# STANDARD TREATMENT GUIDELINES & NATIONAL ESSENTIAL MEDICINES LIST TANZANIA MAINLAND

# FOREWORD

The development and implementation of Standard Treatment Guidelines (STG) and National Essential Medicines List (NEMLIT) is an important step in the health care system for quality diagnosis, treatment and prevention of diseases as well as procurement and supply of pharmaceuticals. The goal of the Standard Treatment Guidelines is to promote high standards of clinical practice and to improve the quality of health care to the public. STGs summarise recommended prevention and treatment strategies for commonly occurring disease conditions in the country. The STG/NEMLIT need to be updated periodically; and this is the fifth edition officially approved to guide health care workers at all levels of healthcare delivery system in the country.

The guidelines reflect changes in the management of various diseases following recommendations from WHO and experts from local and international medical associations and agencies. It is emphasised that the choices described in this document are evidence based, clinically approved and are consistent with the already existing WHO and other national and international guidelines.

Like the previous editions, the new edition comprises a National Essential Medicines List (NEMLIT). The NEMLIT is in line with the World Health Organization (WHO) model list of Essential Medicines (EML) 20th edition of March, 2017. The NEMLIT should be used to restrict antibiotic use in health facilities to those selected as the most appropriate for use at each level of health care delivery. The antibacterials in the NEMLIT have been categorized into ACCESS, WATCH and RESERVE groups (as per WHO recommendations). The ACCESS antibiotics will be prescribed and dispensed at all levels including dispensary and health centres. The WATCH group will only be allowed to be prescribed and dispensed from council hospitals. The RESERVE group consists of protected and prioritized antibiotics to be used only at tertiary level i.e. national, zonal, referral and specialized hospitals.

This document reflects the policy of the Government of Tanzania of ensuring availability of safe and efficacious essential medicines to all its citizens. It is therefore, a key tool which should effectively be used to promote access to essential medicines to achieve maximum therapeutic benefit and optimize patient outcomes. All public health facilities shall abide to the NEMLIT for procurement and treatment purposes as the identified medicines are considered essential for the treatment of the most common disease conditions in Tanzania. However, comments and suggestions that may help us to improve the treatment guidelines will be appreciated in order to ensure that these guidelines continue to advance and remain adapted to the reality of the field.

I am confident that all prescribers and dispensers will find these guidelines very useful.

Hon. Ummy A. Mwalimu (MP)
**MINISTER FOR HEALTH, COMMUNITY DEVELOPMENT, GENDER, ELDERLY AND CHILDREN**

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Dr. Mpoki M. Ulisubisya
**PERMANENT SECRETARY (HEALTH)**

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| ABBREVIATIONS, ACRONYMS AND SYMBOLS | |
|---|---|
| **AA** | Aplastic Anaemia |
| **ACR** | Albumin Creatinine Ratio |
| **AHF** | Acute Heart Failure |
| **AIDS** | Acquired Immunodeficiency Syndrome |
| **ALU** | Artemether-Lumefantrine |
| **ANC** | Absolute Neutrophil Count |
| **ANUG** | Acute Necrotizing Ulcerative Gingivitis |
| **APH** | Ante Partum Haemorrhage |
| **APTT** | Activated Partial Thromboplastin |
| **ARDS** | Acute Respiratory Distress Syndrome |
| **ARF** | Acute Renal Failure |
| **ARI** | Acute Respiratory Infections |
| **ATS** | Anti-Tetanus Serum |
| **BP** | Blood Pressure |
| **BUN** | Blood Urea Nitrogen |
| **CaCx** | Carcinoma of the Cervix |
| **CBG** | Capillary Blood Glucose |
| **CCF** | Congestive Cardiac Failure |
| **CKD** | Chronic Kidney Diseases |
| **CNS** | Central Nervous System |
| **COCs** | Combined Oral Contraceptives |
| **CPT** | Cotrimoxazole Preventive Therapy |
| **CrCl** | Creatinine Clearance |
| **CS** | Caesarean Section |
| **CTC** | Centre for Care and Treatment |
| **D&C** | Dilation and Curettage |
| **DENV** | Dengue Virus |
| **DIC** | Disseminated Intravascular Coagulation |
| **DKA** | Diabetes Ketoacidosis |
| **DM** | Diabetic Mellitus |
| **DPM** | Drops Per Minute |
| **DVT** | Deep Vein Thrombosis |
| **ECG** | Electro Cardiogram |

| | |
|---|---|
| **EBT** | Exchange Blood Transfusion |
| **FBC** | Full Blood Count |
| **FFP** | Fresh Frozen Plasma |
| **HB** | Haemoglobin |
| **HIV** | Human Immunodeficiency Virus |
| **HSV** | Herpes Simplex Virus |
| **HTLV** | Human T – Cell Leukemia/Lymphoma Virus |
| **ICT** | Intracavity |
| **ICU** | Intensive Care Unit |
| **ID** | Intra Dermal |
| **IDDM** | Insulin Dependent Diabetes Mellitus |
| **IE** | Infective Endocarditis |
| **IEF** | Iso Electric Focusing |
| **IHD** | Ischemic Heart Diseases |
| **I.M/i.m** | Intramuscular |
| **INR** | International Normalized Ratio |
| **IPTp** | Intermittent Preventive Treatment in Pregnancy |
| **ITI** | Immune Tolerance Induction Therapy |
| **ITP** | Idiopathic Thrombocytopenic Purpura |
| **IU** | International Unit |
| **I.V/i.v** | Intravenous |
| **KS** | Kaposi's Sarcoma |
| **L/l** | Litre |
| **LFT** | Liver Function Test |
| **MB** | Multibacillary |
| **MDIY** | Multiple Daily Insulin Therapy |
| **MDR** | Multiple Drug Resistance |
| **mmHg** | Millimeters of Mercury |
| **MU** | Mega Unit |
| **NEMLIT** | National Essential Medicines List for Tanzania |
| **NGT** | Nasal Gastric Tube |
| **NHL** | Non-Hodgkin's Lymphoma |
| **NKHS** | Non Ketotic Hyperosmolar State |
| **NSCLC** | Non-Small Cell Lung Cancer |
| **NS** | Normal Saline |

| | |
|---|---|
| **NSAID** | Non Steroidal Anti-Inflammatory Drugs |
| **ORS** | Oral Rehydration Salts |
| **PE** | Pulmonary Embolism |
| **PHC** | Primary Health Care |
| **PID** | Pelvic Inflammatory Disease |
| **PO** | Per Oral |
| **PONV** | Post-Operative Nausea and Vomiting |
| **PPH** | Post-Partum Hemorrhage |
| **PPROM** | Preterm Premature of Rapture of Membrane |
| **PT** | Prothrombin Time |
| **RDW** | Red cell Distribution Width |
| **SAA** | Severe Aplastic Anaemia |
| **SCA** | Sickle Cell Anaemia |
| **SCD** | Sickle Cell Disease |
| **SMFE** | Systemic Fat Embolism |
| **SP** | Sulphadoxine/Pyrimethamine |
| **STG** | Standard Treatment Guidelines |
| **T1DM** | Type I Diabetes Mellitus |
| **T2DM** | Type 2 Diabetes Mellitus |
| **WBC** | White Blood Cells |
| **TT** | Tetanus Toxoid |
| **UA** | Unstable Angina |
| **UTI** | Urinary Tract Infection |
| **µg** | Microgram |

# CHAPTER ONE
# SYNDROMIC APPROACH

This chapter deals with symptoms that patients present with when visiting health facilities. It helps the clinicians to identify those clinical patterns, which indicate what disease the patients may have and when they can treat it and when they must be referred to higher level health facilities.

## 1.1 PAIN

Pain is the most common symptom of many diseases. It is an unpleasant sensation or emotional experience associated with actual or potential tissue damage. Any pain of moderate or higher intensity is accompanied by anxiety and the urge to escape or terminate the feeling.

**Diagnostic Criteria**
Self-report is the key to pain assessment. In non- or pre verbal children, facial expression is the most valid indicator of pain; therefore use faces pain scale to assess severity. Pain should be assessed by:

- Duration
- Severity, e.g. does the patient wake up because of the pain
- Site
- Character, e.g. stabbing, throbbing, crushing, cramp like
- Persistent or intermittent
- Relieving or aggravating factors
- Accompanying symptoms
- Distribution of pain
- In children pain can be assessed by child's crying voice, posture, movement and colour

### 1.1.1 Headache

#### 1.1.1.1 Acute Headache

**Diagnostic Criteria**

- Secondary to fever and infectious diseases
- Secondary to local inflammatory cause

For further actions refer to fever, eye, ear and oral sections.

**Pharmacological Treatment**

**A:** Paracetamol (PO) 1g every 8 hours for at least 3 days

**OR**

**A:** Ibuprofen (PO) 400mg 8 hourly for at least 3 days

**Children**

**A:** Paracetamol 15 mg/kg/dose 6 hourly when required to a maximum of 4 doses per 24 hours

If there is no relief to paracetamol give:

**A:** Ibuprofen (PO) 5–10mg/kg/dose 8 hourly

| **Note:** Ibuprofen shall be given with food |
|---|

#### 1.1.1.2 Chronic Headache

**Diagnostic criteria**

- Migraine
- Cluster headache
- Tension headache

**Pharmacological Treatment:**
**Migraine**
In acute attack give analgesics:

**A:** Paracetamol (PO) 1g immediately then every 4 hours; maximum dose of 4g per day

**OR**

**A:** Acetylsalicylic acid 600mg 6 hourly.

**AND**

**C:** Metoclopramide (PO) 10mg 8 hourly.

**OR**

**C:** Metoclopramide IV 10mg 8 hourly

In severe attack give:

**C:** Ergotamine tartrate 2mg sublingual, 12 hourly. Not to be repeated at intervals less than 4 days.

For prevention purposes give**:**

**A:** Propranolol (PO) 40–80mg 12 hourly

**OR**

**A:** Amitriptyline (PO) 10–50mg at night

Cluster and tension headaches: Give analgesics as in acute headache (section 1.1.1)

### 1.1.2 Chest Pain

**Differential Diagnoses**

- Angina
- Myocardial infections
- Reflux Esophagitis
- Lung infection
- Pericarditis

**Non-Pharmacological and Pharmacological Treatments**
Treat as for main disease as indicated in specific chapters.

## 1.1.3 Abdominal Pain

1.1.3.1 Upper Abdominal Pain

**Differential Diagnoses**

Pain related to eating food:

- Dyspepsia
- Gastritis

Pain related to eating food but persisted for more than three months

- Peptic ulcers

Acute and recurrent pain in upper quadrant

- Gallbladder diseases
- Inflammatory bowel syndrome
- Chronic pancreatitis
- Diabetic autonomic neuropathy

**Non-Pharmacological and Pharmacological Treatments**

Treat as for main diseases

**1.1 3.2 Lower Abdominal Pain**

**Diagnostic Criteria**

Pain associated with diarrhoea or constipations

- Intestinal involvement
- Helminthes

Colicky pain in abdomen without diarrhoea or constipation

- Colitis

Pain just before or during menstruation

- Dysmenorrhoea
- Endometriosis

Pain over lower abdomen and back associated with excessive white discharge in women

- Pelvic inflammatory diseases

Pain during urination

- Urinary tract infections (UTI)

**Non-Pharmacological and Pharmacological Treatments**

Treat as for main disease as indicated in specific chapters

## 1.1.4 Other Pains

Other pains may include:

- Generalized body ache
- Joint pain
- Pain due to local infections
- Pains due to injury

- Eye pains
- Ear pains

**Non-Pharmacological and Pharmacological Treatments**
For generalized pain give analgesics as in **section 1.1.1.** Advise the patient to rest and make a follow-up. For joint, infections, injury, eye and ear pains treat as for main disease.

**CAUTION:** Do not use aspirin for abdominal pain or if a patient is vomiting or has nausea and do not use aspirin in children. Patients with peptic ulcers should not be given acetic salicylic acid tablet.

**Referral:**
Refer patients to Regional and Tertiary care for:
- Children with moderate and acute severe pain
- No response to oral pain control
- Uncertain diagnosis
- All acute abdominal pain accompanied by vomiting and no passing of stool
- Pain requiring definitive treatment for the underlying disease
- Pain requiring strong opioids

## 1.2 FEVER

Fever is also known as pyrexia and is usually a symptom of an infection. It is characterized by an elevation of body temperature above the normal range of 36.5–37.5 $^0$C

**Diagnostic Criteria:**
- Depression
- Lethargy
- Anorexia
- Sleepiness
- Hyperalgesia
- Inability to concentrate
- Feeling cold
- Increased muscle tone
- Shivering

**Note:** Fever alone is not a diagnosis

**Non-Pharmacological Treatment**
- Advise patient for bed rest
- Ask patient to take plenty of fluids

**Note:** In children, temperature >40$^0$C need urgent lowering. However, lukewarm sponging and evaporative cooling are not recommended. Fevers caused by virus are usually self-limiting but all other fevers need treatments

**Pharmacological Treatment**
Give antipyretic medicines:

**A:** Paracetamol (PO)
Adult: 1g 6 hourly when required
Children: 15mg/kg 6 hourly when required
**OR**
**A:** Paracetamol suppository, rectally 125mg–250mg, 6hourly

**CAUTION!!**
Aspirin is not recommended in children and young adult, under 16 years due to risk of Reye's syndrome[6]

**Referral:**
Refer the patient to the next facility with adequate expertise and facilities.

- All fevers where no diagnosis is established
- If no improvement of fever after the use of antibiotics
- Fever that recurs

## 1.3 COUGH

Cough is a common reflex action that clears the throat of mucus, allergens, dusts or other foreign irritants. A cough can be caused by several conditions both temporary and permanent. Frequently coughing usually indicates the presence of disease.

**Diagnostic Criteria:**

- If cough is dry without sputum and fever, it is probable an allergic condition or mild upper respiratory illness (e.g. allergic rhinitis or allergic bronchitis)
- If cough is dry without sputum or fever and is associated with other congestive symptoms it may be due to Congestive Cardiac Failure (CCF)
- If it is a repeated attack cough with wheezing but without fever, it is likely to be bronchitis asthma
- If it is a cough with fever, rapid breathing and chest in-drawing, it is likely pneumonia
- If it is cough with sputum which is yellowish pus like and there is fever, it is likely acute bronchitis or pneumonia
- If it is cough with blood in sputum and/or irregular fever with loss of weight and appetite it is a suspected tuberculosis
- If it is cough with large quantity of sputum, very foul smelling it is likely lung abscess or bronchiectasis

**Pharmacological Treatment**
Causative/precipitating factors e.g. CCF, asthma; allergies must be established and treated accordingly.

## 1.4 CONVULSIONS

A convulsion is a medical condition where body muscles contract and relax rapidly and repeatedly, resulting in an uncontrolled shaking of the body. Convulsion is sometimes related to malaria.

**Differential Diagnoses**
Special concerns includes body twitching, body spasms, jerking limbs, head spasms, fits, bladder incontinence, bowel incontinence, loss of consciousness and sleeping after convulsion.

**Diagnostic Criteria**

- Trauma
- Epilepsy
- Intracranial haemorrhage
- Alcohol or medication withdrawal
- Drug induced seizures etc.

**Investigations:**
Some investigations must be ordered:

- Serum glucose level
- Serum electrolytes (where appropriate)
- Exclude pregnancy for women of child bearing age
- CT scan is indicated as outpatient/inpatient depending on progress of patient after episode of seizure (where appropriate)

**Pharmacological Treatment**

**A:** Diazepam IV 10–20mg at a rate of 0.5ml (2.5mg) per 30 sec, repeated if necessary after 30–60min; may be followed by IV infusion to max. 3mg/kg over 24 hours or per rectum 500µg/kg up to max of 30mg.

**OR**

**B:** Phenobarbitone IV 10mg/kg at less than 100mg/min in adult

| **Note:** Look for treatable causes and if present treat them. |
|---|

**Referral:**
Refer the patient to next facility with adequate expertise and facilities if:

- Fits do not stop
- Eclampsia
- Other complications

## 1.5 SHOCK

Shock is a state of acute circulatory failure leading to decreased organ perfusion, with inadequate delivery of oxygenated blood to tissues and resultant end-organ dysfunction and it is an emergency condition. Adherence to evidence-based care of the specific causes of shock can enhance a patient's chances of surviving[7].

**Diagnostic Criteria (Presentation of Shock)**

- Low blood pressure (systolic BP below 80 mmHg) is the key sign of shock
- Weak and rapid pulse
- Rapid and shallow breathing
- Restlessness and altered mental state
- Weakness
- Low urine output

**Table 1.1: Types of shock & Additional Symptoms**

| Type of shock | Description | Additional symptoms |
|---|---|---|
| Hypovolemic | Most common type of shock<br>Primary cause is loss of fluid from circulation due to haemorrhage, burns, diarrhoea etc. | Weak thread pulse, cold and clammy skin. |
| Cardiogenic shock | Caused by the failure of heart to pump effectively e.g. in myocardial infarction, cardiac failure etc. | Distended neck veins, weak or absent pulses |
| Septic shock | Caused by an overwhelming infection, leading to vasodilatation. | Elevated body temperature |
| Neurogenic shock | Caused by trauma to the spinal cord, resulting in sudden decrease in peripheral vascular resistance and hypotension. | Warm and dry skin |
| Anaphylactic shock | Caused by severe allergic reaction to an allergen, or drug. | Bronchospasm, angioedema and/or Urticaria |

**Investigations**

The following investigations can be performed depending on the type of shock

- Basic serum chemistry (including renal function)
- Liver function tests
- Blood culture
- Ultrasound
- Echocardiography
- Lumbar puncture if a patient is suspected with meningitis

**Non-Pharmacological Treatment**

Prompt diagnosis of underlying cause is essential to ensure optimal treatment.

- Maintain open airway
- Administer oxygen with face mask and if needed after intubation with assisted ventilation
- Check for and manage hypoglycemia

**Pharmacological Treatment**

Treatment depends on the type of shock. Intravenous fluid therapy is important in the treatment of all types of shock except for cardiogenic shock.

Adults:

**A**: 0.9% Sodium chloride given as the 1L bolus infusion. Repeat bolus until blood pressure is improved. Transfuse blood and plasma expanders (-) in hemorrhagic shock

Children:

**A:** 0.9% Sodium chloride 20 mol/kg as a slow infusion.

**Note**

- Do not administer IV fluids in case of cardiogenic shock but maintain IV line
- If patient develops respiratory distress, discontinue fluids but maintain IV line
- Septicemia in children: All children with shock which is not obviously due to trauma or simple watery diarrhea should receive antibiotic cover for probable septicemia. Give ceftriaxone, IM, 50–80 mg/kg/dose immediately as a single dose.

**CAUTION !**

- Do not administer calcium containing fluids, e.g. Ringer Lactate, within 48 hours of administering ceftriaxone
- Contra-indicated in neonatal jaundice
- Annotate dose and route of administration on referral letter.

## 1.6 DEHYDRATION

It refers to the loss of body water, with or without salt at a rate greater than the body can replace it. The cause of dehydration is a combination of physiological and disease processes. Persons at greatest risk for dehydration include persons with diarrhoea, vomiting, fever, diabetes or infections, impaired level status.

**Table 1.2: Types of Dehydrations**

| | **Mild** | **Moderate** | **Severe** |
|---|---|---|---|
| **Consciousness** | Is normal | May be irritable but is conscious | Unconscious |
| **Skin pinched up** | Becomes normal immediately | Takes two seconds for folds to disappear | Remain in folds for over two seconds |
| **Eyes** | Moist and tears are present | Sunken, tears and absent | Sunken and tearless |
| **Mouth** | Not dry | Is dry | Is dry |

**Note:** In Severe dehydration there is also oliguria

**Investigations**

- Blood chemistry (to check electrolytes, especially sodium, potassium, and bicarbonate levels)
- Blood urea nitrogen (BUN)
- Full blood count (FBC)
- Creatinine
- Urine specific gravity

Other tests may be done to determine the cause of the dehydration (for example, blood sugar level to check for diabetes).

**Non-Pharmacological Treatment**

The treatment for minor dehydration often considered the most effective, is drinking water and stopping fluid loss.

**Pharmacological Treatment**

In more severe cases, correction of a dehydrated state is accomplished by the replenishment of necessary water and electrolytes.

**A:** Oral Rehydration salt (ORS)

**OR**

**A:** IV 0.9% Sodium Chloride

**OR**

**A:** IV Ringers Lactate solution

If there is no electrolyte loss; give

**A:** IV Dextrose solution 5%

**Note**: If the underlying disease condition is diagnosed; treat as per specific condition in guidelines.

# CHAPTER TWO
# ANESTHESIA

Anesthesia is a state of controlled reversible loss of consciousness usually accompanied by analgesia, muscle relaxation, amnesia and areflexia. It is usually induced for the purpose of facilitating surgery and other therapeutic or diagnostic procedures. It is a continuum of clinical services that range from monitored anesthetic care, sedation to deep general anesthesia or it can be regional anesthesia alone or combined with light general anesthesia.

**Anesthesia may be achieved with either:**

- Regional anesthesia alone e.g. spinal/epidural anesthesia, arm block
- General anesthesia
- A combination of regional and general anesthesia
- Regional anesthesia with sedation
- Local anesthesia through topical application/spray or infiltration of local anesthetics

The provision of anesthetic services usually cover the whole peri-operative period i.e. preoperative care, intra operative care and post-operative care. Thus anesthetic services include the use of medicines for premedication, induction of anesthesia, maintenance of anesthesia, reversal or recovery from anesthesia and post-operative care.

**Note:**

- Anesthetic medicines and sedatives MUST be provided by medical practitioners who are properly trained and have appropriate experience with their use
- Medicines and equipment for resuscitation should be immediately available whenever general anesthesia, regional anesthesia or sedation is administered.

## 2.1 GENERAL ANESTHESIA

Medicines used in general anesthesia include the following pre-medications:

**Sedation and Anxiolytics**

**A:** Diazepam: IV 0.05–0.1mg/kg

**OR**

**C:** Diazepam: (PO) 0.5–0.75mg/kg

**OR**

**C:** Lorazepam: 0.05mg/kg IM or 0.04mg/kg IV

**OR**

**D:** Midazolam: 0.05–0.1mg/kg IV

**Benzodiazepine antagonists**

If there is an overdose with benzodiazepines use the following antidote:

**D:** Flumazenil: 0.2mg IV one time over 30 seconds. Repeated dose of 0.2mg may be given at 1 minute intervals until desired level of consciousness is achieved; do not exceed 4 doses (1mg).

**Antimuscarinics**

If there is bradycardia, salivary secretion or other muscarinic side effects give

**A:** Atropine 0.01mg/kg

**OR**

**S:** Glycopyrollate 0.2–0.4mg IV (0.2mg for every 1mg of neostigmine)
Alternatively, a dose of 10–15 μg/kg (0.01–0.015mg/kg) IV with 50 μg/kg (0.05mg/kg) neostigmine or equivalent dose of pyridostigmine

**Antiemetic**

Indicated for prevention of Post-Operative Nausea and Vomiting (PONV)

**A:** Dexamethasone sodium phosphate injection 4–5mg IV for PONV prevention

**OR**

**B:** Metoclopramide 10mg IV

**OR**

**S:** Ondansetron **4** mg **IV** administered over 2–5minutes

**Antacids**

Are given to patients at risk of aspiration, such as pregnant women, before Caesarean section

**D:** Sodium citrate: 0.3Moles, oral, 30mL. Not more than 30 minutes pre–induction of anesthesia

**D:** Ranitidine Injection 50mg IV as soon as the possibility of surgery is known in cases of emergency procedures

**General Anesthetics**

Used for induction of anesthesia as boluses or for maintenance of anesthesia as continuous infusions in Total Intra–Venous Anesthesia (TIVA).

**B:** Ketamine IV, 1–2 mg/kg

**OR**

**C:** Thiopental IV, 3–5 mg/kg

**OR**

**D:** Propofol IV, 1.5–2.5 mg/kg for induction of anesthesia and 6–12 mg/kg/hour IV infusion for maintenance in TIVA, if volatile agent use for maintenance of anesthesia is contraindicated

**OR**

**S:** Etomidate, IV, 0.3 mg/kg (0.2–0.6 mg/kg)

**Inhalational anaesthetic agents (for induction and/or maintenance)**

**B:** Halothane 2–4% in air, oxygen or oxygen/nitrous oxide and maintenance 0.5–1.5%

**OR**

**D:** Isoflurane 1.2–2.5%, titrate to desired effect

**OR**

**S:** Sevoflurane 5–7%

Maintenance: 0.5–3% sevoflurane with or without the concomitant use of nitrous oxide.

**Muscle Relaxants**

**C:** Suxamethonium IV, 1–1.5 mg/kg

**OR**

**C:** Pancuronium I.V 0.04–0.1 mg/kg

**OR**

**S:** Rocuronium 0.9 mg/kg, IV.

**OR**

**S:** Atracurium 0.4–0.5 mg/kg I.V over 60 seconds followed by 0.08–0.1 mg/kg 20–45 minutes after initial dose for maintenance or infusion at 0.05–0.1 mg/kg/min (For patients with renal impairment)

**Contraindications**: in patients with risk for developing Suxamethonium induced hyperkalaemia, e.g. upper or lower motor neuron defect, prolonged chemical denervation, direct muscle trauma, tumour or inflammation, thermal trauma, disuse atrophy, severe infection

**Medicines for Reversal Of Neuromuscular Blockade**

**C:** Neostigmine IV 50µg/kg with atropine IV, 20µg/kg (maximum 1.2mg)

**OR**

**S:** Glycopyrrolate IV, 10 µg/kg

**OR**

**S:** Sugammadex 2–4mg/kg

**Analgesics for Pain Management in Peri–operative Period**

**Opioid analgesics**

**B:** Tramadol IM/IV, 50mg 6hourly

**C:** Morphine, IV/IM, 3–5mg as a single dose, then further boluses of 1–2mg/minute.

Maximum dose of morphine 0.1–0.2 mg/kg, and monitor vitals closely

**OR**

**S:** Fentanyl IV, 1–2 µg/kg

**OR**

**C:** Pethidine: 1–2mg/kg (used for analgesia during anesthesia, and also during labour)

**Antagonists of Opioids**

For opioid over–dosage

**C:** Naloxone: 0.4mg–2mg IV, alternatively may be given intramuscularly or subcutaneously. For reversal of opioid sedation initial dose 0.1–0.2mg IV at 2–3 minutes intervals to the desired degree of reversal.

**Non–Opioid Analgesics**

B: Paracetamol IV injection 15mg/kg 8hourly

## 2.2 LOCAL ANESTHESIA

Medicines used as local anesthetics cause revisable absence of pain sensation, although other senses are often affected as well. Also when it is used on specific nerve pathways, paralysis also can be achieved.

Lidocaine, Bupivacaine and Ropivacaine

**B:** Lidocaine: Maximum 4.5mg/kg without vasoconstrictors (adrenaline) or 7mg/kg with vasoconstrictors

**OR**

**D:** Levobupivacaine: Infusions in 100ml or 200ml bags of levobupivacaine 625 µg/ml (0.0625%) 1.25 mg/ ml (0.125%)

**OR**

**C:** Hyperbaric Bupivacaine: bupivacaine hydrochloride 5mg/ ml (0.5%) with 80 mg/ ml glucose (specific gravity of 1.026). The addition of glucose produces a hyperbaric solution relative to cerebrospinal fluid.

**Medicines for Local Anaesthetics Overdose**

**S:** Lipid Emulsion (intralipid 20% or 30% solution) for severe local anaesthetic toxicity with cardiovascular or neurological impairment

**Dose:** 1.5 mL/kg over 1min, then continuous infusion 0.25 mL/kg/min. Repeat bolus 1–2 times for persistent cardiovascular collapse. Double infusion rate to 0.5 mL/kg/min if BP remains low. Continue infusion for at least 10 minutes after cardiovascular stability attained. Recommended upper limit: approximately 10 mL/kg lipid emulsion over the first 30 minutes.

**Adjuvants To Anesthetics**

**Medical Gases**

**B:** Medical gases (Air and Oxygen)

**OR**

**C:** Nitrous Oxide

**Pressos**

**Ephedrine**: Used frequently for hypotension in obstetric anesthesia as it may maintain uterine/placental blood flow more efficiently than some other sympathomimetic it should be reserved for this indication.

**B:** Ephedrine Dose: IV, 3–5 mg as a single dose and then further boluses as required to a maximum of 30 mg.

**OR**

**S:** Phenylephrine: IV, 50–100 µg as a single dose and then infuse at 60–180 µg/minute. Administer intravenously after dilution to at least 1 mg/ ml 10 ml.

**OR**

**S:** Metaraminol 0.5–5mg followed by infusion of 15–100mg in 500mls of normal saline or 5% Dextrose injection adjusting rate to maintain desired blood pressure. Administer intravenously after dilution to at least 1 mg/ ml 10 ml

**Pressors by Infusion: Noradrenaline, Adrenaline; Dopamine, Dobutamine**

**A:** Adrenaline 1–2µg/kg, nebulised to reduce symptoms associated with acute upper airway obstruction, post–intubation swelling and infectious croup

**OR**

**S:** Noradrenaline 0.05–0.1µg/kg/min infusion

**OR**

**D:** Dobutamine: in Critical Care practice a combination of noradrenaline and dobutamine is often preferred to adrenaline alone, giving greater control over rate and pressure.

