.** Unconscious **Signs of Distress** **1.** Dyspnea **2.** Orthopnea **3.** Wheeze **4.** Stridor **Hydration Status** **1.** Sunken Eyes **2.** Mucus membrane dryness **Head, Neck & Chest**

5	**Systemic Inquiry** **1. Respiratory System** Dyspnea Wheeze Cough Sputum Hemoptysis Chest pain **2. Gastrointestinal System** Abdominal pain Nausea Loss of appetite Vomiting Hematemesis Bowel habit Bleeding per rectum Melena **3. Musculoskeletal System** Myalgia Arthralgia Back pain Joint swelling **4. Nervous System** Headaches Visual disturbances Hearing Tinnitus Light headedness Fits Unsteady gait Weakness Paraesthesia **5. Renal System** Frequency Nocturia Polydipsia Polyuria Loin pain Haematuria **6. Reproductive System** Menarche Menopause Menstrual cycle Dysmenorrhea Intermenstrual bleeding Post coital bleeding **7. Mental Status** Insomnia Stress Anxiety			1. Central cyanosis 2. Anemia 3. Jaundice 4. Corneal arcus 5. Xanthelasma 6. Nasal bleeding, Gum bleeding 7. Mouth Ulcer 8. Dental Hygiene 9. Tonsillitis 10. Parotid Swelling 11. Lymph Nodes Enlargement (Cervical, Axilla, Inguinal) 12. JVP 13. Carotid Pulsation 14. Bleeding Tendency 15. Skin pigmentation, 16. Gynecomastia **<u>Upper Limbs</u>** 1. Peripheral cyanosis 2. Capillary Refilling Time 3. 4Clubbing 4. Tar Staining 5. Leukonychia 6. Koilonychia 7. Palmar erythema 8. Palmar Crease (Anaemia) 9. Spider- naevi 10. Flapping tremor 11. Tattoo marks, injection marks 12. Osler's node 13. Janeway Lesion 14. Splinter haemorrhage **<u>Lower Limbs</u>** 1. Oedema (Pitting or Non-Pitting) 2. Limbs (Amputation/ Deformity)
			4	**<u>Local Examination (Inspection)</u>** **Chest Shape** 1. Normal Barrel Shape 2. Deformity • Surgical Scar • Visible Pulsation • Apex Beat
			5	**<u>Local Examination (Palpation)</u>** Localization of Apex Beat Thrill Heaving
6	**Past Medical History** 1. Hypertension 2. Heart Diseases 3. Diabetes Mellitus 4. Stroke 5. Asthma 6. Tuberculosis Any operation		**6**	**<u>Local Examination (Auscultation)</u>** **<u>1st and 2nd heart sound</u>** 1. Mitral Area 2. Tricuspid Area 3. Pulmonary Area 4. Aortic Area **Murmur** **Features of heart failure**

7	**Family History** 1. Family Number 2. Some Genetic Related Diseases (Hypertension, Diabetes Mellitus, Cancer)			1. Basal crepitation 2. Ascites 3. Hepatosplenomegaly 4. Dependent Pitting Oedema (Ankle and sacrum)
8	**Drug History** 1. Allergic to a particular drug 2. Regular taking drugs			
9	**Social History** 1. Accommodation 2. Job 3. Diet 4. Smoking 5. Drinking **6.** Betel Chewing			

RESPIRATORY SYSTEM HISTORY TAKING CHECKLIT

No	Activities
1	**Preparation** Introduction Consent and Explanation
2	**Patient's Particular** Name Age Sex Occupation Registration No Address
3	**Presenting Complaint** Dyspnea Wheeze Cough Sputum Hemoptysis Fever Chest pain
4	**History of Present Complaint** **Dyspnea** • Severity (Exertion, at rest) • Trigger **Wheeze** • Time of onset (Day, Night) • Trigger **Cough** • Productive • Dry • Duration **Sputum** • Volume • Color (Whit, Yellow, Red) • Odor • Consistency **Hemoptysis** • Volume • Blood Stained • Blood Streaked **Fever** • Grade (Low, High) • Pattern (Continued, Intermittent, Remittent) • Constitutional symptoms of TB (Weight Loss, Loss of Appetite, Night Sweat) **Chest Pain** • Site (Where) • Onset (Gradual, Sudden) • Character (harp / dull ache / burning) • Radiation • Association (All symptoms associated with pain) • Time course (Worsening, Improving, Fluctuation)