**Medicines For Treatment Of Malignant Hyperthermia**

**S:** Dantrolene Sodium Treatment of acute MH will also require rapid access to ice–cold normal saline 2 l, calcium chloride 10%, sodium bicarbonate 8.4%, glucose 20%, amiodarone 300 mg and a beta–blocker.

Dose: 2.5–10mg/kg, to be reconstituted with water, each vial contains mannitol 3g. Continue repeated administration until cardiac and respiratory symptoms stabilize.

**Others:**

**A:** Magnesium sulphate: for prevention and control of seizure caused by pre–eclampsia or eclampsia, Severe Tetanus. It is valued as an adjunctive agent during anesthesia.

**S:** Dexmedetomidine: is a potent and highly selective α2–adrenoreceptor agonist utilized for continuous infusion for sedation/analgesia in the intensive care unit (ICU). Dexmedetomidine has demonstrated to be an efficacious and safe anaesthetic adjuvant
Dose: Hydrochloride Injection, 1µg/kg

**S:** Clonidine: **(**hydrochloride injection 500µg/ml) used as an adjuvant in regional anesthesia with proved effect of prolonging the duration of the analgesic effect of local anaesthetics. Use in General anesthesia as in use of Dexmedetomidine. Dose: 2µg/kg

## 2.3 SEDATION

The aim of providing sedation is to reduce anxiety, agitation and pain so as to tolerate unpleasant medical procedures or intervention while the patient retains control of airway, breathing and blood pressure. This procedural sedation and analgesia is commonly used in emergency units, radiological /diagnostic units, dentistry and for certain endoscopic and gynaecological procedures.

**General Measures**

- Procedural sedation is a continuum, ranging from minimal sedation (**anxiolysis**), moderate sedation (**conscious sedation**), and deep sedation (**anesthesia**).
- It is often difficult to predict levels of sedation and therefore clinicians undertaking procedural sedation should be adequately trained in this

technique. They should have a detailed understanding of the risks and benefits of the medicines used, and should be competent in resuscitation, airway management and assisted ventilation.

- Procedural sedation should be performed only in an area with adequate light and space, and adequate fully functional monitoring/observation and resuscitation equipment.
- Appropriate sedation protocols and guidelines for patient care from preparation to discharge should be available and implemented.

**Medicines used in Sedation**

**Note:**

- Patient characteristics and required depth and duration of sedation lead to differences in dosing requirements; the doses listed serve only as a guide
- Providers should titrate sedative dosage according to the desired clinical response

**Minimal Sedation/Anxiolysis** (no analgesic effect is required)

**D:** Midazolam: IV, 0.05mg/kg (In a 60 kg patient, give boluses of 1 mg every minute; may require up to 3mg)

**OR**

**A:** Diazepam: IV 0.1mg/kg (In a 60 kg patient, give boluses of 2 mg every minute; may require up to 10 mg)

**OR**

**C:** Nitrous oxide inhaled 20 to 50%, in oxygen (will also provide some analgesia)

**Note:**

- Oral sedation may be appropriate for certain procedures

**Medicines for moderate sedation & analgesia**

If analgesia is required, one of the above is usually combined with an opiate. However, ketamine has analgesic activity and can be used on its own, or combined with a benzodiazepine.

**S:** Fentanyl: IV 0.25 μg/kg

**OR**

**C:** Morphine: IV 0.1 mg /kg, in increments of 2 mg every 5 minutes

**OR**

**B:** Ketamine: IV, 0.5 mg/kg (the addition of a benzodiazepine is often recommended to reduce the incidence/severity of emergence phenomena such as hallucinations and dreaming, but the benefit of this is unclear). Repeat doses of 0.5 mg/kg as required, every 5–10 minutes

**OR**

**C:** Nitrous oxide: 20–50% inhaled, in oxygen the choice of sedative will depend on the availability and easy of safe administration

**Alternative medicines:**

**D:** Propofol: IV, 0.5 mg/kg, repeated as 0.25 mg/kg boluses every 5 minutes as required

**S:** Etomidate IV, 0.1 mg/kg. Repeat doses of 0.05 mg/kg every 5 minutes, as required. But it is more likely to cause myoclonus

**Medicines for Deep Sedation & Analgesia**
This is usually achieved with either higher doses of medications used for moderate sedation, or by combining an opiate, a benzodiazepine, and either Propofol or Etomidate. When agents are combined, lower doses may be adequate.

**Supplemental Analgesia:** Simple analgesics can be given before or after the procedure:

**A:** Paracetamol**,** oral, 1 g 4–6 hourly when required to a maximum of 4 doses per 24 hours.
Maximum dose: 15 mg/kg/dose. Maximum dose: 4 g in 24 hours.

**A:** Ibuprofen, oral, 400 mg 8 hourly with meals after the procedure.

**NOTE: Sedation in intensive care**

- Indications for sedation in intensive care needs to be defined for each patient, and may include one or more of anxiolysis, analgesia, agitation control, or to help patients tolerate uncomfortable situations or procedures (e.g. intubation and ventilation)
- Sedation requirements fluctuate rapidly so, it warrants regular review
- Individualized sedation objectives should be clearly defined, and level of sedation regularly recorded
- Sedation protocols that recognize the need for dose minimization, weaning and sedation interruptions probably improve outcomes
- Adequate pain control is often more efficacious than sedatives for reducing agitation. Delirium should be considered, and managed appropriately.
- The doses listed apply to ventilated patients in whom short term respiratory depression is not a concern

**Short–term and long–term sedation**
**Medicines for short–term sedation** (less than 24 hours)

**D:** Midazolam: IV infusion, 0.05–0.2 mg/kg/hour.

**OR**

**D:** Propofol: IV infusion, 0.5 mg/kg/hour

**Medicines for longer–term sedation** (72 hours or more)

**D:** Lorazepam: IV, 0.1 mg/kg/hour

**OR**

**D:** Midazolam: IV, 0.2 mg/kg/hour

**Note:**

- Lorazepam (0.1 mg/kg/hour) is as effective (and as easy to wean) as midazolam 0.2 mg/kg/hour) but more difficult to titrate.
- Due to high fat solubility, midazolam also becomes 'long acting' after infusions of more than 24 hours

**Supplemental analgesia:**

**C:** Morphine: IV infusion, 0.1–0.2 mg/kg/hour

**OR**

**S:** Fentanyl: IV infusion, 1 µg/kg/hour (also becomes long acting after prolonged infusion due to fat solubility)

## 2.4 SURGERY IN DIABETIC PATIENT

Diabetes Mellitus (DM) is the most common metabolic disorder encountered peri–operatively. Diabetes leads to increased surgical morbidity, mortality and length of hospital stay. Perioperative Hyperglycemia is associated with increased risk of infection, medical complications and death and Hypoglycemia is associated with increased risk of death. The following shall be considered:

- Ideally, the elective patient should have a preoperative glycated haemoglobin <69mmol/mol (8.5%). The ideal perioperative capillary blood glucose (CBG) should be between 6.0–10.0 mmol/ litre for all patients with diabetes. Surgery should be delayed if possible if HBA1C >9% or blood glucose fasting >10 mmol/l of random > 13 mmol/l.
- Screen for nephropathy, cardiac disease, retinopathy and neuropathy and inform surgical team.
- Diabetic patients should be first on the operation list
- Perioperative glycaemic control and early recognition and management of diabetic related complications improve the operative outcome in diabetic patients. (Refer to specific sections in Diabetic chapter 13)
- If on diet and or oral agent therapy and well controlled and surgery is minor:
    - Omit therapy on morning of surgery.
    - Resume therapy when eating normally.

**If on insulin adjust depending on the type of surgery and expected fasting period as follows:**

**Minor surgery (duration < 3hours)**

- Insulin: in the morning intermediate–acting insulin, 1/2 to 2/3 of total daily dose
    - if blood glucose is above 20 mmol/l, give a small dose short–acting insulin
    - In the evening give intermediate–acting insulin, 1/3 of daily dose.
- Fluid: glucose 5% intravenously, volume according to age.
- Blood glucose monitoring: every 1–2 hours values between 10–14 mmol/l

**Major surgery (duration > 3hours)** Involve a general anesthesia and therefore a period of fasting.

- Insulin and fluid: infusion solution containing 5% glucose and 20 mmol/l potassium chloride (maintenance volume)
- Insulin infusion 0.05 IU/kg/hour.
- Blood glucose monitoring: every 1–2 hours; values between 6–14 mmol/l, if < 5 mmol/l reduce infusion rate, continue infusion therapy intraoperatively.
- Post operatively: give IV 1 Litre of 5–10% dextrose + 20ml KCl + 2/3 of total daily dose of insulin over 8hrs and repeat to maintain infusion therapy until food intake is re–established.

# CHAPTER THREE
# HAEMATOLOGICAL DISEASE CONDITIONS

## 3.1 ANAEMIAS DUE TO RED CELL DISORDERS

### 3.1.1 Iron Deficiency Anaemia

This is a condition whereby a lack of iron in the body (mainly due to blood loss secondary to haemorrhage, malabsorption and hookworm infestations and pregnancy) leads to a reduction in the number of red blood cells.

**Clinical presentation**: fatigue, palpitation, dizziness, glossitis, koilonychias (spoon shaped nails) and pica

**Diagnostic Criteria**
Pallor, glossitis, koilonychias (spoon shaped nails) and pica

**Investigations**

- CBC-Low Hb, MCV, MCHC and raised RDW
- Peripheral smear- microcytic hypochromic red cell, pencil cells.
- Low serum Iron levels and raised Total iron binding capacity
- Stool analysis

**Non-Pharmacological Treatment**

- Treat the cause of blood loss, for example menorrhagia, upper GI bleeding due to peptic ulcer and lower GI bleeding secondary to hookworm infestation and malignancy.
- Blood transfusion is only indicated if it is life threatening.

**Pharmacological Treatment**

**A:** Ferrous Sulfate 200 mg (PO) 8 hourly for 3 months Children 5 mg/kg (PO) 8 hourly. Continue for 3 months after the normal hemoglobin has been achieved.

### 3.1.2 Megaloblastic Anemia

This is a condition whereby the bone marrow usually produces large, structurally abnormal, immature red blood cells (megaloblasts) often due to inadequate intake or malabsorption of vitamin $B_{12}$ or folate.

**Diagnostic Criteria**
Pallor, depression, hair loss, pins and needles, numbness in hands or feet, tremors and palsies, mildly jaundiced (lemon yellow tint), beefy tongue, darkening of palms and ataxic gait.

**Investigations**

- FBC-Low Hb, sometime pancytopenia, raised mcv but maybe low normal if coexisting with iron deficiency
- Peripheral smear-oval macrocytes, hyper segmented neutrophils

- Serum vitamin $B_{12}$ maybe low or normal, Serum folate level, TSH, U+Es, LFT
- Raised reticulocyte count
- Bone marrow studies may be indicated

**Pharmacological Treatment**

Vitamin ($B_{12}$ deficiency anaemia) and other macrocytic without neurological involvement

**A:** Hydroxycobalamine, initially 1 mg IM 3 times a week for 2 weeks then 1mg every 3months

Clinically review every 2 months with or without serum $B_{12}$ and if clinically indicated increase the frequency to every 2 months or every month

**Pernicious Anaemia ($B_{12}$ deficiency) with neurological symptoms and signs**

**A:** Hydroxycobalamine, initially 1 mg IM on alternate days until no further improvement (maximum reversal or neuro-psychiatric signs and symptoms are achieved) then 1mg every 2 months

**NOTE:**

- Folic acid 5mg (PO) once daily for least 2 months this must be started simultaneously with injection vitamin $B_{12}$
- Ferrous Sulphate 200mg 8 hourly for at least 3 months

## 3.1.3 Haemolytic Anaemia

Haemolytic anaemia results from an increase in the rate of red cell destruction in the intravascular or in the reticuloendothelial system in some pathological disorders

**Clinical Features:**

- Pallor, jaundice, splenomegaly
- Anaemia, Reticulocytosis, indirect hyperbilirubinemia

**Note:** After supportive treatment refer to higher health facility with adequate expertise and facilities

**Classification of haemolytic anaemia**

**I. Acquired haemolytic anaemias:**

**a. Immune**

- Autoimmune (warm antibody type, cold antibody)

**b. Alloimmune:**

- Haemolytic transfusion reactions
- HD
- Allograft especially marrow transplantation

**Red cell Fragmentation Syndromes:**

- Arterial grafts, cardiac valve
- Microangiopathic haemolytic anaemias

**Others**

- March haemoglobinuria
- Infections (malaria, clostridia)
- Chemicals and physical agents
- Paroxysmal nocturnal haemoglobinulia

**II. Hereditary Haemolytic Anaemia**

- Membrane
  1. Hereditary spherocytosis
  2. Hereditary elliptocytosis
- Metabolism
  1. G6PD deficiency
  2. Pyruvate kinase deficiency
- Haemoglobin
  -Abnormal haemoglobin such as Hb S, C, Unstable Hb

**Clinical Features:**

- The disease may occur at any age and sex
- Patient may present with symptom and features of Anaemia
- Symptoms are usually slow in onset however rapidly developing anaemia can occur
- Splenomegaly is common but no always observed
- Jaundice

**General Treatment:**

i. Remove the underlying cause
ii. Blood transfusion if anaemia is severe
iii. Plasmapheresis

> **Note:** After supportive treatment refer to higher health facility with adequate expertise and facilities

**Pharmacological Management**

**Immunosuppressant's**

**C:** Prednisolone 1–1.5mg/kg/day (PO) for 1–3 weeks until Hb is greater than 10g/dl

**AND**

**S:** Cyclosphophamide 60mg/m2 IV

**OR**

**S:** Azathioprine 100–150mg/mg (PO) daily

**OR**

**S:** Cyclosporin 2–5mg/

**OR**

**S:** High dose immunoglobulin 400mg/kg daily IV for 5 days

**A:** Folic acid is 5mg (PO) daily should be given to severe cases

**Surgical Management**

Splenectomy may be considered in those who fail to respond

## 3.2 SICKLE CELL DISEASE (SCD)

Sickle Cell Disease describes a group of inherited red blood cell disorders characterized by the presence of hemoglobin S or sickle hemoglobin. Sickle cell anemia (SCA), is when an individual inherits two copies of hemoglobin S (homozygous state, HbSS).

**Clinical Features:**
The clinical manifestations of SCA are variable; acute onset of unexplained illness, including acute pain in any part of the body, anaemia, acute neurological symptoms, and loss of vision, collapse, respiratory symptoms, hepatosplenomegaly, jaundice, swollen limbs and sepsis should be tested for SCD. Symptoms usually occur after 6 months of life and may fall into any of the four types of crisis that occur in SCD

- Vaso-occlusive crisis: painful crisis usually presenting as back pain, pain in the upper/lower limbs, joint pain, abdominal pain, chest pain. It is important that other causes of pain are ruled out.
- Hemolytic crisis: presents with features of anemia, jaundice, may have dark urine signifying intravascular hemolysis
- Sequestration crisis: sudden massive enlargement of the liver and spleen accompanied with a fall in hematocrit
- Aplastic Crisis: Where the bone marrow ceases to function - reflected by a worsening of anemia in the absence of reticulocytosis.

**Medical Emergencies:**
The following are life threatening complications that may lead to rapid deterioration and death if not diagnosed and managed in a timely manner

I. Acute Chest Syndrome - Presents with chest pain, tachypnoea, respiratory distress, fever, decreased oxygen saturation and chest X-Ray infiltrates
II. Splenic sequestration - Usually occurs in children, characterised by splenic enlargement, left upper quadrant pain, pallor, weakness, rapidly falling hemoglobin levels and hypovolaemia
III. Infection - Most individuals with SCD develop functional asplenia (due to recurrent splenic infarction) by the age of five, and are therefore immuno compromised.
IV. Stroke - May present with headache and neurological deficit.

**Investigations:**
Screening Tests for SCD include

- Sickling Test
- Sickle Solubility Test

Confirmatory Tests for SCD include:

- Sickle Scan
- Iso Electric Focusing (IEF)
- Haemoglobin elecrophoresis
- HPLC (High Pressure Liquid Chromatography)

Other ancillary laboratory investigations useful in detection and monitoring of the disease include:

- FBC - Red cell indices may suggest macrocytosis due to increased reticulocytosis or compliance with hydroxyurea therapy
- Reticulocyte count - usually ranges from 5–15% in sickle cell disease
- Peripheral blood film - findings may include irreversible sickled red cells, polychromasia, occasional nucleated red cells, and schistocytes, as well as Howell-Jolly bodies. Target cells may also be seen.
- Biochemical changes include high LDH, low haptoglobin, high total and indirect bilirubin, and high AST.

**Pharmacological Management**
**Prophylaxis Against Pneumococcal Infection**

Administer prophylactic
**A**: Phenoxymethyl penicillin (125 mg PO for children younger than 3 years; 250 mg PO for children 3 years and older) twice daily until 5 years of age in all children with SCA

Immunisation against pneumococcal infection
**A:** Pneumococcal conjugate vaccine (PCV-13) - from two months of age, 3 doses 8 weeks apart (i.e at age 2months, 4 months and 6 months) and a booster dose between 12–15 months. If the child has not previously received this vaccine, then at least one dose should be given between 6–18 years.
**A:** Pneumococcal polysaccharide vaccine (PPSV-23) - at 2 years then after every 5 years for life.

**Screening**

- From the age of 10 years, screen for renal disease (proteinuria by urine dipstick) and retinopathy annually
- Annual screening for risk of stroke by transcranial Doppler from the age of 2 years to 16 years.

**Table 3.1: Analgesia for General Pain Relief**

| Severity | Management |
|---|---|
| **Mild** | Reassurance, hot packs, reposition, massage, distraction (stories, play)<br>**Child**: Paracetamol 15mg/kg (PO) 6 hourly<br>**Adult**: Paracetamol 1g (PO) 6 hourly |
| **Moderate** | As for mild pain, PLUS<br>**Child**: Ibuprofen 5mg/kg (PO) 8 hourly<br>**Adult**: Ibuprofen 400mg (PO) 8 hourly |
| **Severe** | As for moderate pain PLUS<br>**Child**: Oral morphine 0.5mg/kg 3–4 hourly as needed<br>**Adult**: Oral morphine 5–10mg, 3–4 hourly as needed |

**Hydration**: Encourage oral fluids first; it should be used whenever possible. Give IV fluids if the patient is unable to drink well, has severe pain, abdominal symptoms, or is not settling

| Body weight (kg) | Fluids (ml/kg/day) |
|---|---|
| <10 kg | 150ml/kg/day |
| 11 – 20kg | 75ml/kg/day for every kilogram above 10kg<br>ADDED to 1500ml for the first 10kg of weight |
| > 20kg | 30ml/kg for every kilogram above 20kg<br>ADDED to 225Oml for the first 20kg of weight |
| Divide the total daily volume by 24 hours to obtain hourly fluid rate | |

**S: Hydroxyurea Therapy**

Hydroxyurea is currently the only approved disease modifying drug for use in selected patients with SCD over the age of 24 months

**Indications for use of Hydroxyurea Include:**

a) Recurrent VOC ( 3 or more severe episodes requiring admission in the last 12 months)
b) Severe and/or recurrent ACS (2 or more episodes in a lifetime)
c) Severe symptomatic chronic anemia that interferes with daily activities or quality of life
d) Where chronic transfusion therapy is not feasible it can be used as an alternative to prevent new or recurrent stroke.
e) Recurrent priapism
f) In adults and children with SCD who have chronic kidney disease and are taking erythropoietin, hydroxyurea therapy can be added to improve anemia

**Principle of Dosage Initiation and Monitoring:**

a) Starting dosage for adults (500 mg capsules): 15 mg/kg/day (PO) (round up to the nearest 500 mg); 5–10 mg/kg/day (PO) if patient has chronic kidney disease
b) Starting dosage for infants and children: 20 mg/kg/day
c) Full blood counts are monitored weekly for the first 4 weeks, fortnightly for the next 8 weeks, and thereafter monthly if the counts remain stable
d) Increase the dose by 2.5–5 mg/kg/day every 12 weeks (range of 4 weeks to 6 months) if absolute neutrophil count (ANC) >2000/µL, Haemoglobin concentration >4.5 g/dL, and platelet count >80,000/µL
e) If neutropenia or thrombocytopenia occurs:
    - Hold hydroxyurea dosing
    - Monitor CBC with WBC differential weekly
    - When blood counts have recovered, reinstitute hydroxyurea at a dose 2.5 mg/kg/day less than the dose given before onset of cytopenias to achieve the maximum tolerable dose
f) Once a stable dose is established, laboratory safety monitoring should include a FBC and reticulocyte count every 2–3 months

**NOTE:**

- Hydroxyurea should be discontinued in all pregnant women
- Hydroxyurea should be discontinued in all breast feeding women
- Hydroxyurea should be stopped at least three months prior to conception in both males and females

## 3.3 BLOOD TRANSFUSION

**Simple (Top-Up) Blood Transfusion**

Blood transfusion is indicated if:

- There are acute symptoms of anaemia, such dyspnoea, tachycardia, severe weakness
- Haemoglobin level is < 6g/dl
- Haemoglobin level has dropped by > 2g/dl below the steady-state value.

**Note**: Because the cardiovascular system adjusts to the chronic anaemia, blood transfusion is not routinely indicated in steady state SCD simply for the reason that haemoglobin level is below 8–10g/dl.

**Exchange Blood Transfusion**

Venesection to reduce the proportion of HbS red cells with transfusion of normal HbA blood is often beneficial in the treatment or prevention of life-threatening and other manifestations of sickle cell disease 5. Hence, the aim in this process of exchange blood transfusion (EBT) is to reduce HbS to 30%. Exchange blood transfusion can be done manually or automatically with a red cell apheresis machine.

**Indications for Exchange Blood Transfusion**

- Cerebrovascular Accidents (CVAs)
- Acute Chest Syndrome (ACS)
- Prior to major surgery
- Multi-organ failure, including Systemic Marrow Fat Embolism (SMFE)
- Multiple pregnancies
- Prevention of recurrent stroke.

**Relative Indications for Exchange Blood Transfusion**

- Intractable or very frequent severe crises
- Major priapism unresponsive to other therapy.

## 3.4 G6PD DEFICIENCY

G6PD is an inherited X-linkded recessive genetic disorder, haemolysis results from oxidative damage to RBCs due to loss of protective effect of the enzyme G6PD.

**Clinical Features:**

- Usually asymptomatic but liable to haemolysis if infection, incriminated drugs or foods are taken (e.g. sulphonamides, fava beans, tabs chloroquine or proguanil).
- Pallor, jaundice and dark urine(Coca-colored urine)

**Laboratory findings**
Anaemia, peripheral smear-normocytic normochromic, spherocytes, bite cell, Reticlocytosis, Heinz bodies, Positive Ham's test

**Non-pharmacological Treatment**

- Avoid incriminated agents/foods or drugs
- Transfusion of packed red blood cells in severe anaemia. Give 10ml/kg body weight over a period of 8 hours. Then assess the level of haemoglobin.

**Pharmacological Treatment**

**A:** Folic acid 5mg (PO) once daily for 1 month

## 3.5 APLASTIC ANAEMIA (BONE MARROW FAILURE)

Aplastic anaemia is defined as pancytopenia resulting from aplasia of the bone marrow Pancytopenia – a reduction in the blood count of all the major cell lines

**Table 3.2: Causes of aplastic anaemia**

| Primary | Secondary |
|---|---|
| Congenital (Fanconi and non-fanconi | Ionozing radiation: Accidental exposure (radiotherapy, radioactive isotopes, nuclear power stations |
| Idiopathic acquired | Chemicals:Benzene, DDT, insecticides<br>T lymphocyte mediated autoimmune suppression of haemopoietic stem cell |
| | Drugs esp. chloramphenical<br>Infections esp viral hepatitis (A or non-A<br>Connective tissue diseases, pregnancy |

**Clinical Features**
Vary with severity but include; Anaemia, easy bruising/bleeding, recurrent infection; splenomegaly is not a feature.

**Diagnostic Criteria**
Pancytopenia, Bone marrow hypocellularity of < 30% hematopoietic cells for children and young adults; confirmed by trephine biopsy.

**Classification by severity of Aplastic Anaemia (AA)**

**Severe AA (SAA)**
For SAA at least two of the following three criteria have to be fulfilled:
Reticulocytes <60x109/L (using an automated analyzer) or < 20 x 109/l (manual count)
Platelets < 20x109/L
Absolute neutrophils <0.5 x109/L
**Very severe AA (vSAA)**
For vSAA, the same criteria of SAA have to be fulfilled; however the absolute neutrophil count has to be < 0.2 x109/l

**Moderate Aplastic Anaemia (AA)**
Moderate AA is considered when the severity criteria of SAA are not fulfilled.

## 3.6 FANCONIANAEMIA

It is an autosomal recessive inherited disorder of bone marrow failure syndrome characterized by decreased production of all types of blood cell. The underlying problem appear to be defective DNA repair

**Diagnostic Criteria**
- Growth retardation and congenital defect of the skeleton.
- Abnormal skin pigmentation (café-au-lait spots).
- Any of 8 gene mutations FANCA through FANCL are associated.
- The majority of the patients have mutations of FANCA, C or G.
- Marrow hypocellularity and pancytopenia may appear gradually after age 5yrs.

**Clinical Features**
- Fatigue
- Pallor, dyspnoe on exertion,
- Bleeding
- Infection as a consequence of cytopenia
- Growth retardation result in short stature especially dysplastic radii and thumbs
- Microcephaly and mental retardation may be a feature
- Hypogonadism

The median survival of untreated severe aplastic anaemia is 3-6 months (~20% survive longer than 1 year

**Non-Pharmacological Treatment**
**Supportive**
- Blood transfusion (irradiated, leucodepleted) when Hb<7
- Platelet transfusion if bleeding (using single donor)
- Antibiotic esp broad spectrum to prevent infections
- Netropenic measure possible isolation of the patient, use of mask
- Allogeneic stem cell transplantation (indicated in patients younger than 45yrs)

**Pharmacological Treatment**
**Immunosuppressive Therapy**

**S:** Anti-thymocyte globulin (ATG) 40mg/kg/daily IV 4–10 days

**OR**

10–20 mg/kg IV every day for 8–14 days, then every other day PRN up to total of 21 doses

**OR**

**S:** Cyclosporine 3–7mg/kg daily 4–6 month

**OR**

**S:** Methylprednisolone 5–10mg/kg for 3–14 days

**OR**

**S:** Cyclophosphamide 45mg/kg per day for 4 doses

**OR**

**S:** Danazol 5mg/kg//day for 6 months

| |
|---|
| Give supportive therapy and refer to higher health facility with adequate expertise and facilities patient to tertiary hospital for diagnosis and treatment. |

## 3.7 BLEEDING DISORDERS

### 3.7.1 Hereditary Bleeding Disorders

Hereditary bleeding disorders includes haemophilia A and B, Von Willebrand disease

#### 3.7.1.1 Haemophilia

Haemophilia is an inherited, X-linked lifelong bleeding disorder which affects males almost exclusively. Most frequent haemorrhage involves joints or muscles. Bleeding parttens differ with age: Infants usually bleed into soft tissues or from the mouth but as the boy grows, characterist joint bleeding becomes more common.

**Haemophilia A (Factor VIII deficiency)**

- Is the most common of the hereditary clotting factor deficiencies and are caused by deficiency of factor VIII
- The inheritance is sex linked but up to 33% of patient have no family history and result from spontaneous mutation

**Clinical Features**: spontaneous joint bleeding without injury, prolonged bleeding after injury, spontaneous muscle bleeding, retroperitoneal bleeding, epistaxis and easy bruising. Complication includes arthropathy and disability.

**Haemophilia B (Factor IX deficiency)**

- Is due to deficiency of clotting factor IX
- Presentation as in Haemophilia A, this is less common 20%.

**Classification of Haemophilia**

Haemophilia is classified as mild, moderate or severe according to the levels of circulating factor VIII or IX and indicates the expected frequency of bleeding.

**Table 3.3: Classification of Hemophilia**

| Classification | Haemophilia A Factor VIII level | Haemophilia B Factor IX level | Clinical features |
|---|---|---|---|
| Severe | <1% of normal<br>≤ 0.01 U/ml | ≤ 1% of normal<br>≤ 0.01U/ml | 1.Spontaneous haemorrhage<br>2.Frequent spontaneous haemarthrosis |
| Moderate | 2-5%of normal<br>0.01-0.05 U/ml | | 1.Haemorrhage secondary to trauma or surgery<br>2.Occasional spontaneous haemarthrosis |
| Mild | 5-40%of normal | 5-40% of normal | 1.Haemorrhage post trauma or surgery<br>2. Rare spontaneous |

**Investigations**

- Prolonged aPTT but normal Platelets counts
- Confirm by factor VIII or IX assay

**General Management of Haemophilia**

- Avoid I.M injections and use small gauge needles if necessary
- Avoid use of NSAIDs, instead use paracetamol
- Inform the patient and parents thoroughly on the problem, and provide means of alerting other medical/pharmaceutical personnel
- Genetic counselling
- For Acute Bleeding episodes ( RICE)
- Ice/cold pack – 5 minutes on, 10 min off - Immobilize joint with a splint
- For haemarthrosis – AVOID incising or aspiration of the affected joint. Treat by replacing the specific factor e.g factor 8 or 9 concentrate if available or FFP (10ml/kg), joint support and tabs Paracetamol for pain.

**Pharmacological Treatment**

**Haemophilia A (Factor VIII Deficiency) no Inhibitor**

Dose depends on bleeding severity

Minor bleed:

**D:** Factor VIII 20–40IU/kg.

Major bleed:

**D:** Factor VIII 50–100 IU/kg

Expected response: 1IU/kg = 2% rise in factor VIII level

Half life Factor VIII: 8–24 hrs

**NOTE:** If there is no response to appropriate replacement therapy test for inhibitors

**Haemophilia B (Factor IX deficiency) no inhibitor**

Dose depends on bleeding severity

Minor bleed:

**D:** Factor IX 20-50IU/kg

Major bleed:

**D:** Factor IX 100IU/kg

Expected response: 1IU/kg= 1.5 rise in the factor IX level

Half-life Factor IX: 16–24 hrs

**OR**

**C:** Fresh frozen plasma (FFP) can be used where factor concentrate is unavailable. Average dose 10-15mls/kg

**Note:**
If there is no response to appropriate replacement therapy tests for inhibitors (an inhibitor is formed when one develops antibodies against factor concentrates)
Detection of inhibitor is by aPTT mix study and confirmed by Bethesda assay (BU)

**Factor VIII Inhibitor management Options**

- High dose factor concentrate infusion
- Use by-pass agent like FEIBA (APCC) or NOVO seven
- Immune tolerance induction therapy (ITI)
- In case of emergency surgery consider plasmapheresis
- Adjuvant antifibronolytic agents can used with either of the above

**Note:**

- All patients suspected with haemophilia A or B refer to the haemophilia treatment centre or consult haematology Unit.
- Children with severe haemophilia are recommended to be on low dose prophylaxis of factor concentrate

### 3.7.1.2 Von Willebrand Disease (VWD)

Von Willebrand Disease is inheritade disease due to deficiency of vWF and patients present with a history of easy bruising, menorrhagea, gum bleeding and spontaneous joint bleeding in severe form, this is a commonest bleeding disorder in the population especially in women.

**Diagnostic Criteria**

Familial history of bleeding disorder is important, aPTT and platelets normal in except in severe form.

Confirmatory test: VWF level assay.

**Pharmacological Treatment**

**C:** Tranexamic acid 500mg (PO) 8 hourly until bleeding is stopped.

**OR**

**C:** Etamsylate 500mg (PO) 8 hourly until the bleeding stop

If no response

**S:** Desmopresin (DDVAP) infusion 0.3µg/kg IV Max. Dose20µg.

**Note:**

- Patient unresponsive to DDVAP may be treated with virus-inactivated vWF containing FVIII concentrate.
- Never give Etamsylate or Tranexamic acid to patients bleeding per urethral

## 3.7.2 Acquired Bleeding Disorders/Platelet Disorders

### 3.7.2.1 Disseminated Intravascular Coagulation (Dic)

Disseminated intravascular coagulation (DIC) is a pathologic, excessive generation of thrombin and fibrin in the circulating blood. During the process, increased platelet aggregation and coagulation factor consumption occur this does not allow time for compensatory increase in production of coagulant and anticoagulant factors.

**Diagnostic Criteria**

- Usually are related to the underlying disorder to the DIC or both
- Bleeding manifestation,
- Extensive organ dysfunction,
- Shock, renal cortical ischemia, coma, delirium and focal neurological symptoms.

**Non-Pharmacological Treatment**

Rapid and appropriate treatment of the underlying disorder, including antibiotics for infection, surgical debridement of necrotic tissues, chemotherapy for acute leukemia, of evacuation of dead fetus; transfusion with platelets support for thrombocytopenia, fresh frozen plasma (FFP) for coagulation factor depletion and cryoprecipitate for hypofibrinogenemia .

Multifactor deficiency, Liver disease gives Fresh Frozen Plasma 10-15mls/kg until bleeding is stoped

- Monitor prothrombin time (PT), international normalized ratio (INR), activated partial thromboplastin (APTT), platelet count and fibrinogen.
- Identify and treat the cause for example infection, Leukaemia especially Acute PromyelocyticLeukaemia, sereve burn, Abraptio placenta
- Vitamin K deficiency

**CAUTION:** If patient is not bleeding Platelets concentrate is contraindicated. If DIC is severe enough to cause multiorgan dysfunction, management in an intensive care unit is required.

### 3.7.2.2 Idiopathic thrombocytopenic Purpura (ITP)

Idiopathic thrombocytopenic Purpura is an acquired disease of children and adults and defined as isolated thrombocytopenia with no clinically apparent associated condition or other causes of thrombocytopenia. The diagnosis relies on exclusion of other causes of thrombocytopenia.

Clinical feature for adult thrombocytopenia appears to be more common in young women than in young men but among older patients, the sex incidence may be equal. Most adult patient presents with a long history of Purpura, menorrhagia, epistaxis and gingival haemorrhage are more common.
Intracerebral haemorrhage occurs infrequently but is the most cause of death overt bleeding is rare unless thrombocytopenia severe (less than 10,000/µl)

**Note**: A palpable spleen strongly suggests that ITP is *not* the cause for thrombocytopenia.

**Treatment**
Patients who are incidentally discovered to have asymptomatic mild or moderate ITP can safely be followed with no treatment. Patients with platelet counts over 50,000/µl usually do not have spontaneous bleeding and may undergo invasive procedure. Emergenct treatment of acute bleeding caused by severe thrombocytopenia need immediate platelet transfusion is indicated in patient with haemorrhagic emergencies

**Pharmacological Treatment**

**C**: Prednisolone 1mg/kg/day (PO) for 3–6 months then taper 10mg weekly (For all patients with platelet counts below 30,000 to 50,000µl)

**OR**

**S:** IV Immunoglobulin may be given as a single dose infusion of 0.4-1.0g/kg followed by immediately platelets transfusion

**C:** 1 mg/kg/day for 7 days and tapered over a week

**Surgical Management**
Splenectomy is indicated in patient with refractory to prednisolone.

## 3.8 COAGULATION DISORDERS

Venous thromboembolism (VTE) is a common disorder that comprises deep vein thrombosis (DVT) and pulmonary embolism (PE). Most clinically important pulmonary embolism arises from proximal deep vein thrombosis i.e. popliteal, femoral or iliac veins in at least 90%.

### 3.8.1 Deep Vein Thrombosis (Dvt) Propagative

Clinical features of Deep Vein Thrombosis includes

- Leg pain, tenderness and swelling.
- A palpable cord representing thrombosed vessels.
- Discoloration, venous distention and prominence of superficial veins and cyanosis.
- The clinical diagnosis of DVT is highly nonspecific.
- In most patients the symptoms and signs are nonspecific.

### 3.8.2 PULMONARY EMBOLISM (PE)

Clinical features of PE includes

- Transient dyspnea and tachypnea in the absence of other clinical features
- Pleuritic chest pain, cough, haemoptysis ,pleural effusion, and pulmonary infiltrate
- Severe dyspnea nad tachypnea and right side heart failure
- Cardiovascular collapse with hypotension, syncope, and coma
- Several less common and nonspecific presentation including unexplained tachycardia or arrhythmia, resistant cardiac failure, wheezing, cough, fever, apprehension and confusion.

**Treatment of Venous Thromboembolism**

Long term anticoagulation is required to prevent a frequency of symptomatic extension of thrombosis and/or recurrent venous thromboembolic events. Warfarin is started with initial heparin or clexane therapy and then overlapped for 4-5days.

**D:** Warfarin 5mg PO for 4–5 days

**OR**

**D:** Low Molecular weight Heparin 1mg/kg subcutaneous for 4–5days

**OR**

**D:** Unfractionated Heparin by 75units/kg IV followed by continuous infusion of 18units/kg/hrs.

Adolescents or children: lower loading dose then 15–25 Units /kg/hr by IV infusion or 250units/kg every 12hrs by subcutaneous injection.

Pregnant women:

**D:** Low Molecular weight Heparin (Clexane) 1mg/kg SC and should be monitored by anti-Xa levels.

**NOTE**

Warfarin therapy should be monitor by INR after 5–7 days of treatment. Heparin should be monitored by aPTT before treatment is initiated and monitor aPTT hourly until aPTT is twice of the initial.

# CHAPTER FOUR
# NOTIFIABLE DISEASES

Diseases under this section pose as public health risks and emergencies with potential of international spread. They require immediate notification to health uuthorities as required by the International Health Regulations, in order to ensure prompt and effective response to avoid further spread and prevent deaths.

**Note:**

- Immediately notify the National Surveillance System as soon as there is a suspect or a case is detected.
- Immediately notifiable disease in Tanzania include Cholera, Anthrax, Plague, Viral Haemorrhagic diseases (Ebola, Lassa, and Marburg), Yellow fever, Cerebrospinal Meningitis. Human Influenza of new subtype, Small Pox, Measles, Bacillary Dysentery, Rabies/Animal Bite and Epidemic Viral Keratoconjuctivitis
- Treat cases on site, in an isolation ward or an established isolation centre
- Use Personal Protective Equipment (PPE) before attending a suspected patient
- Wash hands with liquid soap and running water or use sanitizers as protective measures

## 4.1 BACTERIAL INFECTIONS

### 4. 1.1 Cholera

Cholera is an acute gastrointestinal infection caused by *Vibrio cholerae*. Infection occurs through ingestion of contaminated water or food by human faeces leading to severe diarrhoea and emesis associated with body fluid and electrolyte depletion.

**Note:** When a case of cholera is suspected at home, advise to rehydrate the patient using ORS if available while preparing to take a patient to the nearest health facility or Cholera Treatment Centre

**Diagnostic Criteria**

- A sudden onset of painless watery diarrhoea that may quickly become severe with profuse watery stools, vomiting, severe dehydration and muscular cramps, leading to hypovolemic shock and death
- The stool has a characteristic “rice water” appearance (non-bilious, grey, slightly cloudy fluid with flecks of mucus, no blood and inoffensive odour)

**Investigation**

- Laboratory evidence of dark field microscopic isolation of motile curved bacillus on a wet mount of fresh stool specimen. **OR**
- Isolation of bacteria through stool culture on TCBS agar.

**Note:**

- For confirmation at the beginning of an outbreak, rectal swab or stool specimen should be taken from first 5 to 10 suspected cases.
- If any are positive, every tenth case will be sampled for specimen throughout the outbreak
- Manage a suspected cholera case in an isolation ward or in an established Cholera Treatment Centre

**Prevention**

- Drink water from safe sources (taps, decontaminated deep wells, bottles)
- Boil water or treat it to kill bacteria and make it safe for drinking and other domestic uses
- Wash hands with liquid soap and running water after visiting the toilet, before preparing foods, and before eating
- DO NOT eat uncooked street food and do not eat cooked food that is no longer hot.
- DO NOT eat street prepared fresh fruits. Always eat home prepared fresh fruits

**Management**

- Assess the patient's level of dehydration as per National Guidelines for Prevention and Control of Cholera. It is of paramount importance to make correct diagnosis and administer the right treatment according to the Treatment
    - plan A: No dehydration,
    - plan B: Moderate dehydration and
    - plan C: Severe dehydration.

**Pharmacological Treatment:**

For Severe dehydration:

- Administer intravenous (IV) fluid immediately to replace fluid deficit; Use Ringer Lactate solution or, if that is not available, 0.9% sodium chloride solution. Give 100 ml/kg IV in 3 hours, 30 ml/kg as rapidly as possible (within 30 min) then 70 ml/kg in the next 2.5 hours.
- After the initial 30 ml/kg has been administered, the radial pulse should be strong and blood pressure should be normal. If the pulse is not yet strong, continue to give IV fluid rapidly. Administer ORS solution (about 5 ml/kg/hour) as soon as the patient can drink, in addition to IV fluid.
- If the patient can drink, begin giving **A**: oral rehydration salt solution (ORS) by mouth while the drip is being set up; ORS can provide the potassium, bicarbonate, and glucose that saline solution lacks. Give an oral antibiotic to patients with severe dehydration as follows:

Adults (Not for pregnant women)

**A:** Doxycycline (PO) 300 mg as a single dose or 5mg/kg single dose

**OR**

**A:** Ciprofloxacin (PO) 1g stat or 15mg/kg 12 hourly for 3 days

**AND**

**A:** Folic acid (PO) 5mg once daily for the duration of the treatment.

Expectant mothers:

**A:** Erythromycin (PO) 500mg 8 hourly for 5 days

Children:

**A:** Erythromycin syrup (PO) 12.5mg/kg 6 hourly for 3 days

**OR**

**A:** Co-trimoxazole 48mg/kg once a day for 3 days

For adolescents:

**A:** Ciprofloxacin (PO) 12mg/kg 2 times for 3 days

**OR**

**A:** Doxycycline (PO) 300mg as single dose or 5mg/kg single dose

**AND**

**A:** Folic acid (PO) 2.5mg once daily for children < 6 months, or 5mg once daily for children >6 months for the duration of the treatment

**AND**

**A:** Zinc (PO) 10mg once daily for children <6months, or 20mg once daily for children >6 months for duration of 10 days

***Note:**

- Ciprofloxacin was previously contraindicated to children under 12 years. Recent studies have shown it to be safe for use in children
- Start feeding 3-4 hours after oral rehydration begins. Preferably, give antibiotics with food to minimize vomiting

**For moderate Dehydration**

- Give oral rehydration, approximately 75-100ml/kg in the first four hours
- Reassess after four hours; if improved, continue giving WHO based ORS, in quantity corresponding to losses (eg. after each stool) or 10 to 20ml/kg. If not improved, treat as severe

If no signs of dehydration

- Patients who have no signs of dehydration when first observed can be treated at home
- Give these patients ORS packets to take home, enough for 2 days
- Demonstrate how to prepare and give the solution
- Instruct the patient or the caretaker to return if any of the following signs develop; increased number of watery stools repeated vomiting or any signs indicating other problems (eg, fever, blood in stool)

**Note:**

Prophylaxis of cholera contacts is not recommended. Routine treatment of a community with antibiotics, or mass chemoprophylaxis, has no effect on the spread of cholera, can have adverse effects by increasing antimicrobial resistance and provides a false sense of security.

### 4.1.2 Anthrax

Anthrax is a bacterial disease caused by the spore forming Bacillus anthracis, a Gram positive, rod-shaped bacterium. It is a zoonotic disease whereby man is infected directly through contact with infected hides or inhalation of spores in the lungs or ingestion of infected meat. It can be cutaneous, pulmonary and/or intestinal.

**Diagnostic Criteria:**

- Itching
- A malignant pustule,
- Pyrexia
- Pulmonary and gastrointestinal signs.

**Pharmacological Treatment**

**A:** Benzylpenicillin. Adult 0.6 MU I.V every 6 hours until local oedema subsides then continue with
**A:** Phenoxymethylpenicillin 250 mg 6 hourly for 7 days
**A:** Paracetamol 15mg/kg 8 hourly for 3 days

### 4.1.3 Plague

An infectious disease caused by the bacteria *Yersinia pestis***,** usually found in small mammals and their fleas. It is transmitted between animals from their fleas. Humans can be contaminated by the bite of infected fleas, through direct contact with infected materials or by inhalation.

**Diagnostic Criteria**

- Sudden onset of fever, chills, head and body aches
- Weakness, vomiting and nausea.
- Yersinia pestis is identified by laboratory testing from a sample of pus from a bubo, blood or sputum.
- A specific Y. pestis antigen can be detected by different techniques.

There are 3 forms of plague infection, depending on the route of infection:

- **Bubonic** plague is the most common, caused by the bite of an infected flea. *Y. pestis*, enters at the bite and travels through the lymphatic system to the nearest lymph node, replicates itself and causes the lymph node to be inflamed, tense and painful, turning into open sores with pus.
- **Septicaemic** plague occurs when infection spreads through the bloodstream, following untreated bubonic plague causing bleeding, tissue necrosis and shock.
- **Pneumonic** plague is the most virulent form and is rare. It is typically caused by spread to the lungs from advanced bubonic plague. However, any person with pneumonic plague may transmit the disease via droplets to other humans. Untreated pneumonic plague can be fatal.

**Prevention:**

- Inform people of the presence of zoonotic plague and advised to take precautions against flea bites

- Do not handle animal carcasses and avoid direct contact with infected body fluids and tissues
- Apply standard precautions when handling potentially infected patients and while collecting specimens

**Vaccination:** Not recommended expect for high-risk groups (such as laboratory personnel who are constantly exposed to the risk of contamination, and health care workers).

**Pharmacological Treatment**

**C.** Streptomycin 30 mg/kg/day (up to a total of 2 g/day) in divided doses IM, to be continued for 10 days of therapy or until 3 days after the temperature has returned to normal.

### 4.1.4 Cerebro-Spinal Meningitis

Further information on Meningitis refer Nervous system (**chapter eight**). Note that for epidemics, N. *Neisseria meningitidis* is the one with the potential to cause large epidemics.

**Diagnostic Criteria**

- Sudden fever
- Neck stiffness,
- Intense headache, nausea and vomiting,
- Altered consciousness and convulsions,
- Bulged anterior fontanelle (in infants)

### 4.1.5 Neonatal Tetanus

Usually occurs through introduction of tetanus spores via the umbilical cord during delivery through the use of an unclean instrument to cut the cord, or after delivery by "dressing" the umbilical stump with substances heavily contaminated with tetanus spores.

**Diagnostic Criteria**

- Sudden inability of a newborn to suck/feed between 2$^{nd}$ and 28$^{th}$ day after birth
- Generalized stiffness
- Convulsions

**Prevention**

- Immunize women of reproductive age with TTCV, either during pregnancy or outside of pregnancy. This protects the mother and also her baby through the transfer of tetanus antibodies to the fetus.

- Good hygienic practices when the mother is delivering a child are also important to prevent neonatal and maternal tetanus.

To be protected throughout life, WHO recommends that an individual receives 6 doses (3 primary plus 3 booster doses) of TTCV through routine immunization.

**Management**

- Rigorously cleanse the umbilical stump to stop the production of toxin at the site of infection
- Antibiotic therapy:
  **A:** Amoxycillin via Nasal Gastric Tube 20–30 mg/kg/day every 8 hours
  **AND**
  **A:** Metronidazole 7.5 mg/kg For postnatal age ≤7 days: 1200–2000 g: 7.5 mg/kg/day given every 24 hours >2000 g: 15 mg/kg/day in divided doses every 12 hours. Postnatal age >7 days: 1200-2000 g: 15 mg/kg/day in divided doses every 12 hours >2000 g: 30 mg/kg/day in divided doses every 12 hours

- Immunotherapy, to neutralise circulating toxin
  **B:** Administer human antitetanus immunoglobulin (TIG), 100–300 IU/kg intramuscularly stat, with the dose divided into two different muscle masses

- To provide effective management of muscle spasm, give a sedative cocktail of ALL the following via NGT:
  **B:** Diazepam 0.5 mg/kg every 6 hours
  **AND**
  **A:** Chlorpromazine 2 mg/kg every 6 hours
  **AND**
  **B:** Phenobarbitone 6 mg/kg every 12 hours

**Table 4.1: Guidelines for Dosage Administration****

| **Time (hours)** | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 |
|---|---|---|---|---|---|---|---|---|---|
| Diazepam | * | * | | * | | * | | * | * |
| Chlorpromazine | | * | | * | | * | | | |
| Phenobarbitone | * | | * | | | | | * | |

** These are general guidelines. Frequency of drug administration should be titrated vs clinical condition

- Airway / respiratory control
  - Provide mechanical ventilation.
- Provide adequate fluids and nutrition, as tetanus spasms result in high metabolic demands and a catabolic state.

## 4.1.6 Tick-Borne Relapsing Fever

A bacterial infection caused by *Borrelia* bacteria, transmitted to humans through the bite of infected "soft ticks", that live within rodent burrows, feeding on the rodent. Humans typically come into contact with soft ticks when they sleep in rodent-infested cabins.

**Diagnostic Criteria**

- Recurring episodes of high fever, headache, muscle and joint aches, and nausea
- Reccurring symptoms, producing a telltale pattern of fever lasting roughly 3 days, followed by 7 days without fever, followed by another 3 days of fever. Without antibiotic treatment, this process can repeat several times.

**Investigation**

- Peripheral blood smear reveals a long and spiral-shaped bacterium.

**Prevention**

- Avoid sleeping in rodent-infested buildings whenever possible. Although rodent nests may not be visible, other evidence of rodent activity (e.g., droppings) are a sign that a building may be infested.
- Prevent tick bites. Use insect repellent (on skin or clothing) or permethrin (applied to clothing or equipment).

## 4.2 VIRAL INFECTIONS

### 4.2.1 Viral Haemorrhaghic Fevers

Viral Haemorrhagic Fever (VHF) is a general term for a severe illness caused by viruses and sometimes associated with bleeding.

#### 4.2.1.1 Ebola and Marburg Haemorrhagic Fevers

Primary transmission is from animal to human, through contact with an infected animal or its product. Secondary transmission is from person to person through:

- Contact with a sick person or direct contact with the blood and/or secretions or with objects, such as needles that have been contaminated with infected secretions of an infected person.
- Breast feeding
- Sexual contact

The disease can spread rapidly within the health care setting. The virus enters through broken skin, mucous membrane or exchange of bodily fluids or ingestion, inhalation and injection of infectious material

**Diagnostic Criteria**

High grade fever and one or more of the following**:**

- Headache, body ache, abdominal pain, diarrhoea
- Unexplained haemorrhage may be present or not

**Investigations**

- Blood for RT-PCR
- Antigen detection or IgM (ELISA)

**Note:**

- Do not take specimen before wearing appropriate PPE and ensuring the patient is in an isolation ward/centre

**Non-Pharmacological Treatment:**
There is no specific treatment for Ebola and Marburg Haemorrhagic Fever.
Supportive therapy includes:

- Mechanical ventilation, renal dialysis, and anti-seizure therapy may be required.
- Management of complications symptomatically
- Maintaining Oxygen status and Blood Pressure

**Pharmacological Treatment**

**A:** Paracetamol 15mg/kg 8 hourly for 3 days

- Treat for any complicating infection and co-morbid condition
  **B:** Give oxygen and manage hypoglycaemia if present
- Fluid and electrolyte balance
  **A:** Sodium Lactate Compund (Ringers Lactate), NS intravenously if cannot take fluids orally

Psychological support is given to patient and family

**4.2.1.2 Rift Valley Fever**

This is a viral zoonosis that is primarily spread amongst animals by the bite of infected mosquitoes, transmitting the Rift Valley virus. Aedes mosquitoes are the main vector biting animals. Transmission to human is mainly through direct or indirect contact with blood or organs of infected animals. The virus can be transmitted to human through;

- Handling of animal tissue during slaughtering or butchering, assisting with animal births, conducting veterinary procedures.
- Inoculation e.g via wound from infected knife or through contact with broken skin or through inhalation of aerosols produced during the slaughter of an infected animals.
- Infected mosquito.

Human become viraemic; capable of infecting mosquitoes shortly before onset of fever and for the first 3–5 days of illness. Once infected, mosquitoes remain so for life.

**Diagnostic Criteria**

- Acute febrile illness that does not respond to antibiotic or antimalarial therapy,
- Exhaustion, backache, muscle pains, headache (often severe),
- Photophobia
- Nausea/vomiting
- Evidence of bleeding into skin, bleeding from puncture wounds, from mucous membranes or nose, from gastrointestinal tract and unnatural bleeding from vagina
- Clinical jaundice (3-fold increase above normal of transaminases)

**Investigations**

Anti-RVF IgM ELISA antibodies or positive test on Reverse Transcriptase Polymerase Chain Reaction (RT-PCR)

- FBC
  - Low Hb [Hb $< 8$ gm/dL - Severe pallor

- Low platelets < 100x109 / dL (thrombocytopenia)–small skin and mucous membrane haemorrhages (petechiae)
- Serum Creatinine

**Treatment**
There is no any established course of treatment of this disease. Most of human cases are relatively mild and of short duration so will not require any specific treatment.

**4.2.1.3 Yellow Fever**
An acute viral infection, transmitted to human through a bite of infected Aedes mosquitoes. It is caused by a virus that belongs to the family Flavivirus. The disease can be life threatening causing hemorrhagic fever and hepatitis.

**Diagnostic Criteria**
- Fever, headache, jaundice, muscle pain, nausea, vomiting and fatigue.

**Non-Pharmacological Treatment**
No specific anti-viral treatment, supportive therapies are recommended.

**Prevention**
Prevention and Control involve mosquito control and provision of Yellow Fever vaccine.

**Indication of Yellow Fever Vaccination**
- Persons ≥ 9 months of age
- Planning travel to or residence in an endemic area
- Planning travel to a country with an entry requirement
- Needs to be given ≥ 10 days prior to arrival in endemic area

**4.2.1.4 Dengue Fever**
Dengue is a mosquito-borne viral infection causing by the dengue fever virus, whose full life cycle involves the role of mosquito as a transmitter (or vector) and humans as the main victim and source of infection. Dengue does not spread directly from person to person, it is only spread through the bite of an infected Aedes aegypti mosquito.

**Diagnostic Criteria**
**Dengue Febrile Illness (DF):**
- retro-orbital or ocular pain, headache, rash, myalgia, arthralgia,
- hemorrhagic manifestations (e.g., positive tourniquet test, petechiae; purpura/ecchymosis; epistaxis; gum bleeding; blood in vomitus, urine, or stool; or vaginal bleeding,
- Anorexia, nausea, abdominal pain, and persistent vomiting may also occur but are not case-defining criteria.

**Dengue Hemorrhagic Fever (DHF)**
- Persistent high grade Fever lasting from 2–7 days
- Spontaneous bleeding
- Retro-orbital pain
- Joint, muscle and abdominal pain

- Macular or confluent blanching rash (noted during recovery period)
- Thrombocytopenia (>100,000 cells per $mm^3$)

**Dengue Shock Syndrome (DSS)**

- All criteria for DHF plus circulatory failure as evidenced by rapid and weak pulse and narrow pulse pressure (<20mm Hg)
- Age-specific hypotension and cold, clammy skin and restlessness

**Investigations**

- Elisa for Dengue NSI antigen
- Serological tests: Dengue IgM & IgG Rapid Strip Test.
- FBP

**Non-Pharmacological Treatment**

No specific treatment is available for Dengue fever.

**Pharmacological Treatment:**

A: Paracetamol 15mg/kg 8 hourly for 3 days
A: Maintainance fluid (Ringers lactate, NS) intravenously if child cannot take enough orally
B: Blood transfusion and clotting factors.
B: Oxygen and manage hypoglycaemia if present

**Note:**

- No antibiotics are of proven value.
- Children below 12 years require close monitoring for dangerous form.
- Avoid Aspirin and other NSAIDs.
- Steroids should not be used.

**4.2.1.5 Chikungunya Fever**

**Transmission:** Chikungunya Virus Disease is caused by Chikungunya Virus, transmitted by the *Aedes aegypti* mosquito the same which transmit Dengue virus, West Nile and Yellow Fever viruses.

**Diagnostic Criteria:**

- Fever, Skin rashes, Conjunctivitis
- Muscle and joint pain (Polyarthritis), Malaise, Headache
- Minor haemorrhage, Leukopenia is common

**Prevention and control:** Vector control:removal and modification of breeding sites and reducing contact between mosquitoes and people.

**Non-Pharmacological Treatment:**

Supportive

**Pharmacological Treatment**

- Symptomatic treatment
  **A:** Sodium Lactate Compound (Ringers Lactate) intravenously
  **A:** Give Paracetamol 15mg/kg 8 hourly for 3 days

### 4.2.2 Measles

Measles is an acute, highly communicable infectious disease caused by Measles virus. The mode of transmission is airborne, by droplet spread through coughing or sneezing, or by direct contact with nasal or throat secretions of infected persons.

**Diagnostic Criteria**

- Generalized, reddish (erythematous), blotchy (maculopapular) rash;
- History of fever usually above 38˚C (if not measured, then "hot" to touch);
- Dry cough; Sore throat; Runny nose (coryza);
- Inflamed eyes (conjunctivitis), tiny white spots with bluish-white centers on a red background found inside the mouth on the inner lining of the cheek- also called Koplik's spots.
- In addition, children with measles frequently exhibit a dislike of bright light (photophobia), and often have a sore red mouth (stomatitis).

**Pharmacological Treatment**

**Note:** No specific antiviral treatment exists for measles virus

Adults: **A:** Paracetamol tablets 1g every 8 hours for 5 days

**AND**

**A:** Vitamin A 200000 IU orally, stat

In case of ocular involvement, add

**A:** Oxytetracycline eye ointment 1% apply once daily for 7 days

Children:

**A:** Paracetamol 10–15mg/kg body weight every 8 hours for 5 days

**A:** Vitamin A if less than 1 year give 100000 IU stat and if over 1 year give 200000 IU

**Prevention**

Routine measles vaccination for children combined with mass immunization campaigns

### 4.2.3 Rabies

**(For more information on Rabies, please refer to the section on infectious diseases)**

Rabies is an acute viral infection of the central nervous system that affects all mammals and is transmitted to man by animal bites via infected secretions, usually saliva.

**Diagnostic criteria**

- Early clinical features: apprehensiveness, restlessness, fever, malaise and headache
- Late features: excessive motor activity and agitation, confusion, hallucinations, excessive salivation, convulsions and hydrophobia

**NOTE:** Treat the person immediately after the animal bite, before onset of symptoms

**Pharmacological Treatment**

Local wound therapy:-wash wound thoroughly with running water and soap for 10 minutes, and repeat process with: **A: 10% Povidone iodine**; to prevent secondary bacterial infection.