EXAMINATION CHECKLIST

No.	Activities
1	**reparation** Introduction Consent and Explanation Washing your hands
2	**Vital Signs** BP---------- mmHg PR---------- beat/min RR---------- times/min T---------- C (or) F
3	**General Examination** Ask the patient tenderness anywhere before examination. **Body weight** 1. Obese 2. Average 3. Underweight 4. Wasting/ Cachexic **Conscious level** 1. Alert, 2. Confuse 3. Unconscious **Signs of Distress** 1. Dyspnea 2. Orthopnea 3. Wheeze 4. Stridor **Hydration Status** 1. Sunken Eyes 2. Mucus membrane dryness **Head, Neck & Chest** 1. Central cyanosis 2. Anemia 3. Jaundice 4. Xanthelasma 5. Nasal bleeding, Gum bleeding 6. Mouth Ulcer 7. Parotid Swelling 8. Lymph Nodes Enlargement (Cervical, Axilla, Inguinal) 9. Bleeding Tendency 10. Skin pigmentation 11. Gynecomastia **Upper Limbs** 1. Peripheral cyanosis 2. Clubbing 3. Tar Staining 4. Leukonychia 5. Koilonychia 6. Palmar erythema 7. Palmar Crease (Anemia) 8. Spider- naevi 9. Flapping tremor 10. Tattoo marks, injection marks **Lower Limbs** 1. Oedema (Pitting or Non-Pitting)

	• Exacerbating/ Relieving Factors Severity
5	**Systemic Inquiry** 1. **Cardio Vascular System** ▪ Chest pain ▪ Orthopnoea ▪ Paroxysmal nocturnal dyspnoea ▪ Ankle swelling ▪ Palpitations ▪ Intermittent claudication ▪ High Blood Pressure 2. **Gastrointestinal System** ▪ Abdominal pain ▪ Nausea ▪ Loss of appetite ▪ Vomiting ▪ Hematemesis ▪ Bowel habit ▪ Bleeding per rectum ▪ Melena 3. **Musculoskeletal System** ▪ Myalgia ▪ Arthralgia ▪ Back pain ▪ Joint swelling 4. **Nervous System** ▪ Headaches ▪ Visual disturbances ▪ Hearing ▪ Tinnitus ▪ Light headedness ▪ Fits ▪ Unsteady gait ▪ Weakness ▪ Paraesthesia 5. **Renal System** ▪ Frequency ▪ Nocturia ▪ Polydipsia ▪ Polyuria ▪ Loin pain ▪ Haematuria 6. **Reproductive System** ▪ Menarche ▪ Menopause ▪ Menstrual cycle ▪ Dysmenorrhea ▪ Intermenstrual bleeding ▪ Post coital bleeding ▪ Dyspareunia 7. **Mental Status** ▪ Insomnia ▪ Stress ▪ Anxiety
6	**Past Medical History** 1. Hypertension 2. Heart Diseases 3. Diabetes Mellitus 4. Stroke

	2. Limbs (Amputation/ Deformity)
4	**<u>Local Examination (Inspection)</u>** ▪ Chest Shape ▪ **Movement** 1. Symmetrical 2. Asymmetrical ▪ Scar ▪ Visible Veins
5	**<u>Local Examination (Palpation)</u>** ▪ **Position of Trachea** 1. Normal 2. Left shift 3. Right Shift ▪ **Expansion of Chest** 1. Fully 2. Restricted
6	**<u>Local Examination (Percussion)</u>** ▪ **Resonance** 1. Normal 2. Hyper resonance 3. Dullness 4. Stony Dullness ▪ Equal Resonance on both lungs area
7	**<u>Local Examination (Auscultation)</u>** ▪ **Breath Sound** 1. Vesicular 2. Bronchial ▪ Vocal fremitus ▪ Vocal Resonance ▪ Rhonchi ▪ Added Sounds