Active immunization: Human Diploid Cell Vaccine (HDCV) – either ID or IM

**A:** Anti-rabies Vaccines (2- 3 IU/dose)

- **IM:** 1ml on days 0, 3, 7, 14, 28 (5 doses)
- **ID:** 0.2ml by dividing 0.1 ml on left shoulder and 0.1ml on right shoulder, on days 0, 3,7 and 28 (4 doses). **Intradermal (ID)** is mostly advised.

In addition, patients should receive rabies immune globulin with the 1st dose (day 0)

**Passive Immunization**

**B:** Anti-rabies human immunoglobulin 20 IU/kg half the dose given parenterally and the other half injected into and around the wound

**AND**

**A:** Tetanus toxoid vaccine, please refer to the *section on Tetanus*

### 4.2.4 Zika Virus Disease

Zika Virus Disease is caused by Zika Virus, transmitted by the *Aedes aegypti* mosquito, the same which transmit Dengue virus (DENV), Chikungunya, West Nile and Yellow Fever viruses.

**Diagnostic Criteria:**

- Fever, skin rashes, conjunctivitis,
- Joint pain, malaise, Headache - usually mild and last for 2–7 days.
- Neurological and auto-immune complications of Zika virus disease, babies born with microcephaly (Observed in northeast Brazil).

**Investigations**

- PCR and virus isolation from blood samples.
- Diagnosis by serology can be difficult as the virus can cross-react with other flaviviruses such as dengue, West Nile and yellow fever.

**Prevention and control:**

- Vector control: - removal and modification of breeding sites and reducing contact between mosquitoes and people
- Currently no proven vaccine to prevent Zika virus infection

**Non-Pharmacological Treatment:**

Supportive

**Pharmacological Treatment**

- Symptomatic treatment –

**A:** Sodium Lactate Compound (Ringers Lactate) intravenously

**A:** Paracetamol 15mg/kg 8 hourly for 3 days

# CHAPTER FIVE
# MALARIA

Malaria is a disease caused by the plasmodium parasite that is transmitted by the bite of an infected female anopheles mosquito.

## 5.1 UNCOMPLICATED MALARIA

Uncomplicated malaria is defined as symptomatic malaria without signs of severity or evidence (clinical or laboratory) of vital organ dysfunction.

**Diagnostic Criteria**

- Fever
- Hheadache
- Joint pains
- Malaise
- Vomiting
- Diarrhea
- Body ache, body weakness
- Poor appetite
- Pallor, enlarged spleen

**Investigations**

The clinical features listed above are not specific for malaria and can be found in several other febrile conditions. Therefore, it is necessary to confirm malaria parasites infection and investigate for other causes of febrile illness. Parasite-based diagnosis is recommended for all patients presenting with signs and symptoms of malaria. The recommended investigations are:

- Quality malaria microscopy or
- Quality malaria Rapid Diagnostic Tests (mRDTs)

**Note:** It is compulsory to test and confirm all suspected malaria patients. Give antimalarial only to those who test positive

**Non-Pharmacological Management**

- Continue with feeding and fluid intake
- Followed up immediately if the condition worsens or on the fourth day if symptoms persist.

**Pharmacological Treatment**

Drug of choice for treatment of uncomplicated malaria is:

**A**: Artemether-Lumefantrine (AL), which is a fixed formulation of artemether 20mg and lumefantrine 120mg or dispersible tablets for paediatric use, also with a fixed formulation of artemether 20 mg and lumefantrine 120mg.

**Table 5.1: Dosage regimen for AL (artemether 20mg/lumefantrine 120mg)**

| | | Day 1 | | Day 2 | | Day 3 | |
|---|---|---|---|---|---|---|---|
| Kg | Dose | 1st | 2nd | 3rd | 4th | 5th | 6th |
| | Hours | 0 (*) | 8 | 24 | 36 | 48 | 60 |
| | Age (years) | tablets | Tablets | tablets | tablets | tablets | Tablets |
| **up to 15** | 0 to 3 | 1 | 1 | 1 | 1 | 1 | 1 |
| **15 up to 25** | 3 up to 8 | 2 | 2 | 2 | 2 | 2 | 2 |
| **25 up to 35** | 8 up to 12 | 3 | 3 | 3 | 3 | 3 | 3 |
| **35 and above** | 12 and above | 4 | 4 | 4 | 4 | 4 | 4 |
| ***(*) 0 hours means the time of starting medication*** | | | | | | | |

An alternative artemisinin-based combination therapy (ACT) for treatment of uncomplicated malaria is:

**B:** Dihydroartemisinin-Piperaquine (DPQ).

Strength: Standard tablet, fixed formulation containing 40 mg of Dihydroartemisinin (DHA) and 320 mg Piperaquine (PPQ). Paediatric formulation contains a fixed combination of 20 mg of Dihydroartemisinin (DHA) and 160 mg Piperaquine (PPQ)

**Table 5.2: Dose schedule for Dihydroartemisinin + Piperaquine**

| Body weight (kg) | Dihydroartemisinin + Piperaquine dose (mg) given daily for 3 days |
|---|---|
| 5 to < 8 | 20 + 160 |
| 8 to < 11 | 30+ 240 |
| 11 to < 17 | 40 + 320 |
| 17 to < 25 | 60 + 480 |
| 25 to < 36 | 80 + 640 |
| 36 to < 60 | 120 + 960 |
| 60 < 80 | 160 + 1280 |
| > 80 | 200 + 1600 |

**Analgesic Medicines**

- Patients with high fever (38.5$^0$C and above) should be given an antipyretic medicine like paracetamol or aspirin every 4 to 6 hours (maximum 4 doses in 24 hours) until symptoms resolve, usually after two days.
- Children below 12 years should not be given aspirin because of the risk of developing Reye's syndrome.

*For more details on management of fever and pain, refer to chapter one-syndromic*

## 5.2 SEVERE MALARIA

In a patient with *P. falciparum* asexual parasitaemia and no other obvious cause of symptoms the presence of one or more of features listed below classify the patient as suffering from severe malaria.

**Diagnostic Criteria**

- Prostration/extreme weakness
- Impaired consciousness
- Change of behaviour
- Convulsions
- Respiratory distress (due to lactic acidosis and/or pulmonary oedema)
- Bleeding tendency/DIC
- Jaundice
- Circulatory collapse/shock
- Vomiting everything
- Inability to drink or breast feed

**Investigations**

In severe malaria, blood slide (BS) is a recommended malaria test as it quantify parasitemia. In severe ill patients receiving injectable antimalarial, serial BS investigations monitors level of parasitemia to verify malaria recovery, or if clinical condition is not improving to rule out another serious condition.

- Blood film for malaria parasites
- Blood glucose estimation in patients with altered consciousness
- Haematocrit and/or haemoglobin estimation
- Lumbar puncture to exclude meningitis (if facilities for LP assessment are available)
- Serum creatinine or urea– to assess Kidney function
- Electrolytes– for early detection of acute renal failure
- Full blood cell count and differential white cell count for additional diagnosis of other infectious diseases
- Blood gases, pH and anion gap– to diagnose acidosis Radiological investigation: Chest X–ray; look for pulmonary oedema or lobar consolidation

**Non-Pharmacological Treatment**

Management of severe malaria comprises four main principles namely; rapid clinical assessment, management of emergency conditions, specific antimalarial treatment and supportive care. Severe malaria is a medical emergency. A rapid assessment must be conducted including airway, breathing, circulation, coma, convulsion, and dehydration status. Differential diagnosis must be made. If effective management of severe malaria and supportive care for complications is not possible, patients should be given pre-referral treatment and referred immediately to an appropriate facility for continued treatment.

**Pharmacological Treatment**

**A:** Parenteral artesunate

Dosage: 2.4 mg/kg in body weight. IV or IM given on admission (time = 0 hour), then at 12 hours and 24 hours for a minimum of 3 injections in 24 hours regardless of patient's recovery.

Children weighing less than 20 kg Dosage: 3 mg/kg/dose (or higher). Same schedule as indicated above (0, 12, 24 hours)

- Complete artesunate injection treatment by giving a complete course (3 days) of artemether-lumefantrine (AL) or other ACT

Administration and dosage (60 mg strength): Injectable artesunate has 2-steps dilutions.

- **Step 1**: The powder for injection should be diluted with 1ml of 5% sodium bicarbonate solution (provided in each box) and shaken vigorously 2–3 minutes for better dissolving until the solution becomes clear.
- **Step 2**: For slow intravenous infusion (3–4 minutes), add 5 ml of 5% dextrose or normal saline, to obtain artesunate concentration of 10 mg/ml. For deep intra–muscular injection, add 2 ml of 5% dextrose or normal saline to obtain a artesunate concentration of 20 mg/ml.

**Table 5.3: Dilution of artesunate for injection**

| **Route** | **IV injection** | | | **IM injection** | | |
|---|---|---|---|---|---|---|
| **Strength** | 30 mg | 60 mg | 120 mg | 30 mg | 60 mg | 120 mg |
| Sodium bicarbonate 5% | 0.5 | 1 | 2 | 0.5 | 1 | 2 |
| Normal saline or 5% of glucose | 2.5 | 5 | 10 | 1 | 2 | 4 |
| Total (ml) | 3 | 6 | 12 | 1.5 | 3 | 6 |
| Artesunate concentration (mg/ml) | 10 | 10 | 10 | 20 | 20 | 20 |

**Table 5.4: Dosage schedule for artesunate injection**

| **Weight** | **Dose** | **ml per dose strength 60mg** | | **Vials of Artesunate 60mg needed**** |
|---|---|---|---|---|
| **Kg** | **mg/kg** | **i/v** | **i/m*** | |
| | | **10 mg/ml** | **20 mg/ml** | |
| <5 | 3.0 | 1.5 | 1 | 1 |
| 5–8 | 3.0 | 2 | 1 | 1 |
| 9–12 | 3.0 | 4 | 2 | 1 |
| 13–16 | 3.0 | 5 | 3 | 1 |
| 17–20 | 3.0 | 6 | 3 | 1 |
| 21–25 | 2.4 | 6 | 3 | 1 |
| 26–29 | 2.4 | 7 | 4 | 2 |
| 30–33 | 2.4 | 8 | 4 | 2 |
| 34–37 | 2.4 | 9 | 5 | 2 |
| 38–41 | 2.4 | 10 | 5 | 2 |
| 42–45 | 2.4 | 11 | 6 | 2 |

| | | | | |
|---|---|---|---|---|
| 46–50 | 2.4 | 12 | 6 | 2 |
| 51–54 | 2.4 | 13 | 7 | 3 |
| 55–58 | 2.4 | 14 | 7 | 3 |
| 59–62 | 2.4 | 15 | 8 | 3 |
| 63–66 | 2.4 | 16 | 8 | 3 |
| 67–70 | 2.4 | 17 | 9 | 3 |
| 71–75 | 2.4 | 18 | 9 | 3 |
| 76–79 | 2.4 | 19 | 10 | 4 |
| 80–83 | 2.4 | 20 | 10 | 4 |
| 84–87 | 2.4 | 21 | 11 | 4 |
| 88–91 | 2.4 | 22 | 11 | 4 |
| 92–95 | 2.4 | 23 | 12 | 4 |
| 96–100 | 2.4 | 24 | 12 | 4 |

*Half the dose is rounded up to 1ml; **Full vial (s) might not be required for a given weight band. The left–over solution must be discarded within 1hr of preparation and must not be reused

**Alternative**

**B: Injectable artemether**

Artemether should be administered in a dose of 3.2mg/kg body weight loading dose IM stat then 1.6mg/kg body weight (time= 0h then at 24 hrs and 48hrs).

**Management of complications**

In an attempt to reduce the unacceptably high mortality of severe malaria, patients require intensive care. Clinical observations should be made as frequently as possible. Airway maintenance, nurse on side, fanning if hyperpyrexia is present, fluid balance review:

- **Coma (cerebral malaria):** maintain airway, nurse on side, and exclude other causes of coma (e.g. hypoglycemia, bacterial meningitis); avoid giving corticosteroids
- **Hyperpyrexia**: fanning, paracetamol if patient can swallow
- **Convulsions**: maintain airways; treat with rectal or IV diazepam 0.15 mg/ kg (maximum 10 mg for adults.) slow bolus IV injection. In children, diazepam rectal route should be used. Give a dose of 0.5–1.0 mg/ kg1. If convulsions persist after 10 minutes repeat rectal diazepam treatment as above. Should convulsions continue despite a second dose, give a further dose of rectal diazepam or phenobarbitone 20 mg/ kg IM or IV after another 10 minutes
- **Hypoglycemia**: remains a major problem in the management of severe malaria especially in young children and pregnant women. It should be deliberately looked for and treated accordingly. Urgent and repeated blood glucose screening; In children: give 5 mls/kg of 10% dextrose OR 2.5 mls/kg of 25% dextrose as bolus; if 50%dextrose solution is available, it should be diluted to make 25% by adding an equal volume ofwater for injection or normal saline. In

[1]Draw the IV preparation into a small syringe and remove the needle. Insert 5 cm of a nasogastric tube into the rectum. Inject the diazepam into the nasogastric tube and flush it with 5 ml of water. If a nasogastric tube is not available, use a syringe without a needle. Hold buttocks together for few minutes to ensure retention and absorption of the medicine

adults: give 125 mls of 10% dextrose OR 50 mls of 25% dextrose as bolus. Where dextrose is not available, sugar water should be prepared by mixing 20 gm of sugar (4–level tea spoons) with 200 ml of clean water. 50 ml of this solution is given ORALLY or by nasogastric tube if unconscious.

- **Severe anaemia**: transfusion of packed cells if haemoglobin (HB) equal or less than 4 g/dl and/or signs of heart failure and/or signs of respiratory distress
- **Acute pulmonary oedema**: Check for restlessness, frothy sputum, basal crepitation, low oxygen saturation (< 95%). Prop patient up to 45 degree angle; review fluid balance andrun patient on "dry side"; give diuretic (IV Furosemide) but avoiding inadequate perfusion of kidneys; set upCentral Venous pressure (CVP) line, give oxygen. Intubation /ventilation may be necessary
- **Acute renal failure**: exclude pre–renal causes, check fluid balance and urinary sodium. Ifadequately hydrated (CVP>5cm) try diuretics. Haemodialysis /hemofiltration (or if availableperitoneal dialysis) should be started early in established renal failure.

## 5.3 MALARIA IN PREGNANCY (MIP)

Malaria is an important cause of morbidity and mortality for the pregnant woman, the foetus and the newborn. The effects of malaria in pregnancy are related to the malaria endemicity, with abortion more common in areas of low endemicity and intrauterine growth retardation more common in areas of high endemicity. Hence, early diagnosis and effective case management of malaria illness in pregnant women is crucial in preventing the progression of uncomplicated malaria to severe disease and death.

### 5.3.1 Uncomplicated Malaria In Pregnancy

In high-transmission areas (moderate to high immunity); malaria is usually asymptomatic in pregnancy or is associated with only mild, non-specific symptoms. (*See section 5.1 above*)

**Pharmacological Treatment**
**First trimester of pregnancy**

**A:** Quinine tablets 10mg/kg 8 hourly

**Second and third trimester of pregnancy**
During the second and third trimesters of pregnancy artemether-umefantrine is the drug of choice

### 5.3.2 Severe Malaria In Pregnancy

In low-transmission areas (low malaria immunity); women in the second and third trimesters of pregnancy are more likely to develop severe malaria than other adults, often complicated by pulmonary oedema and hypoglycaemia.
The following are common features of severe malaria during pregnancy:

- High fever
- Hyperparasitemia
- Low blood sugar
- Severe haemolytic anaemia
- Cerebral malaria
- Pulmonary oedema

**Pharmacological Treatment**
The management of severe malaria in pregnant women does not differ from the management of severe malaria in other adult patients. (***See section 5.2*** *on Management of Severe Malaria*).

## 5.4 INTERMITTENT PREVENTIVE TREATMENT IN PREGNANCY (IPTP)

Malaria parasites can easily accumulate and multiply in the placenta leading to placenta malaria infections, resulting to complications such as maternal anaemia, low birth weight, premature delivery, congenital infection and/or perinatal death.

**Note:** IPTp is an administration of antimalarial in full therapeutic doses at predetermined intervals during pregnancy to individuals with no signs/symptoms of malaria. The aim is to prevent above mentioned complications with adverse effects to both mother and fetus[3]

**The medicine of choice for IPT**

**A**: Sulphadoxine/Pyrimethamine (SP). Give SP tablet strength 500 mg Sulphadoxine, 25 mg Pyrimethamine. Dosage:

- The dose is 3 tablets once
- A minimum of 3 doses of Sulphadoxine/Pyrimethamine (SP) in entire pregnancy period
- The first IPTp-SP dose should be administered from 14 weeks of pregnancy onwards
- Each SP dose should be given at least 4 weeks apart
- The last dose of IPTp with SP can be administered up to the time of delivery, without safety concerns

***Note:***

- SP should not be administered to women receiving cotrimoxazole prophylaxis or pregnant women who are taking folic acid at a daily dose equal or above 5 mg, as counteracts its efficacy
- SP can be administered safely with combined ferrous sulphate 200 mg + folic acid 0.25 mg (FeFo)
- If malaria is diagnosed to a scheduled pregnant woman for IPT with SP; SP should not be given, instead a full treatment with antimalarial should be given

# CHAPTER SIX
# HIV/AIDS

AIDs is a set of symptoms (or syndrome) caused by *Human Immunodeficiency Virus* (HIV). The clinical features may be due to HIV per se or as a result of immune system destruction.

**Diagnostic Criteria**

- Fever, diarrhoea, weight loss, skin rashes, sores, generalized pruritis, altered mental status, persistent severe headache, oral thrush or Kaposi's sarcoma may be found in patients with advanced disease
- Most patients, however, present with symptoms due to opportunistic infections e.g. tuberculosis, candidiasis or pyogenic infections

## 6.1 TREATMENT OF HIV/AIDS IN ADULTS AND ADOLESCENTS

- All HIV infected individuals are eligible for ART. Early initiation of combination treatment (ART) is associated with health benefits in terms of reduced morbidity and mortality in all age groups.
- Antiretroviral therapy (ART) has dramatically reduced HIV-associated morbidity and mortality and has transformed the HIV disease into a chronic, manageable condition. In addition, treatment of HIV-infected individuals with ART is highly efficient at preventing transmission to sexual partners and mother to child transmission (MTCT).

**Types of Antiretroviral Drugs**

The recommended antiretroviral drugs to be used in these guidelines fall into the following main categories:

i) Nucleotide reverse transcriptase inhibitors (NRTIs)
ii) Nucleoside reverse transcriptase inhibitors (NRTIs)
iii) 1st and 2nd generation non-nucleoside reverse transcriptase inhibitors (NNRTIs)
iv) Protease inhibitors (Pls)
v) Integrase strand transfer inhibitors (INSTI)/ Integrase inhibitors
vi) Fusion inhibitors
vii) Chemokine receptor inhibitors/CCR5 inhibitors

**Evaluation to be done before initiating ART**

From the moment a patient tests HIV-positive, he/she should be linked to the Care and Treatment Clinic (CTC). In health facilities where ART is being initiated at RCH and TB clinics, patients can be managed at those clinics. Mobile outreach clinics can also be used where there are no static clinics.

### 6.1.1 First-Line Art Treatment

The following ARV drug combinations are recommended for first-line treatment for adults and adolescents:

**Table 6.1 Recommended first-line regimens for adults and adolescents**

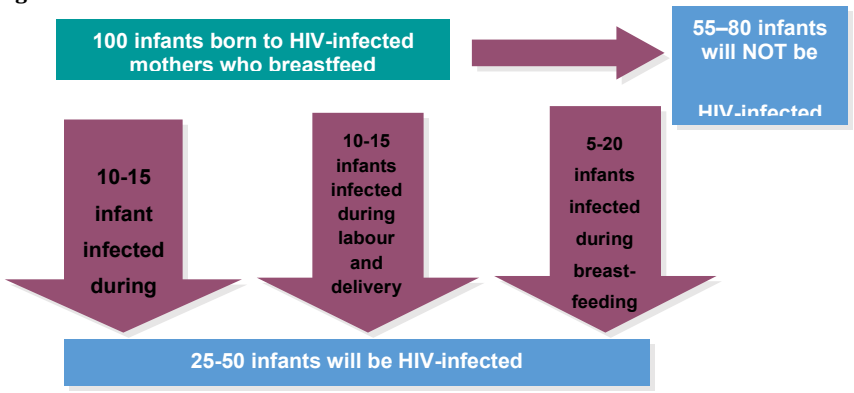
| Patient group | Preferred (Default) regimen | Alternative regimen |
|---|---|---|
| Adults and adolescents (≥15 years), Pregnant/lactating mothers | **A:** TDF/3TC/EFV600mg | **A:** TDF/FTC/EFV600mg<br>**A:** TDF/ (3TC or FTC) +DTG<br>**A:** ABC/3TC+EFV600 or DTG<br>**A:** AZT/3TC+EFV600 or DTG<br>**A:** AZT/3TC/NVP |
| TB co-infections | **A:** TDF/ (3TC or FTC) /EFV600mg | **A:**TDF/FTC/EFV600mg<br>**A:** TDF/ (3TC or FTC) +DTG<br>**A:** AZT/3TC+EFV600 or DTG<br>**A:** ABC/3TC+EFV600 or DTG |
| People who Inject Drugs (PWID) | **A:** TDF/(FTC or 3TC) +DTG | **A:** TDF/ (FTC or 3TC) +ATV/r |

Note:
In the first two weeks of treatment only half of the required daily dose of Nevirapine should be administered. In cases where patients need switching from NVP due to severe NVP associated adverse effects such as Stevens-Johnson's syndrome or hepatotoxicity, Efavirenz should not be used due to overlapping toxicities with Nevirapine. The patient should be introduced to DTG.

**ART in women of childbearing potential or pregnant women**

Mother-to-child transmission (MTCT) of HIV refers to the transmission of HIV infections from HIV-infected mothers to their infants. MTCT can occur during pregnancy, labour and delivery, and breast-feeding. Without intervention, the overall risk of MTCT is approximately 20%–45%. However, with interventions, this risk can be reduced to less than 5%. Transmission of HIV from mother to her child accounts for over 90% of all HIV infections in children aged below 15 years.

**Figure 6.1 Mother to Child Transmission of HIV**



**Prevention of Mother to Child Transmission**

All HIV infected pregnant women and lactating mothers are eligible for ART regardless of CD4 cell count and clinical stage. The pregnant or breast-feeding women with HIV should be started on lifelong ART for their own health at the time of diagnosis.

**The recommended first-line regimen is once a day fixed dose combination regimen of Tenofovir (TDF) + Lamivudine (3TC) + Efavirenz (EFV).**

- This regimen should be continued postpartum
- Women should receive on-going counselling support to continue with HIV care and treatment in order to maintain good health and to reduce the risk of HIV transmission to others.
- Available alternative first-line ART regimen includes AZT+3TC+NVP and AZT+3TC+EFV.

**Prophylaxis for HIV Exposed Infants**

- Administer NVP syrup immediately after birth to all HIV exposed infants and continue until six weeks of age
- In case a high risk HIV exposed infant is identified, administer duo prophylaxis containing NVP syrup (once daily) and AZT syrup (twice daily) for the first 6 weeks of life, then continue with daily NVP alone up to 12 weeks of life
  *High-risk infants are those who are:*
  - born to women with established HIV infections who have received less than 4 weeks of ART at the time of delivery; or
  - born to women with established HIV infection with viral load >1000 copies/mL in the 4 weeks before delivery, if viral load measurement is available; or
  - born to women with incident HIV infection during pregnancy or breast-feeding; or
  - Identified for the first time during the postpartum period, with or without a negative HIV test prenatally.

- Infant prophylaxis is most effective when given as soon as possible after birth, preferably within 6–12 hours
- HIV exposed infants identified beyond the age of 4 weeks should not be given ARV prophylaxis

**Table 6.2: NVP Dosing Recommendation**

| Infant age | NVP daily dosing |
|---|---|
| Birth to 6 weeks | |
| ▪ Birth weight 2000–2499g | 10mg(1 ml) once daily |
| ▪ Birth weight ≥2500g | 15mg(1.5ml) once daily |

The recommended NVP dosing is based on the dosing required to sustain exposure in the infant of >100 ng/mL with the fewest dose changes
Low birth weight infants <2000g should receive mg/kg dosing; suggested starting dose is 2mg/kg once daily.

### 6.1.2 Second-line Antiretroviral Therapy in Adults and Adolescents

Before treatment failure is confirmed and a particular regimen discarded, every effort should be made to rule out causes other than drug resistance.

**Drugs used as the second line in Tanzania include:**

**NRTIs**

**A**: Zidovudine (AZT) 300mg
**A**: Tenofovir (TDF) 300mg
**A**: Abacavir (ABC) 600mg
**A**: Lamivudine (3TC) 150mg
**A**: Emtricitabine (FTC) 200mg

**PIs**

**C**: Atazanavir 300mg boosted by Ritonavir 200mg (ATV/r)
**C**: Lopinavir 800mg boosted by Ritonavir 200mg (LPV/r)

**INSTIs**

**C**: Dolutegravir 50 mg (DTG)

**Table 6.3: Recommended second-line regimens for adults and adolescents**

| Patient group | Preferred (Default) regimen | Alternative regimen |
|---|---|---|
| Adults, adolescents (≥15 years) and Pregnant women/lactating mothers | **A**: AZT/3TC+ATV/r: if TDF was used in first line.<br>**A**: TDF/FTC+ATV/r: if AZT was used in first line | AZT/3TC+LPV/r in Case of TB<br>ABC/3TC+ATV/r<br>ABC/3TC+LPV/r<br>TDF/FTC+LPV/r |
| HIV and TB co-infection | **A**:AZT/3TC+LPV/r<br>**A**: ABC/3TC+LPV/r<br>**A**: TDF/FTC+LPV/r | Note: double dosage of LPV/r to 800/200mg for Rifampicin based TB treatment. |
| People Who Inject Drugs (PWID) | **A**: ABC/3TC + ATV/r | DTG+(ABC/3TC)+ATV/r |

The second line NRTI choice for adults and adolescents depends on the first-line regimen. For patients on TDF based regimens in first-line, the preferred second-line option is AZT plus 3TC combined with a ritonavir-boosted PI, preferably ATV/r because it is dosed once daily and has fewer metabolic complications and side effects. The same NRTIs, with exception of 3TC and FTC used in previous regimen should not be used in subsequent regimens during switching due to treatment failure. LPV/r can be used as an alternative to ATV/r in patients using anti-TB drugs (with ritonavir super boosting) and children below 6 years. Also, ATV/r (300/100mg) cannot be used in children below 30kg.

For patients who were on AZT and had never used TDF regimen, the default second-line option will be TDF or ABC based regimen combined with a boosted PI (TDF+FTC+ATV/r).

For patients who were introduced to TDF in first-line due to AZT toxicity, the default second-line option is to use ABC plus 3TC combined with a ritonavir-boosted PI ATV/r or LPV/r. (ABC + 3TC + LPV/r or ATV/r). However, ABC may be rendered ineffective due to cross resistance with TDF associated resistance mutations. Doses for these drugs are shown in Appendix 4.

**Note**: ATV/r, LPV/r, ABC/3TC and TDF/FTC are currently available as FDC formulations which simplify dosing and administration.

### 6.1.3 Third-Line Art Treatment

Patients failing 2nd line regimens may have extensive NRTI and NNRTIs associated resistance mutations (RAMS) which preclude/minimise their use in third-line regimens. Therefore, 3rd line regimens, in order to have at least two or preferably three effective drugs, need to be constructed using other new classes of drugs or second generation formulations of previous drugs. These second generation drugs usually have a higher genetic barrier to resistance and their efficacy is not compromised by RAMs associated with the first generation formulations.
Therefore, this guideline recommends the use of:

- Integrase Inhibitors Dolutegravir 50mg (DTG) and Raltegravir 400mg (RAL),
- Second generation PIs Darunavir 800mg /Ritonavir 100mg (DRV/r),
- Second generation NNRTI Etravirine 200mg (ETV).

**Table 6.4: Recommended third-line regimens for adults and adolescents**

| **Patient group** | **Preferred (Default) regimen** | **Alternative regimen** |
|---|---|---|
| Adults, adolescents (≥15 years) | **S:**DTG+DRV/r+ ETV | **S:** DTG+ATV/r+ ETV |
| Pregnant women/lactating mothers | **S:** (DTG or RAL)+DRV/r+ ETV | **S:** DTG+ATV/r+ ETV |
| HIV and TB co-infection | **S:** DTG+ ETV+ (3TC or FTC) | |
| People Who Inject Drugs (PWID) | **S:** DTG+DRV/r+ ETV | **S:** DTG+ATV/r+ ETV |
| **Note:** For second and third line regimens which are non TDF based, in case of new Hepatitis B co-infection TDF with FTC should be added to the new regimen as treatment of Hepatitis B. | | |

## 6.2 CHANGING ANTIRETROVIRAL THERAPY

This can be grouped into two major categories:

**Drug adverse events-toxicities**

- Intolerable side effects
- Drug interactions
- During pregnancy if patient is on EFV

**Treatment failure**

- Clinical failure-occurrence or persistence of HIV related OIs
- Immunological failure
- Virological failure

**Changing antiretroviral therapy due to toxicity**

From a clinical perspective, it is generally recommended that when changing a client's regimen due to toxicity, only the toxic drug(s) should be replaced, wherever possible, by a drug without overlapping toxicities. Table 6.5 provides guidance on ARV drug combinations with some common toxicity substitution within first-line regimens.

**Table 6.5: Common toxicity substitution in first-line drugs**

| First-line | Problem | Substitution |
|---|---|---|
| TDF + (3TC or FTC) + EFV 600 | Nephrotoxicity due to TDF | ABC + 3TC + EFV<br>AZT + 3TC + EFV |
| | Severe CNS effects due to EFV600 | TDF+(FTC or 3TC)+DTG<br>AZT+3TC+NVP<br>TDF+3TC+EFV400 |
| AZT + 3TC + (EFV or NVP) | Anemia due to AZT | TDF + FTC + EFV |
| | Lipodystrophy due to AZT | TDF + FTC + EFV |
| | Severe CNS effects due to EFV600 | AZT+3TC+(DTG or NVP) |
| | Mild to Moderate Hypersensitivity due to NVP | AZT + 3TC + EFV |
| | Severe Hypersensitivity e.g. Steven-Johnson Syndrome or Hepatotoxicity due to NVP | AZT+3TC+ DTG<br>AZT+3TC+ (ATV/r or LPV/r) |
| AZT or TDF based regimens | Both Anemia and Nephrotoxicity | ABC+3TC+ EFV<br>ABC+3TC+DTG |

**NOTE**: For TB co-infected patients, the dose for DTG should be given twice daily i.e. 50mg bid

**Figure 6.2: Substitution within first-line Antiretroviral Regimens**

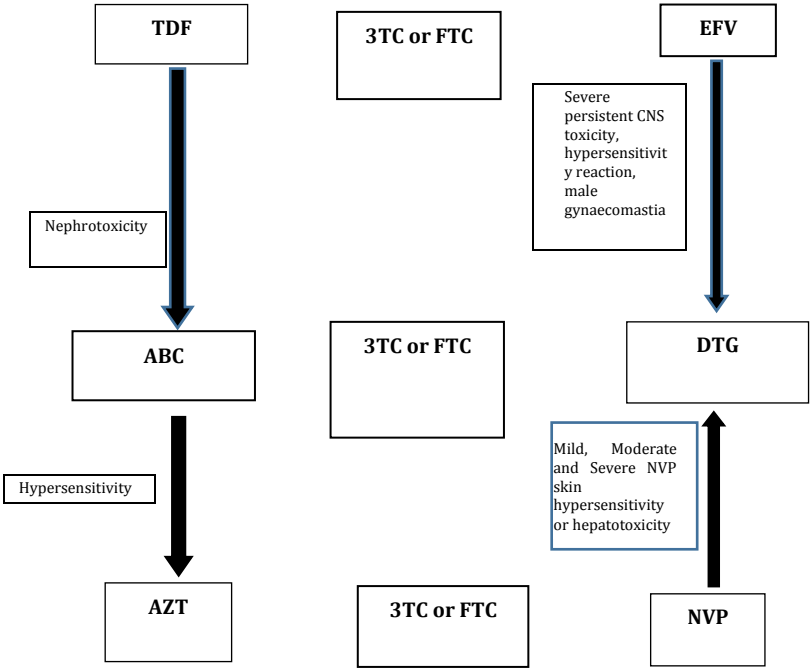



**Table 6.6: Types of toxicities associated with first and second-line ARV drugs**

| ARV | Major types of toxicity | Risk factors | Suggested management |
|---|---|---|---|
| TDF | Tubular renal dysfunction, Fanconi syndrome | Underlying renal disease<br>Older age<br>BMI <18.5 (or body weight <50kg)<br>Untreated diabetes mellitus<br>Untreated hypertension<br>Concomitant use of nephrotoxic drugs or a boosted PI | If TDF is being used in first-line ART, substitute it with AZT or ABC<br><br>If TDF is being used in second-line ART (AZT use in first line ART), substitute it with ABC |
| | Decreases in bone mineral density | History of osteomalacia and pathological fracture<br>Risk factors for osteoporosis or bone loss | |

| | | | |
|---|---|---|---|
| | Lactic acidosis or severe hepatomegaly with steatosis | Prolonged exposure to nucleoside analogues<br>Obesity | |
| | Exacerbation of hepatitis B (hepatic flares) | Discontinuation of TDF due to toxicity | No available alternative drug in the country for treatment of hepatitis B e.g. Entecavir |
| ABC | Hypersensitivity reaction | Genetic predisposition (HLA-B 5701 gene) | If ABC is being used in first-line ART, substitute with TDF or AZT |
| AZT | Anaemia, neutropaenia, myopathy, lipoatrophy or lipodystrophy | Baseline anaemia or Neutropaenia<br>CD4 cell count ≤200 cells/$mm^3$ | If AZT is being used in first-line ART, substitute it with TDF or ABC<br><br>If AZT is being used in second-line ART, substitute it with ABC |
| | Lactic acidosis or severe hepatomegaly with steatosis | BMI >25 (or body weight >75 kg)<br>Prolonged exposure to nucleoside analogues | |
| LPV/r | Hepatotoxicity | Underlying hepatic disease<br>HBV and HCV co-infection<br>Concomitant use of hepatotoxic drugs | Replace it with ATV/r |
| | Pancreatitis | Advanced HIV disease | |
| | Lipoatrophy or metabolic syndrome dyslipidaemia, severe diarrhea and risk of prematurity | Risk factors unknown | |
| ATV/r | Indirect hyperbilirubinaemia (clinical jaundice) | Underlying hepatic disease<br>HBV and HCV co infection<br>Concomitant use of hepatotoxic drugs | Indirect hyperbilirunemia is usually transient and ATV/r can be continued, however, if severe jaundice develops and is associated with significantly raised transaminases, then ATV/r should be replaced with LPV/r |
| | Nephrolithiasis and risk of prematurity | Risk factors unknown | Replace it with LPV/r |

| | | | |
|---|---|---|---|
| EFV | Persistent central nervous system toxicity (such as dizziness,abnormal dreams, depression or mental confusion) | Depression or other mental disorder (previous or at baseline)<br>Taking with high fat meal | Replace it with DTG or NVP. If the person cannot tolerate either INSTI or NNRTI, use boosted PIs |
| | Hepatotoxicity | Underlying hepatic disease – HBV and HCV co infection<br>Concomitant use of hepatotoxic drug | |
| | Convulsions | History of seizure | |
| | Hypersensitivity reaction, Stevens-Johnson syndrome | Risk factors unknown | |
| | Potential risk of neural tube birth defects (very low risk in humans) | | |
| | Male gynecomastia | | |
| NVP | Hepatotoxicity | Underlying hepatic disease<br>HBV and HCV co-infection<br>Concomitant use of hepatotoxic drugs<br>CD4 >250 cells/mm3 in women<br>CD4 >400 cells/mm3 for men<br>First month of therapy (if lead-in dose is not used) | EFV. If the person cannot tolerate either NNRTI, use DTG or a boosted PI |
| | Severe skin rash and hypersensitivity reaction (Stevens-Johnson syndrome) | Risk factors unknown | |
| **DTG** | Increase in cholesterol levels; mild elevated liver enzymes; significant rises in creatinine levels; Insomnia and headache may also be experienced. | History of dyslipidemia, diabetes, hypertension | Monitor cholesterol levels; monitor Liver function especially in HBV and HCV. Provide symptomatic treatment |

| | | | |
|---|---|---|---|
| **ETV** | Common: Skin rash, allergic reactions, Nausea, increased low density Lipids, Gastrointestinal disorders and Fatigue<br>Rare: Severe skin rash, Peripheral neuropathy and renal failure | No known risk factors | Monitor severity and occurrence of fever and other symptoms.<br>Provide symptomatic treatment |
| **RAL** | Increased Cholesterol levels, Glucose, Aspartate Amino Transferase (AST), Bilirubin. Rash, Cough, Fatigue, dizziness and insomnia | History of dyslipidemia, diabetes, hypertension | In case of severe adverse effects, switch to DTG if patient is >12 years old |
| **DRV/r** | Increased Cholesterol levels, triglycerides; Diarrhea, Headache, Rash, Abdominal pain and Nausea | History of dyslipidemia | Monitor severity and occurrence of fever and other symptoms.<br>Provide symptomatic treatment |

**Changing antiretroviral therapy due to treatment failure**

**Table 6.7: WHO definitions of treatment failure in chronological order of occurrence: virological, immunological and clinical failure for the decision to switch ART regimens**

| Failure | Definition | Comments |
|---|---|---|
| Virological | Plasma viral load above 1000 copies/ ml based on two consecutive viral load measurements after 3 months, with adherence support | An individual must be taking ART for at least 6 months before it can be determined that a regimen has failed. |
| Immunological | CD4 cell count falls to the baseline (or below)<br>or Persistent CD4 levels below 100 cells/mm$^3$ | Without concomitant or recent infection or steroid use to cause a transient decline in the CD4 cell count<br>Immunological and clinical characteristics of treatment failure develop much later after virological failure. Immunological and clinical criteria of treatment failure may also misclassify treatment failure and lead to unnecessary ARV switch to subsequent (line of treatment) regimen |

| | | |
|---|---|---|
| Clinical | New or recurrent clinical event indicating severe immunodeficiency (WHO clinical stage 4 conditions) after 6 months of effective treatment. | The condition must be differentiated from IRIS |

Transient rises in viral load are called viral blips and are not due to treatment failure. A diagnosis of treatment failure requires two consecutive viral load levels after >6months of treatment above 1000 copies/mL within an interval of 3 months and after adherence intensification.

Treatment failure should be distinguished from IRIS in which case the viral load will be low and the CD4 cell count will be high.

**Switching To Third-Line Arv Regimens**

It is crucial that before a regimen is declared to have failed, a multidisplinary switch team is convened to rule out non-adherence which is the commonest cause of reduced CD4 cell count and a VL rise, but is often not associated with HIV drug resistance. This team will also plan for enhanced adherence and support, for a period of 3 months before a second VL test. In case of non-adherence, these measures will lower the VL, increase CD4 cell count and avert a switch to a subsequent regimen

Before switching to third-line ARV regimens, genotypic HIV drug resistance is recommended to rule cross resistance between 1st and 2nd generation drugs and also assist in the determination of whether treatment failure is from non-adherence. Genotyping will also inform possibility of recycling drugs used in previous regimens i.e. some drugs used in 1st or 2nd regimens may still be effective in third-line.

## 6.3 MONITORING PATIENTS ON ART

Monitoring of patients on ART is based on clinical and laboratory parameters.

**Clinical Monitoring:**
In most cases, treatment will be associated with weight gain and reduced morbidity from opportunistic infections and improvement in the quality of life. At each clinic visit, thorough history and physical examination should be done and recorded in the patient file.

**Laboratory Monitoring:**

- Initiation of ART is done irrespective of $CD_4$ cell count. Baseline $CD_4$ cell count should nevertheless be determined to monitor immunological response. For patients with $CD_4$ cell count less than 350 cell/$mm^3$, the $CD_4$+ T-lymphocyte count should be repeated after 6 months, until patient is stable $CD_4$+ T-lymphocyte count more than 350cell/$mm^3$ and two consecutive viral load less than 50copies/ml). However, in cases of suspected IRIS, $CD_4$ can be tested at intervals less than six months. IRIS is diagnosed if $CD_4$ cell count shows rising trends.

- Viral load (VL) testing is recommended as the preferred monitoring approach to diagnose and confirm treatment failure compared to immunological and clinical monitoring.

**Table 6.8 Clinical and laboratory monitoring of patients on first line drug regimen**

| Regimens | Monitoring Tests | Frequency | Rationale |
|---|---|---|---|
| TDF/3TC or FTC/EFV | $CD_4$ | Baseline, 6-monthly where there is no HVL<br>Baseline, 6-monthly if CD4 <350 where HVL is available | ART monitoring<br><br>Screening for early renal toxicity |
| | Serum creatinine | Baseline, and after every 6 months. | |
| AZT/3TC+EFV and AZT/3TC/NVP<br>TDF/FTC+DTG<br>AZT/3TC+DTG<br>ABC/3TC+DTG | CD4 | Baseline, after every 6-months where there is no HVL<br>Baseline, after every 6-months if CD4 <350 where HVL is available | ART monitoring |
| | FBC/Hb (For patients on AZT) | Baseline, week 4, thereafter 6 monthly | Anemia |
| | ALT (For patients on NVP) | Baseline, after every 6 months and whenever symptomatic | Liver toxicity |
| | ALT (For patients on DTG) | Baseline, after every 6 months and whenever symptomatic | Liver toxicity |

**NOTE:** Clinical evaluation will determine more frequent laboratory tests if required.

**Laboratory monitoring of patients on second line drugs**

The following laboratory tests are recommended for Monitoring of patients on second line drugs:

- CD4, baseline, if less than 350 cells/ml after every 6 months until more than 350cells/ml
- FBC, baseline, then monthly for 3 months, then after every 6 months (with CD4 and viral load)
- Fasting cholesterol and triglyceride, baseline, 6 months and thereafter every 12 months
- Liver function tests, (ALT) 6 monthly
- Fasting glucose, every 12 months
- Urinalysis at baseline and after every 3 months
- Serum creatinine at baseline and once a year.

**When changing treatment, the following should be observed:**

- Never change a single drug in the combination if the reason for changing is treatment failure. Change at least two drugs, preferably change all three drugs
- If changing due to toxicity, change only the drug suspected to be causing the problem.
- Never change to monotherapy (i.e. single drug)
- When selecting drugs, choose drugs that have not been used before, drugs which do not have cross-resistance/or no overlapping toxicities or drug-drug interactions.
- Lamivudine has advantage of decreasing viral fitness therefore it may be retained when changing the failing regimen

## 6.4 IMMUNE RECONSTITUTION INFLAMMATORY SYNDROME (IRIS)

IRIS is a phenomenon associated with the occurrence or worsening of opportunistic infections/malignancies which can occur early after initiation of ART or at later (several months) during the course of ART. There is an increased risk for occurrence of IRIS in the following situations:

- Treatment naïve patients
- Patients with advanced HIV disease with CD4 cell count < 50 cells/mm3
- Patients with undiagnosed and untreated opportunistic conditions
- Patients who have been introduced on ART before or shortly after initiation of treatment of opportunistic infection/malignancy

**NB:** Any OI may present as IRIS

**Diagnostic Criteria:**
The criteria for making a diagnosis of IRIS are delineated in Table 6.8:

**Treatment of IRIS**
Mild to moderate forms:

- Reassure the patient and do not stop ART
- Provide specific treatment for the opportunistic infections/malignancies or other diseases

Severe life threatening IRIS

- Reassure the patient and Stop ART temporarily
- Provide high doses of prednisolone 1mg/kg for 4 weeks then taper down the dose.
- Provide other appropriate supportive measures such as management of fever, oxygen therapy, i.e. fluids
- Restart ART when the patient stabilizes.

**Table 6.9: Immune Reconstitution Inflammatory Syndrome**

**Diagnosis of IRIS would require:**
**Both major (A plus B) criteria or criterion A plus 2 minor criteria**

**Major criteria**

**A.** A typical presentation of "opportunistic infections or tumours" in patients responding to anti-retroviral therapy (ART) includes:

- Localized disease e.g. lymph nodes, liver, spleen
- Exaggerated inflammatory reaction e.g. severe fever, with exclusion of other causes of painful lesions
- Atypical inflammatory response in affected tissues e.g. granulomas, suppuration, necrosis, perivascular lymphocytic inflammatory cell infiltrate
- Progression of organ dysfunction or enlargement of pre-existing lesions after definite, clinical improvement with pathogen specific therapy prior to commencement of ART and exclusion of treatment toxicity and new diagnoses
- Development or enlargement of cerebral space occupying lesions after treatment for cerebral cryptococcus or toxoplasmosis
- Progressive pneumonitis or the development of organizing pneumonia after treatment of pulmonary-TB or PCP
- New onset or worsening of uveitis/vitritis after resolution of CMV retinitis
- Fever and cytopenia after treatment for disseminated Mycobacterium avium complex (MAC) disease
- Enlargement of Kaposi's sarcoma lesions and subsequent resolution or partial regression without
- Commencement of radiotherapy, systemic chemotherapy or intralesional therapy

**B.** Decrease in plasma HIV-RNA level by > 1 log base ten copies/ml (1 log drop = 9/10 of Baseline VL copies). This applies in settings where baseline VL is performed.

**Minor criteria**

- Increased blood CD4+ cell count after initiation of ART
- Increase in immune response specific to the relevant pathogen e.g. delayed type hypersensitivity to mycobacterial antigens (PPD conversion)
- Spontaneous resolution of disease without specific antimicrobial therapy or tumour chemotherapy with continuation of anti-retroviral therapy.

## 6.5 ANTIRETROVIRAL THERAPY IN CHILDREN AND ADOLESCENTS BELOW 15 YEARS

ART in children has been proven to increase survival and decrease HIV-related morbidity and mortality. Children should be started on ART as soon they are diagnosed including those who are presumably diagnosed.

**Diagnostic Criteria**

There are 2 groups for eligibility to begin treatment:

i. All children who have a confirmed diagnosis of HIV, regardless of WHO clinical stage or $CD_4$ cell count
ii. All HIV exposed children below 18 months old with a presumptive HIV infection.

**Table 6.10: When to start ART in children under 15 years**

| Age | When you start |
|---|---|
| Children 0-15 years | Treat all of them regardless of WHO clinical stage or CD4 cell count |
| Children below 18 months old who qualify for presumptive diagnosis | Start ART while awaiting for DNA-PCR confirmation test results. |

**Table 6.11: First-Line ARV Regimens in Infants and Children under 15 years**

| Patient group | Preferred 1L | Justification | Alternatives |
|---|---|---|---|
| Children under 3 years | **A:**ABC/3TC+LPV/r | • Higher genetic resistance barrier<br>• Avoids NNRTI transmitted resistance from mother during PMTCT<br>• Possibility of malaria prevention<br>• Spares AZT for second line | **A:** AZT/3TC+LPV/r<br>**A:** AZT/3TC/NVP |
| Children 3 to 15 years | **A:**ABC/3TC+LPV/r | • Higher genetic resistance barrier<br>• Avoids NNRTI transmitted resistance from mother during PMTCT<br>• Possibility of malaria prevention<br>• Spares AZT for second line | **A:** AZT/3TC+EFV<br>**A:** ABC/3TC+EFV<br>**A:** TDF/3TC/EFV<br>**A:** AZT/3TC+LPV/r<br>**A:** AZT/3TC/NVP |
| For TB co-infected children 3 to 15 years already on LPV/r based regimen | **A** :ABC/3TC+LPV/r | • Continue with ABC/3TC+LPV/R but the dose of LPV/r should be doubled due to the interaction between ritonavir and rifampicin | |
| For newly initiated TB co-infected children 3 to 15 years | **A:** ABC/3TC+EFV | | ABC/3TC+LPV/R but the dose of LPV/r should be doubled due to the interaction between ritonavir and rifampicin |

For dosing of ARV regimens see Annex 6, Paediatric Antiretroviral Dosing
**NOTE:** Children > 2 years with weight above 35kg can use TDF

**Special Considerations for LPV/r syrup and tablets**

- The LPV/r liquid requires a cold chain only during storage at the facility
- After dispensing, the liquid is stable at room temperature for 1 month so patients should be given a maximum of 1-month supply
- Patients do not have to refrigerate the LPV/r liquid
- LPV/r tablet is heat stable but must be swallowed whole and should not be split or crushed as it loses effectiveness
- LPV/r has shown protection benefit against malaria[2].

## 6.6. CHANGING ARV THERAPY IN CHILDREN UNDER 15 YEARS

**i) Drug toxicity**

The principles for changing ARVs and the managing drug toxicity in children are similar to those applied to adults.

**ii) Treatment failure**

- **Virological treatment failure:** Viral load is the most reliable method to detect early treatment failure. Virological treatment failure is recognized if the child is adherent to the current ART regimen, for 6 months or more and has two consecutive viral load measurements over 1000 copies/ml at 3 months apart.

Immunological treatment failure: If adherence is good, immunological criteria indicating that a change to second-line therapy is warranted where/when HVL test is not available includes the following**:**

**Table 6.12: CD4 criteria suggesting immunological failure** [a]

| Immunological failure is recognized as developing or returning to the following age-related immunological thresholds after at least 6 months on ART, in a treatment-adherent child: | |
|---|---|
| <5 years of age | $CD_4$ count of <200 cells/$mm^3$ or CD4 <10% |
| ≥5 years of age | $CD_4$ count of <100 cells/$mm^3$ |
| [a] Preferably, at least two CD4 measurements should be available<br>Use of CD4 in children <5 years and absolute CD4 cell counts in those ≥5 years of age is preferred.<br>If serial CD4 values are available, the rate of CD4 cell count declines from the peak, CD4 cell count reached should be taken into consideration. | |

**NOTE:** CD4 cell percent should not be measured during an inter-current infection but can be determined when the child has recovered.

If there is a modest decline in CD4 cell count or percent (< 5%); and if there is no failure to thrive do not change medication, instead maintain close monitoring.

[2]Achan J et al. antiretroviral agents and prevention of malaria in HIV infected Ugandan Children. New England Journal of Medicine 2012, 367:2110-2118.

**Clinical Treatment Failure:**
Clinical conditions indicating that a change to second-line therapy is warranted include:

- Poor growth (failure to gain weight, declining or stagnant weight) over a 6-month period, after excluding other causes, such as TB, feeding problems and food insecurity
- No improvement of neuro-developmental milestones
- Development of HIV encephalopathy
- Recurrent infections, such as oral candidiasis, persistent diarrhoea, recurrent severe bacterial pneumonia
- Advancement from one clinical stage to another or new evidence of new WHO stage 3 or 4 disease (see Annex 2 Pediatrics WHO Clinical Staging)

**Note:**

- Short inter-current episodes of pneumonia, LRTI and gastroenteritis should not be regarded as clinical failure
- Pulmonary or lymph node TB, which are clinical stage 3 conditions, are not indications of treatment failure, and thus may not require consideration of second-line therapy
- The response to TB therapy should be used to evaluate the need for switching therapy
- Before an ARV regimen is thought to be failing based on clinical criteria, the child should have received the regimen for at least 6 months.

**Table 6.13: Laboratory parameters for monitoring infants and children under 15 years at baseline, before and during ART**

| Laboratory tests for diagnosis and monitoring | Baseline (at entry into care) | At initiation of 1st or 2nd -line ART regimen | Every 6 months | As required or symptom-directed |
|---|---|---|---|---|
| HIV diagnostic testing | √ | | | √ |
| Haemoglobin[a] | √ | √ | | √ |
| WBC and differential count | | | | √ |
| %CD4+ or absolute CD4 cell count | √ | | | √[e] |
| Pregnancy testing in adolescent girls | | √[c] | | √ |
| Full chemistry (including, but not restricted to, liver enzymes, renal function, glucose, lipids, amylase, lipase and serum electrolytes)[e] | | | | √ |
| HIV VL measurement | | | √[d] | √ |
| OI screening (where possible) | √ | √ | √ | √ |

Routine monitoring (every six months) of full chemistry, particularly lipid levels, liver enzymes and renal functions, should be considered for infants and children on second-line drugs

[e]CD4 cell count should be taken on emergence of WHO stage 3 or 4 disease

[d]Viral load monitoring is annual if the first two successful VL results 6th month apart are ≤1000 copies/Ml

**Assessment of Infants and Children Receiving ARV Therapy**

Important clinical signs of response to ARV therapy in children include improvement in growth and development and decreased frequency of infections (bacterial infections, oral thrush, and/or other opportunistic infections).

Clinical monitoring of ARV treatment in children should include:

- Feeding practice and nutritional status
- Growth monitoring: weight, height, MUAC (mid-upper arm circumference)
- Head circumference should be monitored in children under 3 years old
- Neurologic symptoms and developmental milestones
- Cotrimoxazole prophylaxis taken daily
- Adjustment of ARV dose based on weight
- WHO disease clinical staging
- Immunization status
- Other medical conditions
- Screening for malaria and TB.

## Recommended Second-Line ARV Therapy for Infants and Children under 15 years

- After failure of a first line LPV/r-based regimen, children younger than 3 years should remain on their first-line regimen, and measures to improve adherence should be taken. (PI based regimen have high genetic barrier for mutation and virological suppression can still be achieved.)
- After failure of a first line LPV/r based regimen, children of 3 years and above should switch to a second-line regimen containing an NNRTI plus two NRTIs; EFV is the preferred NNRTI
- After failure of a first-line regimen of ABC or TDF + 3TC, the preferred NRTI backbone option for second-line ART is AZT + 3TC
- After failure of a first-line regimen containing AZT + 3TC, the preferred NRTI backbone option for second line ART is ABC or TDF + 3TC

**Note**: Infant and children take longer time to attain adequate viral suppression. Before confirming treatment failure, calculate drop in VL (using 0.5 log 2 years and above, 0.7log below 2 years- for further details on how to convert VL into numbers see Annex 05).

**Table 6.14: Recommended Second-line ART regimens for children under 15 years**

| Patient group | If is on the following first-line | Preferred 2L | Justification |
|---|---|---|---|
| Children under 3 years | ABC/3TC+LPV/r | ABC/3TC+LPV/r<br>AZT/3TC+LPV/r | • For children who were on PI based first-line regimen, maintain the same regimen |
| | AZT/3TC/NVP | | • For children who were not on PI-based first-line regimen |
| Children 3–15 years | ABC/3TC+LPV/r | AZT/3TC+EFV | |
| | | ABC/3TC+EFV | |
| | | TDF/3TC/EFV | |

**For dosing of ARV regimens see Annex on Paediatric Antiretroviral Dosing**

**NOTE:**

- TDF may only be given to children > 2 years and above 35kg
- ATV/r can be used as an alternative to LPV/r in children above 6 years old if paediatric formulation is available but adolescents >40kg can take adult formulation.

## Third-Line ARV regimens in children under 15 year

Patients failing 2nd line regimen have extensive NRTI and NNRTIs associated resistance mutations which minimise their use in third-line regimens. Third-line regimen is constructed using new classes of drugs or second generation formulations, in order to have at least two or three effective drugs.
This guideline recommends the use of Integrase Inhibitors DTG and RAL, Second generation PIs (DRV/r), and an NNRTI (ETV).

**Criteria for Change to Third-line**
**Failing any 2nd line regimen**
Referral to specialist care is recommended where third line regimen can be chosen according to genotype resistance testing and managed by an expert panel at tertiary care facilities.
The criteria for diagnosing second-line failure are the same as those used for diagnosing first-line failure.

**Eligibility for Third Line Evaluation*:***
All clients should have undergone an Enhanced Adherence Counselling

- Failing 2nd line regimens
- Documented virologic failure (VL > 1000) on a PI regimen; except children below 3 years

Steps to refer client to 3rd line review committee

- Client suspected to have 2nd line failure from dispensary or health centre is referred to a hospital.
- At the hospital, the client is reviewed by clinicians working in CTC, the checklist is completed and only the checklist is sent to the review committee at the tertiary /zonal referral hospital
- At the zonal level, the review committee reviews the checklist and recommends which clients should be referred for evaluation including genotype resistance testing and decision
- Zonal level review committee communicates the decision back to the referring hospital within a month.

## Third-line Regimens FOR Paediatrics and Adolescents

Selection of third-line regimen should consider genotype resistance test results as well as treatment history.

**Table 6.15: Third-line Regimens for Paediatrics and Adolescents**

| Patient group | Third options | Justification |
|---|---|---|
| Children <12 years | **S:** RAL+DRV/r+ETV<br>**S:** RAL + 2 NRTIs<br>**S:** DRV/r + 2 NRTIs<br>**S:** DRV/r + RAL ± 1-2 NRTIs | **DRV/r**<br>• High genetic barrier<br>• Effective for patients with resistance to LPVr and ATVr<br>• Cannot be used in children < 3 years of age<br>**ETV**<br>• Effective for patients with NNRTI resistance<br>**RAL**<br>• Can be used for children under 12 years<br>**DTG**<br>• Can be used for children > 12 years |
| Children 12 years and above | **S:** DTG+DRV/r+ETV<br>**S:** DTG (or RAL) + 2 NRTIs<br>**S:** DRV/r + 2 NRTIs<br>**S:** DRV/r + DTG (or RAL) ± 1-2 NRTIs | |

**Adverse reactions in children**

Drug-related adverse reactions while on ART can occur immediately (soon after a drug has been administered), early (within the first days or weeks of treatment) or later (after months of treatment). Adverse reactions can vary in severity from mild to severe to life-threatening and may be specific to the drug or general to the class of drugs in use.