	5. Asthma 6. Tuberculosis 7. Any operation
7	**Family History** 1. Family Number 2. Some Genetic Related Diseases
8	**Drug History** Allergic to a particular drug Regular taking drugs
9	**Social History** Accommodation Job Diet Smoking Drinking Betel Chewing

GESTRO-INTESTINAL SYSTEM HISTORY TAKING CHECKLIST/ABDOMEN EXAMINATION CHECKLIST

No	Activities
1	**Preparation** ▪ Introduction ▪ Consent and Explanation
2	**Patient's Particular** ▪ Name ▪ Age ▪ Sex ▪ Occupation ▪ Registration No ▪ Address
3	**Presenting Complaint** ▪ Abdominal pain ▪ Nausea ▪ Loss of appetite ▪ Vomiting ▪ Hematemesis ▪ Bowel habit ▪ Bleeding per rectum ▪ Melena ▪ Mass in Abdomen
4	**History of Present Complaint** **Abdominal pain** ▪ Site (Where) ▪ Onset (Gradual, Sudden) ▪ Character (sharp, dull ache, colicky, burning) ▪ Radiation ▪ Association (All symptoms associated with pain) ▪ Time course (Worsening, Improving, Fluctuation) ▪ Exacerbating/ Relieving Factors ▪ Severity **Vomiting** ▪ Amount ▪ Color ▪ Odor ▪ Taste **Bowel Habit** ▪ Normal ▪ Change (Diarrhea, Constipation) **Bleeding Per Rectum** ▪ Volume ▪ Color ▪ Odor **Melena** ▪ Volume ▪ Previous episodes **Mass in Abdomen** ▪ Onset ▪ Rate of Growth (Slow, Rapid) ▪ Association factors

No	Activities
1	**Preparation** ▪ Introduction ▪ Consent and Explanation ▪ Washing your hands
2	**Vital Signs** ▪ BP---------- mmHg ▪ PR---------- beat/min ▪ RR---------- times/min ▪ T---------- C (or) F
3	**General Examination** ▪ Ask the patient tenderness anywhere before examination. ▪ **Body weight** 1. Obese 2. Average 3. Underweight 4. Wasting/ Cachexic ▪ **Conscious level** 1. Alert 2. Confuse 3. Unconscious ▪ **Signs of Distress** 1. Dyspnea 2. Orthopnea 3. Wheeze 4. Stridor **Hydration Status** 1. Sunken Eyes 2. Mucus membrane dryness **Head, Neck & Chest** 1. Central cyanosis 2. Anemia 3. Jaundice 4. Xanthelasma 5. Nasal bleeding, Gum bleeding 6. Mouth Ulcer 7. Parotid Swelling 8. Lymph Nodes Enlargement (Cervical, Axilla, Inguinal) 9. Bleeding Tendency 10. Skin pigmentation, 11. Gynecomastia **Upper Limbs** 1. Peripheral cyanosis 2. Clubbing 3. Tar Staining 4. Leukonychia 5. Koilonychia 6. Palmar erythema 7. Palmar Crease (Anemia) 8. Spider- naevi 9. Flapping tremor 10. Tattoo marks, injection marks