**Table 6.16: Major Types of ARV Toxicity in Children**

| | |
|---|---|
| **ABC** | ABC is associated with hypersensitivity reactions. Patients may have severe skin rashes or other non-specific symptoms such as fever, arthralgias and lymph node enlargement. |
| **AZT** | AZT is associated with risk of haematological toxicity which can include anemia neutropenia and thrombocytopenia. Measuring hemoglobin is recommended before initiating ART among children with low body weight, low CD4 cell counts and advanced HIV disease. Patients with severe anaemia at baseline (haemoglobin < 7.5 g/dL) should avoid AZT as first line therapy. |
| **TDF** | TDF is associated with nephrotoxicity. Nephrotoxicity is more common in elderly patients but it also occurs in children, especially if co-administered with PI based therapy. Monitoring of creatinine clearance is recommended. |
| **EFV** | EFV's main type of toxicity is central nervous system side effects, which typically resolve after a few weeks. However, in some cases, they can persist for months or never resolve at all. |
| **NVP** | NVP's major toxicities include severe skin rash and hypersensitivity reaction (Steven's Johnson syndrome) and hepatotoxicity. Because of the risk of potentially life-threatening hepatotoxicity associated with NVP, hepatic dysfunction of any aetiology in a child on NVP requires careful consideration of whether NVP should be continued. |
| **LPV/r** | LPV/r's major toxicity includes hepatotoxicity, pancreatitis, diarrhoea and lipoatrophy. The risk of hepatotoxicity is increased in patients with underlying hepatic disease and the risk of pancreatitis is increased in patients with advanced HIV disease. Electro-cardiac abnormalities are also possible; patients with pre-existing conduction system disease are at increased risk |
| **ATV/r** | Toxicities of ATV/r are similar to those of LPV/r. ATV/r can cause jaundice (indirect hyperbilirubinemia). Jaundice (indirect hyperbilirubinemia) is usually transient and ATV/r can be continued. If severe jaundice develops and there are significantly raised transaminases, then ATV/r should be replaced with LPV/r |
| **DRV/r** | DRV/r's major toxicity is hepatotoxicity. Patients with underlying hepatic disease, hepatitis B or C co-infection or who are taking other hepatotoxic drugs are at higher risk. The other side effect is severe skin and hypersensitivity reactions. Patients with sulphonamide allergy are at higher risk |
| **ETV** | ETV's potential toxicity has severe skin and hypersensitivity reactions |
| **RAL** | RAL's potential toxicity includes rhabdomyolysis, myopathy and myalgia as well as hepatitis and hepatic failure and severe skin rash and hypersensitivity reactions |
| **DTG** | DTG major toxicity is hepatotoxicity and hypersensitivity reactions. Patients with underlying liver disease or hepatitis B or C co-infection are at higher risk. |

**Principles in the management of ARV drug toxicity**

**Severe life-threatening reactions***:* Immediately discontinue all ARV drugs, manage the medical event (i.e. provide symptomatic and supportive therapy) and reintroduce ARV drugs using a modified regimen (i.e. with an ARV substitution for the offending drug) when the patient is stabilized

**Severe reactions***:* Substitute the offending drug without stopping ART

**Moderate reactions***:* Consider continuation of ART as long as it is feasible. If the patient does not improve on symptomatic therapy, consider single-drug substitution

**Mild reactions**: Reassure a child and caregiver that while the reaction may be bothersome, it does not require a change in therapy; provide counselling and support to mitigate adverse reactions.
Emphasize on the maintenance of adherence despite mild and moderate reactions.

**Table 6.17: Suggested ARV Substitutions**

| **Toxicity events** | **Responsible ARV** | **Suggested first-line ARV drug substitution** |
|---|---|---|
| Acute symptomatic hepatitis | **NVP** | EFV<br>If the patient cannot tolerate either NNRTI, use boosted PI |
| Severe or life-threatening rash (Stevens-Johnson syndrome) | | boosted PI |
| Hypersensitivity reaction | ABC | AZT |
| Lipoatrophy/metabolic syndrome | LPV/r | If LPV/r is used in first line ART for children, use an age appropriate NNRTI (NVP for children below 3 years and EFV for children with 3 years and above)<br><br>ATV/r can be used for children above 6 years |
| Severe anaemia or neutropenia | AZT | Substitute with ABC if < 35 kg<br><br>Substitute with TDF if ≥ 35 kg |
| Severe gastrointestinal intolerance | | |
| Persistent and severe central nervous system toxicity | EFV | NVP |
| Tubular renal dysfunction | TDF | If TDF is being used in first line ART, substitute with AZT or ABC<br>If TDF is being used in second line ART, substitute with ABC |

**NOTE:** Patients on third line ARV regimen who develop toxicities should be referred to next level facility with adequate expertise and facilities

## 6.7 HIV PREVENTION

This section describes the biomedical, structural interventions and Social Behavioural Change Communication (SBCC) that are related to prevention of HIV infection. Particular emphasis is given on the Positive Health, Dignity and Prevention (PHDP) package, also includes key HIV prevention services to Key and Vulnerable Populations (KVP).

**Positive Health, Dignity and Prevention (PHDP)**

PHDP focuses on improving and maintaining the health and well-being of PLHIV, which, in turn, contributes to the health and well-being of sexual partners, families and communities.

In order for PHDP programming to be successful, it must include a synergistic combination of interventions at three different levels.

**Central Level Interventions**

At Central level, interventions mainly focus on changes in the policy and legal framework to alter the environment in ways that promote and support implementation of PHDP activities and services.

**Health Facility Interventions**

HIV care and treatment clinics provide an important setting for HIV infection prevention and control. Components of a comprehensive package for HIV infection prevention and control in the clinical setting are:

- Condom promotion and distribution
- Messaging and counselling support for behavioural change including: sexual risk reduction; retention in care, adherence to medications, and partner HIV testing and counselling
- HIV testing and counselling
- ART as prevention
- Voluntary Medical Male Circumcision (VMMC)
- Screening and treatment of STIs and RTIs
- Prevention of Mother to Child Transmission (PMTCT)
- Safer pregnancy counselling and family planning services integration
- Identification of social needs, referral and linkage for community-based services
- Cervical cancer screening with visual check using acetic acid (VIA)

**Community Level Interventions**

Community level interventions are in line with the national guidelines on Community Based HIV Services (CBHS). The following are the components of the minimum package of the CBHS:

- Condom promotion and distribution
- Messaging and counselling support for health behaviours including: sexual risk reduction; retention in care, adherence to medications, and partner HIV testing and counselling

- HIV testing and counselling
- Screening of STI
- Safer pregnancy and family planning counselling
- Identification of needs for care, treatment, referral and linkage for health facility- based services

### 6.7.1 Post Exposure Prophylaxis (PEP)

Post Exposure Prophylaxis (PEP) is the immediate provision of preventive measures and medication following exposure to potentially infected blood or other bodily fluids in order to minimize the risk of acquiring infection. Several clinical studies have demonstrated that HIV transmission can be reduced by 81% following immediate administration of antiretroviral agents.

Effective post-exposure management entails the following elements:

- Management of exposure site
- Exposure reporting
- Assessment of infection risk
- Appropriate treatment
- Follow-up and counselling.

When an exposure occurs, the circumstances and post exposure management procedure applied should be recorded in the exposed person's confidential form for easy follow up and care.

**Evaluation of the Exposed Individuals**

Individuals exposed to HIV should be evaluated within two hours and no later than 72 hours. A starter pack should be initiated within 2 hours after exposure and before testing the exposed person. Exposed healthcare workers should be counselled and tested for HIV at baseline in order to establish infection status at the time of exposure. PEP should be discontinued if an exposed healthcare worker refuses to test. Vaccination against Hepatitis B should be considered.

In addition, rape survivors should be:

- Offered counselling, crisis prevention and provision of an on-going psychosocial support so as to reduce/minimize immediate rape trauma disorder and long-term post-traumatic stress disorder should be offered.
- Referred to mental care, police and legal services, according to the law and regulations.

**Evaluation of the Source Person**

Evaluation of the source person should be performed when the exposed individual agrees to take PEP.

- If the HIV, HBV and HCV status of the source person is unknown perform these tests after obtaining consent. The exposed healthcare worker should not be involved in obtaining consent from the source person.
- If the source person is unknown, evaluation will depend on other risk criteria.
- Do not test discarded needles or syringes for viral contamination.

**Treatment for HIV PEP**

**For Adults**: TDF 300mg + 3TC 300mg + EFV 600mg once a day for 4 weeks

**For children** (based on body weight):

- Less than 3 years: AZT + 3TC + LPV/r twice daily for 4 weeks
- More than 3 years: AZT + 3TC twice daily + EFV once daily for 4 weeks

**NOTE:** If the source is using PI based regimen, then the PEP regimen should be PI based.(Similar to the source's regimen)

**Follow-up of HIV Exposed individuals**

HIV antibody tests should be performed at least after 4–6 weeks post-exposure (i.e. at 6 & 12 weeks). HIV testing should also be performed for any exposed person who has an illness that is compatible with an acute retroviral syndrome, irrespective of the interval since exposure.

If PEP is administered, the exposed person should be monitored for drug toxicity at baseline and 2 weeks after starting PEP. Minimally, it should include a Full Blood Count (FBC), renal function test (RFT-Serum creatinine and urinalysis) and hepatic function tests (LFT- ALT).

Exposed persons should be re-evaluated within 72 hours, after additional information about the source of exposure including serologic status, viral load, current treatment, any resistance test results (if available) or information about factors that would modify recommendations, is obtained.

PEP should be administered for 4 weeks if tolerated. If not tolerated manage symptoms accordingly and if intolerance persists change to more tolerable PI based regimen. If the patient seroconvert and the exposed person becomes HIV infected, he/she should be referred to a CTC for proper care and treatment service.

## 6.7.2 Voluntary Medical Male Circumcision (VMMC)

Voluntary Medical Male Circumcision (VMMC) has been implemented in different sub-Saharan countries in an effort to reduce the incidence of HIV infection amongst heterosexual men. Surgical removal of the foreskin reduces male's vulnerability to HIV in penile-vaginal intercourse. Therefore, VMMC is an important component of comprehensive HIV prevention in areas with a high prevalence of heterosexually-transmitted HIV infection. Early Infant Male Circumcision (EIMC) is another component in Tanzania's National HIV prevention strategy.

**Minimum Package of VMMC Services**

All HCW offering VMMC services should:

- Educate clients on the link between VMMC and HIV prevention.
- Offer HIV testing and counselling so that clients know their HIV status and refer client who test positive to a care and treatment clinic.
- Refer clients who test positive to care and treatment for clients who test HIV positive.
- Screen for STIs and RTIs (and treatment, when indicated) since STIs increase a person's risk of acquiring or transmitting HIV.

- Counsel on risk reduction,
- Promote and distribute **A**: male and female condoms together with the promotion of their correct and consistent use.
- Provide surgical care that is safe and of high quality, in settings that are adequately equipped and environmentally suitable for minor surgical procedures.
- Provide appropriate postoperative care and care of any associated adverse events.

**Minimum Package of Early Infant Male Circumcision (EIMC) Services**
All HCW at facilities offering EIMC services for HIV prevention must:

- Provide information to parents or guardians on advantages and risks of EIMC.
- Offer of HIV testing and counselling to parents or guardians to ensure identification of HIV-exposed infants.
- Link HIV-positive parents to HIV care and treatment services.
- Counsel on the post-operative care of circumcised infants and identification of related complications, danger signs and where to go for follow-up care, if required.
- Provide surgical care that is safe and of high quality, in settings that are adequately equipped and environmentally suitable for minor surgical procedures.
- Provide appropriate postoperative care and care of any associated adverse events.
- Refer clients to appropriate services such as immunization, well baby care, and HIV care and treatment for HIV-exposed infants and/or those infants found to be HIV-positive through Early Infant Diagnosis (EID).

### 6.7.3 Blood Safety

Unsafe blood transfusion is a well-documented mode of transmission of HIV and other infections. Many recipients of blood and blood products are at risk of transfusion-transmissible infections, including HIV, as a result of poor blood donor recruitment and selection practices and the use of unscreened blood.

### 6.7.4 HIV Prevention Services to Key and Vulnerable Populations (KVP)

**Key Populations (KPs):** KPs are defined as groups who, due to specific higher-risk behaviours, are at increased risk of HIV irrespective of the epidemic type or local context. Also, they often have legal and social issues related to their behaviours that increase their vulnerability to HIV.
**Vulnerable populations (VPs):** are groups of people who are particularly vulnerable to HIV infection in certain situations or contexts, such as adolescents (particularly girls in sub-Saharan Africa), orphans, street children, people with disabilities and migrant and mobile workers.
Key and vulnerable populations (KVP) are therefore, important to the dynamics of HIV transmission and in an effective response to the epidemic. The groups include:

- Sex workers–SW and their clients
- people who inject or use drugs–PWID/PWUD
- people in prisons and other closed settings

- Adolescent girls and young women (AGYW)
- mobile populations (long distance truck drivers, fisher folks and fishing communities, miners and mining communities, construction and plantation workers)
- disabled persons in all forms
- Street living, working children and displaced people.

Health service providers need to provide non-judgmental, non-discriminatory services to be able to identify and address the special needs of key and vulnerable populations within and beyond the health care setting. The following list summarizes the key services to be offered to KVP:

- Promote and provide **A**: male and female condoms
- Provide VMMC service
- Provide HTS
- Provide ART to HIV infected individuals
- Screen and manage STIs, RTIs and cervical cancer
- Counsel and offer Reproductive Health Services (RHS) inclusive of family planning services and dual protection as well as counselling and PMTCT
- Link to facility providing medication-assisted treatment (MAT) and other drug dependence treatments (i.e. harm reduction)
- Provide behaviour change and communication service
- Screen for Hepatitis B and C and provide vaccination for Hepatitis B as appropriate
- Screen for Tuberculosis and manage accordingly
- Screen for sexual violence and provide PEP along with other interventions for gender-based violence (GBV)
- Link with psychosocial support services
- Proper Linkage and referral mechanisms to community support programmes (e.g. psychosocial support, income generating groups, spiritual support and legal support etc.).

# CHAPTER SEVEN
# TUBERCULOSIS AND LEPROSY

## 7.1 GENERAL MANAGEMENT OF TUBERCULOSIS

Tuberculosis is chronic airborne infectious disease caused by *Mycobacterium tuberculosis*.

**Diagnosis criteria**

- Cough of more than two weeks
- Fever
- Excessive night sweats
- Haemoptysis (sputum mixed with blood stains)
- Loss of weight
- Others includes swelling of lymph nodes, ascites, difficulty in breathing, swelling of joints etc., depending on the site of the disease

**Investigations**

- Sputum- smears microscopy or sputum for Gene –Expert.
- Culture and sensitivity; this is done to DR presumptive patients and DST surveillance
- Chest X-rays: done when smear negative and still suspect TB

**NOTE**. *Conduct HIV provider initiated testing and counseling for all TB patients*

For detailed diagnosis and investigation of tuberculosis, refer to Tanzania National TB & leprosy guidelines.

**Pharmacological Treatment**

TB treatment is divided into two phases:

- Initial /intensive phase, which consists of:
  **A:** RHZE for 2 months for new case
  **AND**
  **A:** SRHZE for 2 months then **A**: RHZE 1month for re-treatment case.
- Continuation phase, which consists of:
  **A:** RH for 4 months for new patient
  **AND**
  **A:** RHE 5 months for re-treatment case.

**Table 7.1 Recommended daily doses of first-line anti-TB drugs for adults and children**

| New/Retreatments | Initial Phase | Continuation Phase |
|---|---|---|
| New | Rifampicin + Isoniazid + Pyrazinamide and Ethambutol in fixed dose (RHZE) for 2 months | Rifampicin + Isoniazid (RH) for 4 months |
| Retreatments | Streptomycin+ Rifampicin + Isoniazid + Pyrazinamide and Ethambutol for 2months then RHZE for 1months | Rifampicin + Isoniazid+ Ethambutol (RHE) for 5 months. |

**Table 7.2 Daily dosage of anti-TB drugs (FDCs) in new adult patients**

| Body weight | Number of tablets in initial phase: 2 months (R150/H75/Z400/E275) mg | Number of tablets in continuation phase: 4 months (R150/H75) mg |
|---|---|---|
| 21–30 kg | 2 | 2 |
| 31–50 kg | 3 | 3 |
| 51–74 kg | 4 | 4 |
| ≥75 kg | 5 | 5 |

**Table 7.3 Daily dosages of anti-TB Drugs (FDCs) in new paediatric patients**

| Duration | Drug | Weight Bands (Number of Tablets) | | | | |
|---|---|---|---|---|---|---|
| | | 4-7kg | 8-11kg | 12-15kg | 16-24 kg | 25 kg+ |
| 2 months of intensive phase, daily observed treatment | (RHZ) [75/50/150]<br>(E) [100] | 1<br>1 | 2<br>2 | 3<br>3 | 4<br>4 | Go to adult dosages and preparations |
| 4 months of continuation phase, daily observed treatment | (RH) [75/50] | 1 | 2 | 3 | 4 | |

**Note:**
- The oral drugs should preferably be given on an empty stomach in a fixed dose combination
- The oral drugs must be swallowed under observation from health facility staff or treatment supporter of his/her choice at home

## 7.2 DRUG RESISTANCE TUBERCULOSIS (DR-TB)

It is a laboratory diagnosis confirmed after testing *Mycobacterium tuberculosis* strains for resistance using rapid genotypic tests (gene-expert) or conventional phenotypic culture and DST.

**Diagnostic Criteria**
The features are the same as sensitive tuberculosis but patient's shows resistance to the first line treatments.

**Pharmacological Treatment**
When you diagnose MDR TB communicate with DTLC for initiation of treatments.

**Table 7.4 Treatment for Drug Resistance Tuberculosis**

| Type of Regimen | Intensive Phase | Continuation Phase | remark |
|---|---|---|---|
| **Standardized Long DR TB regimen** | **S:** Inj–Kanamycin 10 mg/kg **OR** **S:** Capromycine 15mg/kg **OR** **S:** Amikacin 15mg/kg 5doses per week. | | |
| | **S:** Levofloxacin tabs (750mg) | Levofloxacin(750mg) | |
| | **A:** Pyrazinamide tabs 20–30 mg /kg daily | Pyrazinamide tabs 20–30 mg /kg daily | |
| | **S:** Ethionamide tabs 15mg/kg maximum 1gm | Ethionamide tabs 20–30 mg /kg daily | |
| | **S:** Cycloserine tabs 10–15mg /kg daily | Cycloserine tabs 10–15mg /kg daily | |
| | **Duration: 8 months** | **Duration: 12 months** | |
| **Standardized short DR TB regimen** | **S:** Inj–Kanamycin (1gm)–10 mg/kg **OR** **S:** Inj–capromycine (1gm) – 15mg/kg **OR** **S:** Inj–amikacin (1gm)– 15mg/kg 5doses per week. | | |
| | **S:** Moxifloxacin tabs 7.5–10mg/kg (usual dose 750mg) | Moxifloxacin tabs 7.5–10mg/kg (usual dose 750mg | |
| | **A:** Pyrazinamide tabs 20–30 mg /kg daily | Pyrazinamide tabs 20–30 mg /kg daily | |
| | **S:** Prothionamide tabs (250mg) 15mg/kg maximum 1gm daily | | |
| | **S:** Clofazimine capsule (100mg) | Clofazimine | |
| | **A:** Ethambutol tabs (400mg) | Ethambutol | |
| | High dose Isoniazid | | |
| | **Duration: 4 to 6 months** | **Duration: 5 months** | |
| **Individualized Regimen** | **S:** Bedaqaline or **S:** Delamanide Tablets 50mg, (Levofloxacin or tabs MoxifloxacinZ), (inj Kanamycin or Amikacin or | Use at least 3 effective drugs **Duration: 12 months** | (Bedaqaline / Delamanide Tablets 50mg is used for 24 weeks |

| | | | |
|---|---|---|---|
| | Capromycine), (Prothionamide or Ethionamide) Linezolid Tablets 600mg, Clofazimine, Cycloserine, Pyrazinamide, Ethambutol, isoniazid **S:** p-Amino salicylic acid (PAS) (4gm) Tablets , Amoxicillin/clavulanic acid; Use at least 5 drugs likely to be effective, **Duration: minimum 8 months may be extended** | | extended use should be discussed by expert panel) |
| **XDR TB Regimen** | Bedaqaline or Delamanide Tablets 50mg,( Levofloxacin or tabs Moxifloxacin), ( inj Kanamycin or Amikacin or Capromycine), (Prothionamide or Ethionamide) Linezolid Tablets 600mg, Clofazimine, Cycloserine, Pyrazinamide, Ethambutol, isoniazi[d], p-Amino salicylic acid (PAS) (4gm) Tablets , Amoxicillin/clavulanic acid; Use at least 6 drugs likely to be effective **Duration: minimum 12 months** | Use at least 5 effective drugs **Duration: 12 months** | Bedaqaline / Delamanide Tablets 50mg is used for 24 weeks extended use should be discussed by expert panel) |
| | **Total treatment duration for XDR TB is 24 months post culture conversion** | | |

**Treatment of Tuberculosis in Special Cases**
**Treatment of TB/HIV co-infected patients**
Consideration is needed when handling a patient with TB/HIV co-infection**.**

**Table 7.5 Special considerations for ART in TB/HIV co-infected patients**

| | |
|---|---|
| Start ART for all TB patients living with HIV irrespective of CD4 counts | Treat TB first and start ART as soon as possible, preferably within two weeks of initiating treatment |
| If CD4 count is less than 50 cells/mm$^3$ | Treat TB first and start ART within the first two weeks of initiating TB treatment |
| Already on ART at TB diagnosis | Treat TB and replace nevirapine with efavirenz |

Also, the following shall be considered in treatment of TB patients:

**Pregnancy:** Anti-TB is safe during pregnancies except streptomycin, which causes permanent deafness in the fetus therefore it should be avoided during pregnancy.

**Breast feeding**: In the mothers with pulmonary tuberculosis, the baby should receive INH preventive (5mg/kg) for 6 months followed **A**: BCG vaccination.

**Oral contraceptives**: Rifampicin interacts with oral contraceptives and reduces the efficacy of this contraception.

**Liver disease**: Most of anti-TB medicines can cause liver damage. In case a patient develops jaundice, treatment should be stopped and restarted as soon as the jaundice resolves. In severely ill patients, start streptomycin and ethambutol only.

**Renal failure:** Streptomycin and ethambutol are excreted by the kidneys and should either be avoided or given in a reduced dose.

## 7.3 GENERAL TREATMENT OF LEPROSY

Leprosy is a chronic granulomatous disease caused by *Mycobacterium leprae.* It mainly affects the skin, the peripheral nerves and the mucous membranes. Leprosy is the commonest cause of peripheral neuritis in the world.

**Diagnostic Criteria**

- Hypo pigmented anaesthetic macula or nodular and erythematous skin lesions
- Nerve thickening.
- Burning sensations in the skin
- Numbness and tingling of the feet and/or hands
- Weakness of eyelids, hands or feet
- Painless swellings or lumps in the face and earlobes
- Painless wounds or burns on the hands or feet

Presence of any one among the three cardinal signs of leprosy below:

- Skin patch with loss of sensation
- One or more enlarged peripheral nerves
- Presence of leprosy bacilli–positive smear

**Classification of Leprosy**
**Multibacillary (MB) Leprosy**

- Patients with six or more leprosy skin lesions
- Positive skin smear

**Paucibacillary (PB) Leprosy**

- Patients with one to five leprosy skin lesions
- Negative skin smear

**Note**: If there is any doubt regarding the classification, the patient should be classified and treated as a multi-bacillary case.

**Pharmacological Treatment**
Patients should be treated by multidrug combination therapy; dosage may depend with classification and whether patient is adult or children

**Table 7.6 Treatment of Leprosy**

| Classification | Medicine dosage | Duration of treatment |
|---|---|---|
| Adult MB: 15 years and above | Day 1: Rifampicin 600mg (2x 300mg) + Clofazemine 300mg (3 x 100mg) + Dapsone 100mg. Daily Treatment: Day 2–28, Clofazemine 50mg + Dapsone 100mg | 12 blister packs to be taken within a period of between 12–18 months |
| Child MB: below 15yrs | Day 1: Rifampicin 450mg (3 x 150mg) + Clofazemin 150mg (3 x 50mg) + Dapsone 50mg. Daily Treatment: Day 2–28 Clofazemine 50mg every other day + Dapsone 50mg daily. | 12 blister packs to be taken within a period of between 12–18 months |
| Adult PB: 15 years and above | Day 1: Rifampicin 600mg (2 x 300mg) + Dapsone 100mg. Daily Treatment: Days 2–28: Dapsone 100mg | 6 blister packs to be taken within a period of between 6–9 months |
| Child PB: below 15yrs | Day 1: Rifampicin 450mg (3 x 150mg) + Dapsone 50mg. Daily Treatment: Days 2–28: Dapsone 50mg daily | 6 blister packs to be taken within a period of between 6–9 months |

## 7.4 TREATMENT OF LEPROSY IN SPECIAL CASES

**Tuberculosis:** Patients suffering from both tuberculosis and leprosy require appropriate anti-Tuberculosis therapy in addition to the MDT. **A**: Rifampicin must be given in the dose required for the treatment of tuberculosis. Once the intensive phase of anti TB treatment is completed, the patient should continue with his/her monthly rifampicin for leprosy treatment.

**There are two types of reactions**

- Reverse Reaction (RR) or type I reaction
- Erythema Nodosum Leprous (ENL) or type II reaction (For detail refer Manual for Management of Leprosy for Health Workers)

**Treatment of Reaction:** Depending on severity, treatment of RR is by giving anti-inflammatory drugs or corticosteroids usually prednisolone for a prolonged period.

**Note:** Health care worker should communicate with DTLC when suspect leprosy reaction

# CHAPTER EIGHT
# NERVOUS SYSTEM DISEASE CONDITIONS

## 8.1 INFECTIONS OF THE NERVOUS SYSTEM

Infections of the nervous system can arise secondary to bacteria, fungi, protozoa or viruses. Clinical features will depend on the site of the nervous system involved.

### 8.1 .1 Bacterial infections

#### 8.1.1.1 Bacterial Meningitis

Is a serious infection in which there are inflammations of the layers (meninges) covering the brain and spinal cord. Causative bacteria differs among different age groups

**Diagnostic criteria**

- Headache, high fever
- Confusion, convulsions, coma may occur.
- Photophobia
- Nausea and vomiting
- neck stiffness and other signs of meningeal irritations

**Children**

In infants under 1 year diagnosis is much more difficult therefore always think of it in a sick child if:

- Refusal to eat and or suckle, drowsiness and weak cry
- Focal or generalized convulsions
- Fever may be absent
- Irritability
- Hypotonia, neck is often not stiff
- Bulging fontanel

**NOTE:** A lumbar puncture for CSF analysis is essential to confirm diagnosis

**Supportive therapy**

- Control of fever and pain(refer fever and pain section)
- Control convulsions( see section convulsions)
- If unconscious, insert NGT for feeding and urethral catheter

**Pharmacological Treatment**

**I. Where the organism is not known:**

**Adults:**

**B:** Chloramphenicol 1000mg IV 6 hourly for 14 days

**Plus**

**A:** Benzyl penicillin 5MU IV 6 hourly for 14 days.

**OR**

**A:** Ceftriaxone IV 2 g 12 hourly for 14 days

**OR**

**D**:Cefotaxime 2 g IV 6 hourly for 10–14 days

**Plus**

**A:** Ampicillin IV 2g 6 hourly for 10–14 days

**Plus either**

**S:** Cefepime 2 g IV every 8 hours 10–14 days

**OR**

**S:** Meropenem 2 g IV every 8 hours 10 days

**II. Where the organism is known:**

- **Meningococcal meningitis**

  Adults & children >2yrs

  **A:** Ceftriaxone IM 100mg/kg as a single dose (divide into 2 injections if needed & inject half-dose in each buttock)

- **Haemophilus influenza meningitis**

  **Adults**

  **A:** Ceftriaxone IV 2g 12 hourly for 14 days

  **OR**

  **D**:Cefotaxime 2g IV 6 hourly for 10 days

  **OR**

  **B**: Chloramphenicol 1g IV 6 hourly for 7–10 days.

  **Children**

  **C:** Ampicillin 50–100 mg/kg 6 hourly for 10 days

  **OR**

  **B**: Chloramphenicol 50 mg/kg 6 hourly for 10 days

- **Pneumococcal meningitis**

  **A:** Benzyl penicillin 5MU IV 6 hourly for 14 days

  **OR**

  **B:** Ceftriaxone IV 2 g 12 hourly for 14 days

  **OR**

  **D:** Ceftriaxone **+** Salbactam (IV) 1.5mg twice daily for 14 days

  **OR**

  **D:** Cefotaxime 2g IV 6 hourly for 10 days

### 8.1.1.2 Tetanus

It is an acute, often fatal disease caused by an exotoxin produced by the anaerobic bacterium *Clostridium tetani.* It is acquired through wounds contaminated with spores of the bacteria and in the case of neonates, through the umbilical stump, resulting in neonatal tetanus

**Diagnostic criteria**

- Generalized spasms and rigidity of skeletal muscles
- Locked jaws
- Patients are usually fully conscious and aware.
- Dysphagia
- diaphoresis
- Local spasms may also occur

**Supportive Therapy**

- Nurse in dark, quiet room to avoid unnecessary external stimuli which can trigger spasms
- Protect the airway
- Thorough cleaning of the site of entry (wound/umbilicus), leaving it exposed without dressing
- Pain management with Paracetamol (via NGT) as the spasms can be very painful
- Maintenance of fluid balance and nutrition (via NGT)
- Avoid giving medications via IV/IM route as injections can trigger spasms
- Sedation (see below) and care as for unconscious patient

**Pharmacological Treatment**

Treatment is generally aimed at the following:

- For prevention of further absorption of toxin from the wound

  **B:** Human tetanus immunoglobulin; Adults give 3000IU stat

  **AND**

  **A:** Amoxicillin 500mg via NGT 8 hourly for 5 days

  **AND**

  **A:** Metronidazole 400mg 8 hourly for 5 days

- Control of spasms

Give a sedative cocktail of ALL the following via NGT:

**A:** Injection Diazepam10–30 mg 4–6 hourly
Children: 0.5 mg/kg 6 hourly

**AND**

**A:** Injection Chlorpromazine100–200 mg 8 hourly
Children 2 mg/kg 6 hourly

**AND**

**B:** Injection Phenobarbitone 50–100 mg 12 hourly
Children 6 mg/kg 12 hourly

**Table 8.1: Guidelines for dosage administration****

| Time (Hours) | 0 | 3 | 4 | 6 | 9 | 12 | 15 | 18 | 21 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|
| Diazepam | * | | | * | | * | | * | | * |
| Chlorpromazine | | | * | | | * | | | * | |
| Phenobarbitone | | * | | | | | * | | | |

**Prevention**: Tetanus (toxoid) vaccine 0.5 ml IM; repeat after 4 weeks and after 6-12 months, then boost every 10 years thereafter

### 8.1.1.3 Brain Abscess

Brain abscess is a focal collection of pus/necrotic tissue within the brain parenchyma, which can arise as a complication of a variety of infections, trauma or surgery. The manifestations of brain abscess depends on the site, size and the immune status of the patient

**Diagnostic Criteria**

- Headache is the most common symptom
- Fevers
- Focal neurological deficit
- Vomiting and lethargy may progress to coma
- A ring enhancing lesion demonstrated by a CT scan of the brain.

**Non-Pharmacological Treatment**

Brain abscess is generally managed by:

- Controlling fever and pain with Paracetamol
- If unconscious, insert NGT for feeding and urethral catheter

**Pharmacological Treatment:**

**Table 8.2: Management of Brain Abscess**

| Condition | Treatment | Duration |
|---|---|---|
| **Brain abscess (unspecific bacterial)** | **B:** Benzyl penicillin (I.V) 5 MU 6 hourly (children 125,000 IU/kg/24 hours)<br>**O**R<br>**D:** Cefotaxime 2 g IV 4 hourly<br>**OR**<br>**B:** Ceftriaxone 2 g IV 12 hourly<br>**Plus**<br>**A:** Metronidazole (IV) 500mg 8 hourly (children 7.5 mg/kg/day) | **4-6weeks**<br><br><br>**4-6 weeks** |
| **Brain abscess (Staph aureus)** | **D:** Vancomycin 1 g 12 hourly is used (with cefotaxime or ceftriaxone**)** | **4-8 weeks** |

**Note:** Where the patient is allergic to penicillin, chloramphenicol 500 mg IV every 6 hours can be used instead

**Surgery**

All patient with a brain abscess should be referred to a neurosurgeon

## 8.1.2 Fungal infections

**Cryptococcus meningitis**

It develops in patients who are immune compromised e.g. HIV-positive patients with low CD4 cell count.

**Diagnostic criteria**

- Headache, fever, intolerance to light and sound, neck stiffness, vomiting, seizures, deafness and blindness
- In advanced stages it may present with confusion, altered consciousness and coma.

**Non-Pharmacological Treatment**

Refer to section on bacterial meningitis

**Pharmacological Treatment:**
Treatment is in 3 phases:
**Phase 1: Induction phase**

**D**: Amphotericin B 0.7mg/kg/day IV

**AND**

**D:** 5 Flucytosine 100mg/kg/day administered orally for 14 days

**OR**

**A**: Fluconazole 1200mg IV/(PO) once daily for 14 days

**Phase 2:** Consolidation phase

**A**: Fluconazole 400mg day for 8 weeks or until CSF is sterile.

**Phase 3:** Suppressive phase

**A**: Fluconazole 200mg per day until $CD_4$ more than 350

**Note:**

- LP is done for diagnostic and therapeutic for cryptococal meningitis.
- Cryptococal antigen test should be done as there are cases of negative India ink results with cryptococal meningitis

## 8.1.3 Protozoa infections

**Toxoplasmosis**
Immunocompetent persons with primary infection are usually asymptomatic, but latent infection can persist for the life of the host. In immunosuppressed patients, especially patients with AIDS, the parasite can reactivate and cause disease, usually when the CD4 lymphocyte count falls below 100 cells/$mm^3$.

**Diagnostic Criteria**

- Patients can present with focal paralysis or motor weakness depending on the brain area affected
- Neuro-psychiatric manifestations corresponding to the affected area in the brain, seizures or altered mental status.

**Note:** Diagnosis is predominantly based on clinical findings after exclusion of other common causes of neurological deficit. If available, a CT scan is very useful for confirmation. Toxoplasma serology has to be done for addition in diagnosis.

**Supportive Therapy**
Similar to bacterial meningitis

**Pharmacological Treatment**
Acute infection

**D:** Sulphadiazine 1 gm 6 hourly for 6 weeks

**AND**

**D:** Pyrimethamine 100mg loading dose then 50mg /day for 6 weeks

**AND**

**D:** Folinic acid tabs 10mg /day for 6 weeks.

After six weeks of treatment give prophylaxis therapy with Sulphadiazine tabs 500mg 6 hourly + Pyrimethamine tabs 25-50mg /day + Folinic acid tabs 10mg /day.
For those allergic to sulphur replace Sulphadiazine tabs with

**S:** Clindamycin capsules 450mg 6 hourly for for 6 weeks.

## 8.1.4 Viral infections

In Tanzania, viral infections of the nervous system are mainly caused by *Herpes simplex* virus and HIV.
*See section on viral infections and HIV*

### 8.1.4.1 Rabies

Rabies is an acute viral infection of the central nervous system that affects all mammals and is transmitted to man by animal bites via infected secretions, usually saliva.

**Diagnostic Criteria**

- Early or prodromal clinical features of the disease include apprehensiveness, restlessness, fever, malaise and headache
- The late features of the disease are excessive motor activity and agitation, confusion, hallucinations, excessive salivation, convulsions and hydrophobia

**Pharmacological Treatment**

- Local wound therapy:-Wash wound thoroughly with water and soap and repeat process with 10% Povidone iodine; prevent secondary bacterial infection
- For Prophylactic wound therapy that has lasted less than 8 hours

  **A:** Amoxicillin-clavulanic acid 500mg/125mg (PO) 8 hourly for 5 days

- For Infected wounds and wounds older than 24 hourly,

  **A:** Amoxicillin-clavulanic acid 500mg/125mg (PO) 8 hourly for 5 days

  **AND**

  **S:** Clindamycin 150–300 mg every 6 hourly for 5 days

  **AND**

  **A:** Ciprofloxacin (adults) 500mg 12 hourly for 5 days

  **OR**

  **A:** Trimetroprim/Sulphamethoxazole (children) 120-480mg 12 hourly for 5 days

**i) Passive Immunization**

**B:** Anti-rabies human immunoglobulin 20 IU/kg half the dose given parenterally and the other half injected into and around the wound

**ii) Active Immunization**

**B:** Human Diploid Cell Vaccine (HDCV) 1ml I.M on day 0, 3, 7, 14 and 28.
In addition, patients should receive rabies immune globulin with the first dose (day 0)

**iii)** Tetanus toxoid vaccine see section on Tetanus

### 8.1.4.2 Herpes simplex encephalitis

The majority of cases in adults caused by HSV-1, a small number are caused by HSV-2 usually in immuno-suppression or in neonates. It causes inflammation and necrosis in the brain.

**Diagnostic Criteria**

- Early features are fever, headache & altered consciousness which may develop gradually over days or rapidly over hours
- The most common manifestations are personality change, dysphasia, behavioural disturbance and occasional psychotic features
- Focal or generalized seizures can occur
- On lumbar puncture, CSF is under increased pressure and may appear normal or show a mild-moderate lymphocytosis, a mild-moderate increase in protein and normal or mildly decreased glucose.

**Note:** The disease is easily missed in Tanzanian settings due to lack of diagnostic (HSV-1 and HSV-2 PCR) and should therefore be suspected in patients not responding to antibiotics/other treatment.

**Supportive Therapy**

Manage it as for unconscious patients (control seizures)

**Pharmacological Treatment**

**B:** Acyclovir IV/Oral (10–15 mg/kg every 8 hourly for 14–21 days

# CHAPTER NINE
# RESPIRATORY DISEASE CONDITIONS

## 9.1 ACUTE RESPIRATORY INFECTIONS (ARI)

It is an infection affecting upper or lower respiratory tract. Can be caused by bacteria or viruses

### 9.1.1 Pneumonia

Pneumonia is the inflammation of the lung tissue. Pneumonia can either be primary (to the causing organism) or secondary to pathological damage in the respiratory system

**Diagnostic Criteria**

- Fever
- Dry or productive cough
- Central cyanosis
- Respiratory distress
- Chest pain and tachypnea

#### 9.1.1.1 Pneumonia in Children

(For more details, refer to Integrated Management of Childhood Illness (IMCI) guidelines)

**Table 9.1: Important clinical features of pneumonia in under-fives**

| Age | Signs | Classification |
|---|---|---|
| Infants less than 2 months | • Severe chest in-drawing or<br>• 60 breaths per minute or more | Severe pneumonia (all young infants with pneumonia are classified as severe) |
| | • No severe chest in-drawing<br>• Less than 60 breaths per-minute | No pneumonia:<br>Cough or cold |
| Children from 2 months to 1 year | • Chest in-drawing | Severe pneumonia |
| | • No chest in-drawing<br>• 50 breaths per minute or more | Pneumonia |
| | • No chest in-drawing<br>• Less than 50 breaths per minute | No pneumonia<br>Cough or cold |
| Children from 1 year to 5 year | • Chest in-drawing | Severe pneumonia |
| | • No chest in-drawing<br>• 40 breaths per minute or more | Pneumonia |
| | • No chest in-drawing<br>• Less than 40 breaths per minute | No pneumonia<br>Cough or cold |

**Investigations**

- FBC, CRP and ABG
- CHEST X-ray
- Oxygen saturation

**Non-Pharmacological Treatment:**

- Oxygen therapy if available
- Supportive care
  - Remove clothes
  - If wheezing giving rapid-acting bronchodilator: Nebulized Salbutamol
  - Ensure that the child receives daily maintenance fluid appropriate for the child's age but avoid over-hydration refer to IMCI/ STG & Essential Medicines List for Children

**Pharmacological Treatment:**

**Non-severe pneumonia**

**A:** Amoxicillin 25 mg/kg 8 hourly for 5 days

**Plus**

**A:** Paracetamol suppositories 10–15mg/kg (if there is fever)

**OR**

**B:** Ibuprofen 15mg/kg 12 hourly for 5 days

- Give the first dose at the clinic and teach the mother how to give the other doses at home.
- Encourage breasting and feeding.

**Severe Pneumonia**

**A:** Benzyl Penicillin 50000 units/kg IV or IM every 6 hours for at least 3 days
**THEN**
**A:** Amoxicillin 40 mg/kg 8 hourly for 7 days.

**OR**

**A:** Ampicillin 50 mg/kg IV/IM every 6 hourly

**AND**

**A:** Gentamicin (7.5 mg/kg IV/IM once a day) for 5 days; then,

If child responds well, complete treatment at home or in hospital with
**A:** Amoxicillin 30 mg/kg 8 hourly for 7 days.

**Very severe Pneumonia:**

**A:** Ampicillin 50 mg/kg IV/IM every 6 hours

**AND**

**A:** Gentamicin (7.5 mg/kg IV/IM once a day) for 5 days; then,

If child responds well, complete treatment at home or in hospital with
**A:** Amoxicillin (40 mg/kg12 hourly 10 days
Alternatively,
**A:** Ceftriaxone 80 mg/kg IV or IM once daily for 10 days.

**Note:** For children above 5 years, atypical pneumonia should be considered e.g. mycoplasma

**A:** Erythromycin 125–250mg 8hourly for 10 days

**OR**

**A:** Azithromycin 10mg/kg once daily for 5 days

#### 9.1.1.2 Pneumonia in adults

**Community Acquired Pneumonia**

**Investigation**

- FBC, CRP and ABG
- CHEST X-ray
- OXYGEN SATURATION

**Non Pharmacological treatment**

- Stop smoking if previously smoking

**Pharmacological Treatment**

**First-Line Treatment (Table 9.2)**

**Table 9.2: Treatment of Typical Community Acquired Pneumonia**

| Condition | Treatment | Duration |
|---|---|---|
| Mild pneumonia (treated on out-patient basis) | Amoxicillin (PO)<br>500–1000 mg every 8 hours<br>*Or* Erythromycin 500 mg (PO) every 8 hours | 5 days<br><br>5 days |
| Severe pneumonia (in-patient) | Ceftriaxone 1g IV every 12 hours | 7–10 days |

**Second line treatments**

- If no response to first line further investigation is required.
- If patient is in respiratory distress, or no response after 3 days of first line treatment, or patient's condition deteriorates, then investigate.

**Table 9.3: Treatment of Atypical Community Acquired Pneumonias**

| Condition | Treatment | Duration |
|---|---|---|
| Atypical pneumonias | **A:** Erythromycin (PO) 500 mg every 6 hours | 7 to 10 days |
| *Pneumocystis jirovecii Pneumonia* (PJP) | **A:** Co-trimoxazole (PO) 1920 mg every 6 hours<br>***PLUS*** Folic acid if cytopenic<br>*Alternatively in sulphur allergy*: **S:** Clindamycin 450–600 mg (PO) every 6 hours | 21 days |
| *Staphylococcus aureus* Pneumonia | **B:** Cloxacillin (IV) 1 to 2mg every 6 hours<br>Or **S:** *Clindamycin (IV/PO) 600mg every 6 to 8 hours | 14 days<br>14 days |
| Klebsiella Pneumonia | **B:** Chloramphenicol (IV) 500 mg every 6 hours +/- OR<br>**A:** Gentamicin (IV) 4 to 5 mg/kg/24 hrs in 2 divided doses | 10 to 14 days<br>10 to 14 days |

**Note:** In severe *Pneumocystis jirovecii* pneumonia (PCP), add 30 – 40mg prednisolone for 14 days

Alternative in Staphylococcal and Klebsiella Pneumonia:

**D:** Ceftazidime (IV/IM) 8 hourly for 7–14 days

#### 9.1.1.3 Hospital Acquired Pneumonia

This is defined as pneumonia that occurs 48 hours or more after hospital admission but that was not incubating at the time of admission.

**Pharmacological treatment**

Empirical treatment until bacteriology available

**A:** Ampicillin (IV) 1g every 6 hours for 7 to 10 days

***AND***

**A:** Gentamicin (IV) 4 to 5mg/kg/day in 2 divided doses 7–10 days

**OR**

**S:** Sulbactam (IV) 500mg once daily for 7 days

## 9.2 OBSTRUCTIVE LUNG DISEASES

It's a chronic airway disease which result in airway flow limitation can be either reversible or irreversible.

**Diagnostic Criteria**

- Wheezing
- Difficulty in breathing
- Coughing
- Finger clubbing

### 9.2.1 Asthma

It is a chronic reversible obstructive inflammatory airways disease caused by constriction of bronchial smooth muscle causing bronchospasm, oedema of bronchial mucous membrane and blockage of the smaller bronchi with plug of mucous.

**Diagnostic Criteria**

- wheeze,
- shortness of breath,
- chest tightness
- cough

**Non-pharmacological**

- Avoid polluted environment which can trigger asthmatic attack
- Avoid heavy exercise
- Stop smoking

**Note:** The management of asthma in children is similar to that in adult. Infants under 18 months, may not respond well in bronchodilator

**Table 9.4: Assessment and treatment of severity of asthma attack in children ≥2 years & adults**

| | **Clinical Presentation** | **Treatment (Children & Adults)** |
|---|---|---|
| MILD-MODERATE ATTACK | Able to talk in sentences<br>Respiratory rate<br>Child 2-5 yrs ≤40/min<br>Child >5 yrs ≤30/min<br>*And*<br>No criteria of severity | Salbutamol inhalation[3]<br>Give: 2–4 puffs every 20-30 min up to 10 puffs if necessary during 1st hour<br>- If symptoms completely subside observe for 1–4 hrs, give Salbutamol for 24–48 hrs (2-4 puffs every 4–6 hours) for 3 days<br>- If attack is only partially resolved give 2–4 puffs of Salbutamol every 3–4 hrs if attack is mild; 6 puffs every 1–2 hrs if the attack is moderate, until symptoms subside. When attack completely resolved proceed as above<br>- If symptoms worsen or do not improve, treat as **SEVERE ATTACK** |
| SEVERE ATTACK | Cannot complete sentences in 1 breath<br>*Or*<br>Too breathless to talk/ feed<br>Respiratory rate<br>Child 2-5 yrs>40/min<br>Child >5 yrs>30/min<br>Adult ≥25/min<br>Pulse<br>Child 2-5 yrs>140/min<br>Child >5yrs >125/min<br>Adult ≥110/min<br>$O_2$ saturation ≥92% | Admit the patient, place in semi-sitting position<br>Oxygen continuously 5L/min (maintain $O_2$ saturation between 94-98%)<br>Salbutamol inhalation[4] 2–4 puffs every 20-30 min up to 10 puffs if necessary in children <5 yrs, up to 20 puffs in children >5 yrs and adults<br>Hydrocortisone injection (IV) 5mg/kg in children, 100mg in adults every 6 hrs until the patient stabilizes, then switch to oral Prednisolone 1-2mg/kg once daily to complete 3–5 days of treatment<br>If attack is completely resolved continue with Salbutamol inhalation 2–4 puffs every 4 hrs for 24-48 hours and oral Prednisolone 1-2mg once daily to complete 3–5 days of treatment.<br>If not improving or condition worsens, treat as LIFE-THREATENING ATTACK |

Use a spacer to increase effectiveness. If conventional spacer not available, take a 500ml plastic bottle, insert the mouth piece of the inhaler into a hole on the bottom of the bottle (the seal should be as tight as possible). The child breathes from the mouth of the bottle in the same way as he would with a spacer

| | | |
|---|---|---|
| LIFE-THREATENING ATTACK | Altered level of consciousness (drowsiness, confusion, coma)<br>Exhaustion<br>Silent chest<br>Paradoxical thoracoabdominal movement<br>Cyanosis<br>Collapse<br>Bradycardia in children or arrhythmia/ hypotension in adults<br>$O_2$ saturation<92% | Admit the patient, place in semi-sitting position<br>Oxygen continuously 5L/min (maintain $O_2$ saturation between 94-98%)<br>Salbutamol nebulizer 2.5 mg for children <5 yrs and in children >5 yrs&adults 2.5-5 mg every 20–30 min then switch to Salbutamol aerosol when clinical improvement is achieved<br>Hydrocortisone injection (IV) 5mg/kg in children, 100mg in adults every 6 hrs<br>In adult administer a single dose of Magnesium Sulphate (Infusion of 1 to 2g in 0.9% Sodium Chloride over 20 minutes)<br>In children use continuous nebulization rather than intermittent nebulisation. |

***Nocturnal Asthma***

Patients who get night attacks should be advised to take their medication on going to bed.

## 9.2.2 Chronic Asthma in Adults

The assessment of the frequency of daytime and nighttime symptoms and limitation of physical activity determines whether asthma is intermittent or persistent. There are 4 categories (see table).

Therapy is step-wise (Step 1–4) based on the category of asthma and consists of:

- Preventing the inflammation leading to bronchospasm (controllers)
- Relieving bronchospasm (relievers)

**Controller medicines in asthma**

- Inhaled corticosteroids e.g. Beclomethasone

**Reliever medicines in asthma**

- $\beta_2$ agonists e.g. Salbutamol (short-acting)

**Table 9.5: Long-term treatment of asthma according to severity**

| Categories | Treatment |
|---|---|
| STEP 1<br>Intermittent asthma<br>- Intermittent symptoms < once/week<br>- Night time symptoms < twice/ month<br>- Normal physical activity | No long-term treatment<br>Inhaled Salbutamol *when symptomatic* |
| STEP 2<br>Mild persistent asthma<br>- Symptoms > once/ week | Continuous treatment with inhaled Beclomethasone in children <5 yrs 50-200 µg twice daily; in children >5 yrs and adults 100- |

| | |
|---|---|
| but < once/ day<br>- Night time symptoms > twice/ month<br>- Symptoms may affect activity | 250 µg twice daily<br>Plus<br>Inhaled Salbutamol *when symptomatic* |
| STEP 3<br>Moderate persistent asthma<br>- Daily symptoms<br>- Symptoms affect activity<br>- Night time symptoms >once/ week<br>- Daily use of Salbutamol | Continuous treatment with inhaled Beclomethasone in children <5 yrs 200–400 µg twice daily; in children >5 yrs and adults 250–500 µg twice daily<br>Plus<br>Inhaled Salbutamol 1–2 puffs four times/day |
| STEP 4<br>Severe persistent asthma<br>- Daily symptoms<br>- Frequent night time symptoms<br>- Physical activity limited by symptoms | Continuous treatment with inhaled Beclomethasone in children <5 yrs>400 µg twice daily; in children >5 yrs and adults >500 mcg twice daily<br>+Inhaled Salbutamol 1-2 puffs four–six times/day |

## 9.3 BRONCHITIS

### 9.3.1 Acute Bronchitis

It is a self-limited inflammation of the bronchi due to upper airway infection. Acute bronchitis is one of the most common conditions associated with antibiotic misuse. This respiratory condition is generally caused by a virus. Pertussis is the only indication for antibacterial agents in the treatment of acute bronchitis.
It is also known as a chest cold, is short-term inflammation of the bronchi (large and medium-sized airways) of the lungs.

**Diagnostic Criteria**

- Patients with acute bronchitis present with a cough lasting more than five days (typically one to three weeks), which may be associated with sputum production.
- Acute bronchitis should be distinguished from chronic bronchitis (see below), it is not a form of COPD.

**Symptomatic Treatment**

- With non-steroidal anti-inflammatory drugs: paracetamol, aspirin
- Cough suppressant syrups
- There is NO benefit from antibiotic use

### 9.3.2 Chronic Bronchitis

It defined by a chronic productive cough for three months in each of two successive years in a patient in whom other causes of chronic cough have been excluded. Patients may get secondary bacterial infection with development of fever and production of thick smelly sputum.

**Non-Pharmacological Treatment**

- Stop smoking and/or remove from hazardous environment
- Prompt treatment of infective exacerbations
    - Antibiotics as above in case of secondary bacterial infection
    - Controlled oxygen therapy
- Physiotherapy
- Bronchodilator may give some benefit

**Pharmacological Treatment**

**A:** Inhaler Salbutamol (PO) 100 µg two puff 6 hourly

**OR**

**A:** Salbutamol (PO) 4mg 8 hourly

**OR**

**D:** Ipratropium bromide aerosol 20–80mg, 6–8 hourly

Trial of steroids if there is possibility of reversible airways obstructions

**A:** Prednisolone (PO) 20mg once daily for 5 days

**Note**: Patient should be given salbutamol inhaler but when not available consider salbutamol tablets.

## 9.4 EMPHYSEMA

It is a long-term, progressive disease of the lungs that primarily causes shortness of breath due to over-inflation of the alveoli (air sacs in the lung).

**Diagnostic Criteria**

- Shortness of breath
- Cough, sometimes caused by the production of mucus
- Wheezing

**Non-Pharmacological Treatment:**

- Stop smoking
- **B:** Give oxygen

**Pharmacological Treatment:**

Treatment as in section 9.2 above

## 9.5 OTHER RESPIRATORY INFECTIONS

### 9.5.1 Acute Laryngo-tracheobronchitis

Laryngo-tracheobronchitis (croup) is acute inflammation of the larynx, trachea and bronchi which occurs in young children (usually between 6 months to 3 years of age). It arises as a result of narrowing of the airway in the region of the larynx. The most common cause is viral infection (particularly parainfluenza viruses) but may also be due to bacterial infection. The obstruction is due to inflammation and oedema.

**Diagnostic Criteria**

- The symptoms include paroxysmal "barking" cough, inspiratory stridor, fever, wheezing, hoarseness of voice and tachypnoea
- Such symptoms usually occur at night
- Respiratory failure and pneumonia are potentially fatal complications.

**Non-Pharmacological Treatment**

- Prevent asphyxiation
- Treat inflammatory oedema
- Humidification of inhaled air
- Hospitalization may be necessary

**Note**

- No stridor at rest, give no antibiotics
- Stridor at rest or chest in-drawing or fast breathing REFER IMMEDIATELY to hospital

**Mild Croup**

- Only stridor when upset, no moderate/severe ARI
- Likely of viral origin
- Home care – steam inhalation
- Antibiotics NOT required

**Severe Croup**

- Likely bacterial origin
- Stridor in a calm child at rest
- Chest in drawing
- Antibiotics are NOT effective and should not be given

**Pharmacological Treatment**

Admit to hospital, give Oxygen therapy to all patients with chest in-drawing (using nasal prongs only, DO NOT use nasopharyngeal or nasal catheter) until the lower chest wall in-drawing is no longer present

**A:** Dexamethasone 0.6 (PO) mg/kg daily in 1–2 divided doses

**AND**

**C:** Nebulized Adrenaline 400 mcg/kg every 2 hours if effective; repeat after 30 min if necessary.

## 9.5.2 Laryngeal Diphtheria

Is an infection caused by *Corynebacterium diphtheria*; it is directly transmitted from person to person by droplets. Children between 1–5 years of age are most susceptible although non-immune adults are also at risk.

**Diagnostic Criteria**

Diphtheria is characterized by grayish-white membrane, composed of dead cells, fibrin, leucocytes and red blood cells as a result of inflammation due to multiplying bacteria.

**Non-Pharmacological Treatment**

- Isolate the child
- Gently examine the child's throat – can cause airway obstruction if not carefully done.
- NGT for feeding if unable to swallow
- Avoid oxygen unless there is incipient airway obstruction
- May need tracheostomy if there is incipient airway obstruction

**Pharmacological Treatment:**

Drug of choice

**A:** Penicillin V (250 mg four times daily) for a total treatment course of 14 days

**OR**

**A:** Erythromycin (PO) 125–250 mg every 6 hourly for 14 days

**OR**

**A:** Azithromycin (PO) 500mg daily for 3 days

**OR**

**A:** Penicillin G (Benzyl Penicillin) 25,000–50,000 units/kg to a maximum of 1.2 million units IV every 12 hours until the patient can take oral medicine)

**AND**

Diphtheria antitoxin (IM or slow IV) dose depends upon the site and severity of infection:

- First give a test dose of 0.1ml of 1 in 10 dilution of antitoxin in 0.9% Sodium Chloride intradermal to detect hypersensitivity
- It should be given immediately because delay can lead to increased mortality
- The dose should be administered intravenously over 60 minutes in order to inactivate toxin rapidly
- 20,000–40,000 units for pharyngeal/laryngeal disease of <48 hours duration,
- 40,000–60,000 units for nasopharyngeal disease
- 80,000–120,000 units for >3 days of illness or diffuse neck swelling ("bull-neck")

**Note:** Tracheostomy may be required for airway obstruction

### 9.5.3 Whooping Cough

It is a highly infectious childhood disease caused by *Bordetella pertussis*. It is most severe in young infants who have not yet been immunized.

**Diagnostic Criteria**

- Paroxysmal cough associated with a whoop
- Fever
- Nasal discharge

**Non-Pharmacological Treatment**

- Place the child head down and prone, or on the side, to prevent any inhaling of vomitus and to aid expectoration of secretions.
- Care for the airway but avoid, as far as possible, any procedure that could trigger coughing, such as application of suction, throat examination
- Do not give cough suppressants, sedatives, mucolytic agents or anti-histamines.
- If the child has fever (>38.5$^0$C) give paracetamol.

- Encourage breastfeeding or oral fluids
- Whooping cough is preventable by immunization with pertussis vaccine contained in DPT-HepB-Hib vaccine at week 6, 10 and 14.

**Pharmacological Treatment**

**A**: Erythromycin (12.5 mg/kg 6 hourly) for 10 days.
This does not shorten the illness but reduces the period of infectiousness

- If there is fever give
  **A***:* Cotrimoxazole (PO) 18 mg/kg 12 hourly for 5 days to treat possible secondary pneumonia

**Oxygen**

- Give oxygen to children who have spells of apnoea or cyanosis, or severe paroxysms of coughing.
- Use nasal prongs, not a nasopharyngeal catheter or nasal catheter which can provoke coughing.

### 9.5.4 Bronchiectasis

Bronchiectasis is characterized by inflamed and easily collapsible airways, obstruction to airflow, and frequent hospital visits and admissions.

**Diagnostic Criteria**

The diagnosis is usually established clinically on the basis of chronic daily cough with viscid sputum production, and radiographically by the presence of bronchial wall thickening and luminal dilatation on chest x-rays.

**Non-Pharmacological Treatment**

- Physiotherapy and postural drainage
- Avoid smoking
- Respiratory care during childhood measles helps prevent the development of bronchiectasis in children

**Pharmacological Treatment**

**Acute exacerbation**

Adults:

**A:** Ciprofloxacin 500mg (PO) 12 hourly for 10 days

**AND**

**A:** Metronidazole 400mg (PO) 8 hourly for 10 days

Children:

**A:** Amoxicillin 40mg/kg (PO) in 2 divided doses for 7 days

**AND**

**A:** Metronidazole 7.5 mg/kg 8 hourly for 5–7 days

**Prevention of infection**

**A:** Ciprofloxacin 500mg (PO) once daily for 7–14 days/month

**OR**

**A:** Erythromycin (PO) once 250–500mg for 7–14 days/month

### 9.5.5 Lung Abscess

Lung abscess is a cavity within the lung parenchyma filled with necrotic tissues, which occurs as a result of tissue-destroying infection.