5	**Systemic Inquiry** 1. **Cardio Vascular System** ▪ Chest pain ▪ Orthopnoea ▪ Paroxysmal nocturnal dyspnoea ▪ Ankle swelling ▪ Palpitations ▪ Intermittent claudication ▪ High Blood Pressure 2. **Respiratory System** ▪ Dyspnea ▪ Wheeze ▪ Cough ▪ Sputum ▪ Hemoptysis ▪ Chest pain 3. **Musculoskeletal System** ▪ Myalgia ▪ Arthralgia ▪ Back pain ▪ Joint swelling 4. **Nervous System** ▪ Headaches ▪ Visual disturbances ▪ Hearing ▪ Tinnitus ▪ Light headedness ▪ Fits ▪ Unsteady gait ▪ Weakness ▪ Paraesthesia 5. **Renal System** ▪ Frequency ▪ Nocturia ▪ Polydipsia ▪ Polyuria ▪ Loin pain ▪ Haematuria 6. **Reproductive System** ▪ Menarche ▪ Menopause ▪ Menstrual cycle ▪ Dysmenorrhea ▪ Intermenstrual bleeding ▪ Post coital bleeding 7. **Mental Status** ▪ Insomnia ▪ Stress ▪ Anxiety
6	**Past Medical History** 1. Hypertension 2. Heart Diseases 3. Diabetes Mellitus 4. Stroke 5. Asthma 6. Tuberculosis

	Lower Limbs 3. Oedema (Pitting or Non-Pitting) 4. Limbs (Amputation/ Deformity)
4	**Local Examination (Inspection)** ▪ Shape 1. Normal 2. Flat 3. Protruded ▪ Distension ▪ Move with respiration ▪ Umbilicus ▪ Visible mass ▪ Scar ▪ Dilated veins
5	**Local Examination (Palpation)** ▪ Light palpation- (9) Regions ▪ Deep Palpation- (9) Regions ▪ Tenderness ▪ Rebound Tenderness **Liver** (If palpable) 1. Size 2. Edge (sharp/round) 3. Consistency (Soft, Firm, Hard) 4. Tenderness **Spleen** (if palpable) 1. Size 2. Notch **Kidney** 1. Ballotable (or) Not 2. Tenderness **Any Mass** 1. Site (in 9 Regions) 2. Size 3. Shape 4. Tenderness
6	**Local Examination (Percussion)** Liver Spleen Shifting Dullness Fluid Thrill
7	**Local Examination (Auscultation)** Bowel Sound Liver Bruit Splenic Rub

	7. Any operation		
7	**Family History** 1. Family Number 2. Some Genetic Related Diseases		
8	**Drug History** 1. Allergic to a particular drug 2. Regular taking drugs		
9	**Social History** 1. Accommodation 2. Job 3. Diet 4. Smoking 5. Drinking 6. Betel Chewing		

NEUROLOGICAL HISTROY TAKING CHECKLIST

No	Activities	Performed	Did Not perform	Comments
1	**Hand washing**(According to WHO guideline)			
2	**Introduction** Introduce yourself (name and role) to client			
3	**Confirm patient details….** Name Date of birth Sex Address Mother name Father name Registration number			
4	**Gain consent….** Explain about examination to client Take permission to patient			
5	**Assess patient condition well or not** **Conscious level** **Mental status**			
6	**GCS……** **Eye opening response** **Verbal response** **Motor response**			
7	**Taking Vital sign** • Temperature • Blood pressure • Pulse rate • Respiratory rate • Body weight • **SPO_2**			
8	**Chief compline….** **Why do you come to the clinic today?**			
9.	**History of present illness.** **a. For how long** • How it began (e.g., suddenly, gradually over how long?) • Is the symptom constant or intermittent? • Is it improving or deteriorating? • What makes the symptom worse? • What makes the symptom better? • Associated symptoms. • (where is the pain worst ask the patient to point to the site with one finger). • Radiation (does the pain move anywhere else?). • Character (i.e. dull aching stabbing burning etc.). • Severity (scored out of 10, with 10 as the worst pain imaginable). Mode and rate of onset (how did it come on over how long?)			
10	**Past medical history….** **Do you have any chronic disease** **Do you have hospitalization history** • Hypertension • Heart Diseases • Diabetes Mellitus • Stroke/TIA			

	• Epilepsy(fitting) • Meningitis • Tuberculosis • Any operation • Any Accident • Any head injury			
11	**Drug history…….** • Any drug allergic(particular) • Regular taking drugs(what medicine/for how long/who prescript it/for what disease) • Currently use medication • Traditional medication			
12	**Family history…….** • How many family member does you have? • Any similar problem in your family? • Are they healthy? • Any chronic disease in family?			
13	**Social history…….** • Married status • Drink alcohol history/how many /how much/what kind • Smoking history/how many /how much • Chewing bateaus history /how many/how much/what kind • Sexual history • Occupation • Any person gets ill in your environment? • Travel history			
14	**System review…….** • Hand • Numberless • Tingling • Weakness • Muscle cramp • Deformity **Head/ Neck** • Vision problem • Facial drop • Loss of smell/taste • Hearing problem • Sliver drop • Difficult swallow • Slurry speech • Voice change **Respiratory** • Cough • Chest pain • Difficult breathing • Orthopnea **Abdominal** • Any pain • Vomiting • Nausea • Bowel movement			

	• Urination **CVS** • Leg swelling • Chest pain • Difficult breathing • Orthopnea			
15	**Say Thank you to patient**			
16	**Hand washing**			
17	**Record and summary**			

NEUROLOGICAL EXAMINATION CHECKLIST

No	Activities	Performed	Did Not perform	Comments
1	**Hand washing** (According to WHO guideline)			
2	**Introduction**. Introduce yourself (name, workplace and position) to client			
3	**Confirm patient details….** Name Date of birth Sex Address Mother name Father name Registration number			
4	**Gain consent.** Explain about examination to client. Take permission to patient			
5	**Assess patient condition well or not.** **Conscious level**			
6	**GCS……** **Eye opening response** **Verbal response** **Motor response**			
7	**Taking Vital sign** • Temperature • Blood pressure • Pulse rate • Respiratory rate • Body weight			

8	**General Inspection** **Face** • Jaundice • Pallor • Hyperlipidemia **Hand and finger** • Cyanosis • Clubbing • Capillary refill Time • Hematoma • Palpate pulse(radial/Brachial) • Flapping tremor • Tar staining **Mouth** • Oral hygiene • Stomatitis • Tongue ulcer • Teeth Staining **Neck** • Lymph node			
9	**Cranial Nerve examination…….** • Check Smelling • Check hearing. • Eye movement • (vision, equal both side of pupil movement) • Facial movement • (open mouth, fold forehead, blowing, Smile, shah tongue, tongue movement) • Neck strength side by side • Turn head. • Shoulder strength • Check light(cotton) and deep sensation (pen)			
10	**Upper Limbs.** **Tone (Check Cog-wheeling and rigidity of wrist and elbow)** **POWER……..…** • Check Shoulder Abduction • Check Shoulder Adduction • Check Elbow flexion • Check Elbow extension • Check Wrist extension • Check Wrist flexion • Check Finger extension • Check Finger Adduction • Thumb Abduction **Reflex……** • Check Biceps reflex • Check triceps reflex. • Check supinator reflex. **Sensation** • Assess each of the dermatomes. • Check Light sensation on both side of upper limbs. • Check Pin prick sensation on both side of upper limbs.			

	Coordination • Check Finger to nose test. • Check Rapid alternative movement test.			
11	**Lower Libs……** **Gait…….** • Assess for proximal muscle weakness. • Check Tandem gait • Check power test plantar flexion (Check tip toe walking) • Check power test of dorsiflexion (Heal working) **Tone…….** • Check leg lift test. **Power….** • Check ankle clonus. • Check Hip flexion • Check Hip extension • Check adduction of tight. • Check Knee flexion • Check knee extension. • Check Ankle dorsiflexion • Check Ankle plantar flexion. • Check Extensor halluces longus (Toe) • Check Ankle inversion • Check Ankle eversion **Reflex……** • Check knee jerk. • Check Ankle jerk • Check plantar reflex. **Sensation ……** • Check with light touch sensation(cotton) • Check pin-prick sensation(pen) **Coordination……** • Check Heel to Shin test (side by side)			
12	**Say Thank you to patient**			
13	**Hand washing**			
14	**Record and summary**			