**Diagnostic Criteria**

It is characterized by high fever, breathlessness, cough productive of large amounts of foul-smelling sputum and haemoptysis.

**Non-Pharmacological Treatment**

Postural drainage

**Pharmacological Treatment**

**A:** Ampicillin (start with IV for one week then oral) 500–1000mg 8 hourly for 3–6 weeks (children 50mg/kg/dose)

**AND**

**B:** Metronidazole (start with IV for one week then oral) 400mg 8 hourly for 4–6 weeks (children 7.5mg/kg)

# CHAPTER TEN
# GASTROINTESTINAL DISEASE CONDITIONS

## 10.1 INFECTIONS OF GASTROINTESTINAL TRACT

### 10.1.1 Amoebiasis

Amoebiasis is an infection caused by the protozoa organism *Entamoeba histolytica,* which can cause colitis and other extra-intestinal manifestations. The infection is primarily acquired through ingestion of contaminated food and water and occasionally can be acquired through oral-anal sexual practices.

**Diagnostic Criteria**

- Bloody diarrhea
- Crampy abdominal pain
- Fever
- Weight loss
- Peritonitis in severe forms
- Evidence of motile trophozoites or cysts on saline wet mount from a stool specimen

**Pharmacological Treatment**

**A:** Metronidazole (PO) 400–800mg 8 hourly for 5 days

**OR**

**B:** Tinidazole (PO) 2g once daily for 3 days

**OR**

**C:** Secnidazole (PO) 2g single dose

### 10.1.2 Amoebic Liver Abscess

It is the most frequent extra-intestinal manifestation of *Entamoeba histolytica* infection which results from the invasion of the portal venous system from the colon leading to inflammation and subsequently abscess formation particularly involving the right lobe of the liver.

**Diagnostic Criteria**

- High grade fever
- Right upper quadrant pain,
- Tender and enlarged liver
- Positive imaging evidence of liver abscess

**AND**

- Serological evidence of *E. histolytica* antibodies or antigens.

**Pharmacological Treatment**

**C:** Metronidazole IV 800 mg, 8 hourly for 10 days.

**OR**

**B:** Tinidazole (PO). Adults: 2g once daily for 3 days

**Note:**

- Metronidazole, Tinidazole, and Secnidazole should not be given in the first trimester of pregnancy due to potential teratogenic effects.
- Should not be taken with alcohol due to disulfiram like effects

**Surgery:**
Abscess cavity (size >5 cm in diameter) not regressing despite 7 days treatment should be aspirated.

## 10.1.3. Giardiasis

It is the infestation of the upper small intestine caused by the flagellate protozoan *Giardia Lamblia* (or *G. intestinalis*), cytopathic effects of which leads to malabsorption and diarrhea. It is more common in immune compromised individuals and is acquired through ingestion of contaminated water

**Diagnostic Criteria**

- Crampy abdominal pain
- Chronic diarrhoea
- Steatorrhea
- Weight loss PLUS

Evidence of *Giardia intestinalis* trophozoites or cysts on serial 3 samples of stool examination

**OR**

Serological evidence of *G. Intestinalis* trophozites antigen or antibody

**OR**

Evidence of *G.Intestinalis* in duodenal aspirates or biopsy specimen.

**Pharmacological Treatment**

**A:** Metronidazole (PO) 400–800mg 8 hourly for 5 days

**OR**

**B:** Tinidazole (PO) 2g once daily for 3 days

**OR**

**C:** Secnidazole (PO) 2g single dose

## 10.1.4 Ascariasis

It is a small intestinal infestation caused by Ascaris lumbricoides which leads to malnutrition, iron deficiency anaemia, impaired growth and cognition in susceptible hosts. It is most common infestation in children and it is acquired through ingestion of contaminated food and water.

**Diagnostic Criteria**

- Chronic Diarrhea
- Steatorrhea
- Malnutrition
- Chronic Cough (loffers's syndrome)
- Intestinal obstruction
- Obstructive jaundice PLUS
- Evidence of ova or worms on wet mount stool examination

**Pharmacological Treatment**

A: Mebendazole (PO) 500mg as a single dose or 100mg 12 hourly for 3 days.

**OR**

A: Albendazole (PO) 400mg as a single dose.

## 10.1.5 Ancylostomiasis

It is a hookworm disease caused by infestation of the small intestine with Ancylostoma duodenale or Necator americanus leading to anaemia and malnutrition.

**Diagnostic Criteria**

- Abdominal pains
- Chronic diarrhea
- Melena stool
- Weight loss
- Chronic cough ( loafers' syndrome) **PLUS**
- Evidence of ova or worms on wet mount stool examination
- Anaemia

**Pharmacological Treatment**

**A**: Mebendazole (PO) 500mg as a single dose or 100mg 12 hourly for 3 days.

**OR**

**A**: Albendazole (PO) 400mg as a single dose.

**Note:**

- If persist, give second course after 4 weeks.
- Iron replacement and nutritional supplementation (protein and vitamins) should be part of the management strategy.
- Albendazole is contraindicated in the first trimester of pregnancy

## 10.1.6 Strongyloidiasis

Small intestinal infestation caused by *Strongyloides stercoralis* usually asymptomatic in immune competent adult but can lead to life-threatening infestation and disseminated strongyloidiasis in an immune-compromised host associated with high mortality rates

**Diagnostic Criteria**

Pruritic papulo–vesicular rash at the site of penetration or uticarial rash involving the perennial region extending to the buttocks, thighs and abdomen

- Chronic cough
- Colicky abdominal pains
- Chronic diarrhea and passage of mucus
- Weight loss
- Hyper-infection syndrome PLUS
- Evidence of rhabiditform larva in wet mount stool examination with Serological evidence (ELISA) for anti-strongyloides antibody

**Pharmacological Treatment**

**A:** Albendazole (PO) 400mg 12 hourly for 3 days (Repeat after 4 weeks if still positive stool findings)

**OR**

**A:** Ivermectin (PO) 200 µg /kg daily for 2 days

**OR**

**A:** Thiabendazole (PO) 25mg/kg body weight (max.1.5g) 12 hourly for 3 days

**Note**: Give treatment for 10 days in case of disseminated/super infestation

## 10.1.7 Taeniasis

Is a tapeworm disease acquired from eating raw or not-well cooked food. Can be due to *Taenia saginata* (beef tapeworm), *Taenia solium* (pork tapeworm), *Diphyllobothrium latum* (fish tapeworm) and *Hymenolepsis nana* (faecal oral contamination from human and dogs) leading to chronic malnutrition (Taeniasis) or multi-organ dissemination and dysfunction (Cysticercosis)

**Diagnostic Criteria**

**Taeniasis**

- Colicky abdominal pain
- Body Weakness
- Loss of or increased appetite
- Constipation or diarrhea
- Pruritus ani
- Hyperexcitability PLUS
- Evidence of characteristic ova, proglottides or scolex in the wet mount stool examination

**Cysticercosis -** The cysticerci are most often located in subcutaneous and intermuscular tissues, followed by the eye and then the brain. The CNS is involved in 60-90% of patients i.e. Neurocystercosis which may manifest as

- Convulsions and/or seizures:
- Intracranial hypertension: headache, nausea, vomiting, vertigo, and papilledema.
- Personality and mental status changes (Neuropsychiatric changes)
- Behavioural changes and learning disabilities more marked in children and immunocompromised adults. PLUS
- CT scan

NB: Refer the patient to high centres for further investigation and expertise.

**Pharmacological Treatment**

**Taeniasis**

**A:** Praziquantel (PO) 5–10mg/kg single dose

**OR**

**C:** Niclosamide (PO) 2g as a single dose after a light breakfast followed

**AND**

**D:** Magnesium sulphate 5–10 g in a glass of water after 2 hours

**Cysticercosis (NCC)**

**A:** Praziquantel 50mg/kg/day for 21 days

**OR**

**A:** Albendazole 15mg/kg/day for 30days.

**AND**

**B:** Dexamethasone IV 4mg hourly can be given up to 7days.

**AND**

**A:** Carbamazepine initially 200 mg 1–2 times daily, increased slowly to 0.8–1.2 g daily in divided doses

**Note:**

- Hydrocephalus should be treated with surgical shutting.
- Ocular manifestation cysticercosis, should be referred to eye specialist

## 10.1.8 Echinococcosis

It is a canine tape worm *Echinococcus Granulosus* which is transmitted by dogs, sheeps and horses. Human infestation is through contamination of food or water causing visceral cysts (Hydatid Cyst Disease) particularly in the liver and lungs and is usually asymptomatic in susceptible host.

**Diagnostic Criteria**

- Upper abdominal discomfort and pain, poor appetite,
- Upper abdominal mass swelling with enlarged liver.
- Cough with features of acute hypersensitivity reaction. ( for ruptured cysts)
- Portal hypertension, Biliary obstruction or Budd-Chiari syndrome (for complicated cases)

**Pharmacological Treatment**

**A**: Albendazole (PO) 400mg 12 hourly for 3 months

**OR**

**A**: Mebendazole 500mg for 3 months

**Surgery:**

For symptomatic/ complicated cases refer to higher centres with management and expertise.

## 10.1.9 Schistosomiasis

Parasitic disease caused by blood flukes (trematodes) of the genus Schistosoma. Common species found in Tanzania are S. haematobium responsible for urogenital schistosomisis and S. mansoni responsible for intestinal schistosomiasis as a result of immune mediated reaction which leads to progressive inflammation and fibrosis of the urinary bladder or portal venous system respectively.

**Diagnostic Criteria**

***Schistosoma mansoni:***

- Swimmer's itch or katayama fevers in acute infection phase.
- Colicky abdominal pains
- Diarrhoea and dysentery

- Anemia
- Hepatomegally
- Portal hypertension with bleeding esophageal varices or
- Decompensated liver disease

***Schistosoma hematobium:***

- Dysuria and terminal hematuria
- Hematospermia
- Obstructive uropathy (hydronephrosis, hydroureters)
- Glomerulonephritis and amylodosis
- Bladder carcinoma
- Chronic kidney failure

**PLUS**

- Laboratory evidence characteristic eggs in urine, (*S. Hematobium) or in stool (S .manson, S.japonicum)* examined by kato katz thick smear procedure or PCR assays of both urine and stool samples.[5]

**Pharmacological Treatment**

**A:** Praziquantel (PO) 40mg/kg as a single dose or in 2 divided doses

## 10.1.10 Typhoid and Paratyphoid

It is an acute systemic disease resulting from infection by Salmonella typhi and S.paratyphi, serovar group A and B respectively. Infection is acquired through ingestion of contaminated food and water.

**Diagnostic Criteria**

- Fever, severe headache, abdominal and muscle pains (myalgia)
- Delirium, obtundation, intestinal hemorrhage, bowel perforation,
- Sequela neuropsychiatric complications Plus
- Laboratory evidence of positive cultures from bone marrow aspirates; blood or stool done within 1 week of acute infection OR
- Serological evidence of rising high titers above 1:160 (Widal test), OR
- Indirect fluorescent Vi antibody, ELISA for immunoglobulin M (IgM) and IgG antibodies to *S. Typhi* polysaccharide.

**Pharmacological Treatment**

**A:** Ciprofloxacin (PO) 500mg 12 hourly for 10 days

**OR**

**B:** Azithromycin (PO) Adult 500mg for 7 days

## 10.1.11 Shigellosis

*Shigella* organisms are a group of gram-negative, facultative intracellular bacteria pathogens. They are grouped into 4 species: *Shigella dysenteriae, Shigella flexneri, Shigella boydii,* and *Shigella sonnei,* also known as groups A, B, C, and D respectively. Shigellosis is spread by means of fecal-oral, by igestion by ingestion of contaminated food or water and leads to bacillary dysentery.

**Diagnostic Criteria**

- Acute abdominal cramping, high-grade fever, emesis and large-volume watery diarrhea
- Tenesmus, urgency, fecal incontinence, mucoid bloody diarrhea
- Severe headache, lethargy, meningismus, delirium, and convulsions
- Hemolytic uremic syndrome (HUS), microangiopathic hemolytic anemia, thrombocytopenia, and renal failure
- Profound dehydration and hypoglycemia PLUS
- Laboratory evidence of microscopic isolation of the bacteria from stool or rectal swabs specimens

  **OR**
- Stool culture for suspected cases in early course of infection

  **OR**
- An enzyme immunoassay (ELISA) for shiga toxin detection in stool for *S. dysenteriae* type-1.

**Pharmacological Treatment**

**A:** Ciprofloxacin (PO) 500mg 12 hourly for 5 days

**OR**

**C:** Nalidixic acid (PO) 1000mg 6 hourly for 7 days

**OR**

**A:** Erythromycin (PO) 250mg 6 hourly for 5 days.

### 10.1.12 Cholera

For diagnostic criteria, investigations, preventation and treatment refer to section 4.1 under notifiable diseases.

## 10.2. DISORDERS OF GASTROINTESTINAL TRACT

### 10.2.1 Peptic Ulcer Disease

Refers to acid related peptic ulceration involving the lower esophagus; stomach and duodenum as a result of active inflammation induced by acid –pepsin leading to disruption of the mucosal integrity causing local defect or excavation

#### 10.2.1.1 Gastroesophageal Reflux Disease (GERD)

It is a disorder resulting from gastric acid-pepsin activity and other gastric contents into the esophagus due to incompetent barriers at the gastroesophageal junction leading to active inflammation of the distal third of the esophagus.

**Diagnostic Features**

- Heartburn and regurgitation are cardinal symptoms.
- Odynophagia, dysphagia, weight loss and bleeding
- Chronic cough, laryngitis, pharyngitis
- Chronic bronchitis, asthma, COPD, pneumonia, chronic sinusitis and dental decay PLUS
- Endoscopic evidence mucosal ulceration OR
- Histological evidence of chronic active inflammation OR
- PositSive finding with a gold standard 24-hours esophageal pH testing.

**Pharmacological Treatment:**

**A:** Omeprazole (PO) 20mg once daily for 8 weeks

**OR**

**S:** Esomeprazole (PO) 20mg once daily for 8 weeks.

**Note:**

- For refractory cases acid suppression therapy may require continuation up to 6 months.
- Life style modification and avoidance of triggers diet is important including avoidance of smoking, alcohol and NSAID use.
- Refer to next level centre with adequate expertise and facility for refractory cases or cases with alarming symptoms (red flags) such as bleeding, dysphagia or weight loss

**10.2.1.2 Gastroduodenal Ulcers (PUD)**

This is a disorder resulting from breakdown of mucosal defense mechanisms against hydrochloric acid and proteolytic enzymes, most commonly secondary to *H.Pylori* infection or NSAID use.

**Diagnostic Criteria**

- Burning epigastric abdominal pains, usually relived by antacids.
- Anorexia, early satiety, bloating,
- Hematemesis or melena stools
- Weight loss PLUS
- Endoscopic evidence of gastric or duodenal mucosal ulceration

**Pharmacological Treatment**

**A:** Omeprazole (PO) 20mg once daily for 8 weeks

OR

**D:** Esomeprazole (PO) 20mg once daily for 8 weeks

OR

**D:** Pantoprazole (PO) 40mg once daily for 8 weeks.

**10.2.1.3 Helicobacter Pylori Related Peptic Ulcer Disease**

**Diagnostic Features**

As above in cap 10.2.1.2 together with evidence of

- Positive stool antigen test OR
- Positive urease breath test OR
- Positive urease test on endoscopic biopsy sample OR
- Identification of the pathogen by histopathology examination

**Pharmacological Treatment**

Triple therapy is indicated for complete eradication of the organism

**A:** Omeprazole (PO) 20mg twice daily Plus amoxycillin (PO) 1000mg twice daily

**AND**

**A:** Metronidazole (PO) 400mg twice daily for 10–14 days

**OR**

**C:** Lansoprazole (PO) 30mg twice daily

**AND**

**D:** Clarithromycin (PO) 500mg twice

**AND**

**B:** Tinidazole (PO) 500mg twice daily for 10–14 days

**OR**

Any combination of PPI + 2 antibiotics active for *H. pylori*

**Note:**

- H.pylori diagnostic tests should be repeated 3 months after 2weeks of triple therapy to confirm eradication.
- Refer to next level of care with adequate expertise and facility for cases refractory to conventional triple therapy or persistent of symptoms or new onset complications

## 10.2.2 Ulcer Related Conditions

### 10.2.2.1 Non-ulcer Dyspepsia (Functional Dyspepsia)

It is a chronic recurrent dyspeptic disorder characterized by epigastrtic pain syndrome and post prandial distress syndrome without any organic, systemic or metabolic disease to explain its presence[6].

**Diagnostic Criteria**

Dyspeptic symptoms present for last 3 months and onset at least months prior to diagnosis and must include one or more of the following 6

- Bothersome post prandial fullness.
- Early satiation.
- Epigastric pains
- Epigastric burning PLUS
- Lack of evidence of structural disease by upper endoscopic examination.

**Pharmacological Treament**

**A:** Omeprazole (PO) 20mg daily

**AND**

**C:** Metoclopramide 10mg 8 hourly (bloating and nausea symptoms)

**OR**

**D:** Domperidone (PO) 10mg 8 hourly or to alleviate bloating and nausea symptoms.

### 10.2.2.2 Gastritis

This is an inflammatory mucosal response to injury from variety of agents and mechanisms including infections, drugs, alcohol, acute stress, radiation, allergy, acid and bile, ischemia or direct trauma. The inflammation may involve the entire stomach (pangastritis) or a region of the stomach (antral gastritis) while the severity of inflammation may be erosive or non erosive.

**Diagnostic Criteria**

- Nausea, vomiting, loss of appetite, belching, and bloating
- Acute abdominal pain or abdominal discomfort

- Fever, chills, and hiccups also may be present PLUS
- Endoscopic evidence of gastric mucosal inflammation OR
- Histologic evidence of chronic active inflammation of biopsy specimen.

**Non-Pharmacological Treatment**

- Reduce the use of drugs known to cause gastritis (eg, NSAIDs, alcohol)
- Stop smoking
- Reduce fatty, spicy and deep fried foods

**Pharmacological Treatment:**

- Triple therapy for *H. pylori* eradication if confirmed present.
- Administer fluids and electrolytes as required, particularly if the patient is vomiting.
- Omeprazole or Pantoprazole and Metoclopramide (for cases presenting with intractable vomiting) in order to relieve symptoms.

**Referral:**

Refer to next level service with adequate expertise and facilities for complicated case with alarm features (anemia, vomiting blood and weight loss).

## 10.2.3 Inflammatory Bowel Diseases

Inflammatory bowel disease (IBD) is an idiopathic disease involving an immune reaction of the body to its own intestinal tract. The 2 major types of IBD are ulcerative colitis (UC) and Crohn disease (CD). Pathologically, ulcerative colitis is limited to the colon while Crohn disease can involve any segment of the gastrointestinal (GI) tract from the mouth to the anus.

### 10.2.3.1 Ulcerative Colitis (UC)

Inflammatory condition that involves the rectum and extends proximally to affect a variable extent of the colon up to the caecum

**Diagnostic Criteria**

- Diarrhoea
- Rectal bleeding
- Tenesmus, passage of mucus
- Crampy abdominal pain
- Fevers and chills PLUS
- Endoscopic evidence of diffuse and continuous colonic mucosal inflammation with friability and loss of mucosal vascularity. characteristic cobble stone appearance **AND**
- Histologic evidence of abnormal crypt architecture and superficial inflammation typical of UC.

**Pharmacological Treatment**

**D:** Sulphasalazine (PO) 1000mg four times a day for acute disease, reducing to 1000mg once daily for maintenance

**OR**

**S:** Mesalazine (PO) 1.5g–4g/day in divided and reduced to 0.75–2g g/day in divided doses for maintenance

**PLUS**

**B:** Prednisolone (PO) 30–60mg once daily for severe, acute and extensive disease; tapering gradually after induction of remission.

**Note**

- Complication of UC may present with massive haemorrhage, toxic mega colon, AND perforation with features of peritonitis.
- Correction of fluid deficit and/or blood is important in acute severe forms which may necessitates hospitalization
- Lifelong follow up is required due to risk of bowel cancer Use steroids only when the disease is confirmed and for induction of remission only.
- Refer to next level of care with adequate expertise and facilities for all suspected cases for initial evaluation and management and cases presenting with acute complications

**10.2.3.2 Chrohn's Disease**

Crohn disease is an idiopathic, chronic, transmural inflammatory process of the bowel that often leads to fibrosis and obstructive symptoms and can affect any part of the gastrointestinal tract from the mouth to the anus.

**Diagnostic Criteria**

- Abdominal pain, diarrhea, weight loss, anorexia and fever
- Gross rectal bleeding or acute hemorrhage is uncommon
- Anemia due to illeal disease involvement
- Small bowel obstruction, due to stricturing
- Perianal disease associated with fistulization
- Gastroduodenal ulceration PLUS
- Endoscopic evidence of rectal sparing skip lesions, cobble stoning with linear ulceration appearance with,
- Histological evidence of transmural disease, apthous ulcers, and non caseating granulomas

**Pharmacological Treatment**

**S:** Methotrexate (PO) 7.5–15mg weekly

OR

**S:** Azathioprine (PO) 50mg once daily for maintenance of remission.

PLUS

**B:** Prednisolone (PO) 1–2mg/kg for induction of remission only.

PLUS

**A:** Metronidazole (PO) 400mg 8hourly for 7–10 days

OR

**A:** Ciprofloxacin (PO) 500mg 12 hourly for 7–10 days – can be added in presence of perianal disease or evident septic complications.

**Note:**

- Resuscitative and supportive management should be instituted as for UC section note above
- Refer to next level of care with adequate expertise and facilities for all

suspected cases for initial evaluation and management and cases presenting with acute complications.

#### 10.2.3.3 Pseudomembrenous Colitis

This condition is caused by *Clostridium difficile* a gram positive, anaerobic bacteria causing antibiotic associated diarrhoea as a result of altered bacterial flora and release of enterotoxins.

**Diagnostic Criteria**

- Bloody Diarrhea
- Abdominal cramps and tenderness
- Nausea, fever, dehydration
- Lower endoscopic pathognomic findings of pseudomembranous yellowish plaques overlying the ulcerated and friable rectal sigmoid colon mucosa PLUS
- Laboratory evidence of *C. difficile* toxin A-B isolation from cultured stool samples (Toxin B) OR ELISA assay (ToxinA)

**Pharmacological Treatment:**

Stop the causative antibiotics
**A:** Metronidazole (PO) 400mg 8 hourly for 7 days
OR
**D:** Vancomycin (PO) Adults, 125mg–500mg 6 hourly for 5–10 days

**Note:**

- Resuscitative and supportive management should be instituted as for UC section note above
- Refer to next level of care with adequate expertise and facilities for all suspected cases for initial evaluation and management and cases presenting with acute complications such as Toxic megacolon

### 10.2.4 Irritable Bowel syndrome

Irritable bowel syndrome (IBS) is a functional GI disorder characterized by abdominal pain and altered bowel habits in the absence of specific and unique organic pathology.

**Diagnostic Criteria**

Recurrent abdominal pains or discomfort at least 3 days per month in the last 3 months associated with two or more of the following

- Improvement with defecation
- Onset associated with a change in frequency of stools
- Onset associated with a change in form of stool
- Bloating or feeling of abdominal fullness

**Non-Pharmacological Treatment**

- Counseling on compelling psycho –social factors, life style modification, avoidance of trigger factors, and reassurance are corner stone of long term management strategy. Plus supportive therapies such as:
- High fibre diet and eating a healthy diet.

**Pharmacological Treatment**

**A:** Hyoscine butyl bromide (PO) 10mg 6hourly per day as needed

**OR**

**D:** Mebeverine (PO) 135mg 8 hourly per day as needed

**Plus**

**C:** Diazepam (PO) 5–10 mg 8 hourly (as needed for relief of anxiety)

**Plus**

**C:** Lactulose (PO) 20mls 12 hourly (as needed for constipation)

**Plus**

**B:** Loperamide (PO) 4mg stat, for diarrhoea followed by 2mg 8 hourly or after each unformed stool until diarrhoea is controlled.

## 10.2.5 Pancreatitis

Pancreatitis is an inflammatory process in which pancreatic enzymes auto digest the pancreatic gland leading to functional and morphologic loss of the gland.

### 10.2.5.1 Acute Pancreatitis

It is due to sudden inflammation of the pancreas due to pancreatic enzymes auto digestion. Common risk factors which trigger the acute episode are presence of gallstones and alcohol intake.

**Diagnostic Criteria**

- Severe, unremitting epigastric pain, radiating to the back
- Nausea and vomiting
- Signs of shock may be present
- Ileus is also common
- Local complications: inflammatory mass, obstructive jaundice, gastric outlet obstruction
- Systemic complication: sepsis, acute respiratory distress syndrome, acute renal failure PLUS
- Raised Serum levels for lipase and amylase greater than 3 times the upper limit of normal ULN and,
- Radiological evidence of inflamed and/or necrotizing pancreatitis.

**Pharmacological Treatment**

- Principles of management include supportive therapies.
  - Intravascular volume expansion (colloids/crystalloid)
  - Opiates analgesia usually required (follow WHO analgesic ladder)
  - Enteral feeding, (only in absence of illeus) start within 72 hours
  - Correction of electrolytes and metabolic deficit accordingly
  - Give Ceftriaxone (IV) 1 g 12 hourly **AND** Metronidazole (IV) 500mg 8 hourly for 7 days
  - ERCP + Sphincterotomy may be needed.

- Refer unstable cases to next level of care with adequate expertise and facility.

### 10.2.5.2 Chronic Pancreatitis

Chronic pancreatitis is long-term (chronic) inflammation of the pancreas that leads to permanent loss of function and morphology of the gland.

**Diagnostic Criteria**

- Chronic upper abdominal pain associated with nausea, vomiting and loss of appetite.
- Malabsorption diarrhoea
- Weight loss
- Diabetes PLUS
- Radiological evidence pancreatic calcification and atrophy.

**Pharmacological Treatment**

Supportive therapies with

**B:** Tramadol (PO) 50mg 12 hourly as need for chronic pain relief.

**PLUS**

**S:** Pancreatin (PO) 1–3 tablet once daily to supplement digestive enzyme and improve food absorption.

**PLUS**

**A:** Metformin (PO) 500mg 12 hourly

**OR**

**B:** Insulin 0.5mg/kg/day in two divided doses (SC) for control of hyperglycaemia.

## 10.2.6 Hemorrhoids

Hemorrhoid disease is due to enlargement or thrombosis of the veins in the external or internal hemorrhoidal plexus.

**Diagnostic Criteria**

- Painless anal rectal piles
- Painless bleeding –post defecation
- Pain
- Pruritus
- Prolapse PLUS
- Endoscopy (Anoscopy, or proctosigmoidoscopy) for evidence of characteristic anal recta piles.

**Treatment**

Depends on severity of the disease

- Grade I hemorrhoids are treated with conservative medical therapy and avoidance of nonsteroidal anti-inflammatory drugs (NSAIDs) and spicy or fatty foods
- Grade II or III hemorrhoids are initially treated with nonsurgical procedures (sclerotherapy, band ligation
- Very symptomatic grade III and grade IV hemorrhoids are best treated with surgical hemorrhoidectomy

**Pharmacological Treatment:**

**B:** Benzyl benzoate 1.25%, bismuth oxide 0.875%, bismuth subgallate 2.25%, hydrocortisone acetate 0.25%, Peru balsam 1.875%, zinc oxide 10.75% (PR) suppository one or twice a day

**OR**

Any compound hemorrhoid preparation containing corticosteroid, soothing agent and local anesthetics (PR) suppository one or twice a day

### 10.2.7 Anal Fissures

These are painful linear ulcers in the anal canal. Young and middle aged adults most commonly affected. Primary fissure occur in the posterior midline. It can also be secondary to Chrohn's disease, anal cancer, or infection such as syphilis, TB in which case they occur more lateral. Passage of hard stools is a common predisposition to primary fissures.

**Diagnostic Criteria**

- Severe sharp pain during and after defecation with/out bright red bleeding. PLUS
- Evidence of linear anal rectal ulceration on protoscopy examination

**Non-Pharmacological Treatment**

- Ensure high fluid intake
- Use non stimulant osmotic laxatives

**Pharmacological Treatment**

- Topical anaesthetics and frequent seat baths can reduce sphincter spasm

Surgical sphicterotomy is definitive treatment.

## 10.3 DISODERS OF THE LIVER AND BILLIARY TRACT

### 10.3.1 Hepatitis

This is the term referring to inflammation of the liver, which may result from various causes, both infectious i.e. viral, bacterial, fungal, and parasitic organisms and non-infectious e.g. alcohol, drugs, autoimmune and metabolic diseases; this section focuses on viral hepatitis and its sequels.

#### 10.3.1.1 Acute Viral Hepatitis

It is a systemic infection predominantly affecting the liver caused hepatotropic viral agents namely Hepatitis A virus (HAV), Hepatitis B virus (HBV), Hepatitis C virus (HCV),HBV – associated delta agent or Hepatitis D virus (HDV), and Hepatitis E virus (HEV);in most cases leads to a self limiting disease but can take a fulminant course and lead to hepatic failure.

**Diagnostic Criteria**

- Fever, anorexia, malaise, jaundice and abdominal pain
- Enlarged and tender liver
- Altered consciousness, coma (hepatic encephalopathy), and bleeding stigmata (in fulminant cases). Plus
- Serological evidence of specific viral antigen/ core antibody tests (HBc IgM or HBc IgG); and biochemical alteration of liver tranaminases (ALT, AST).

**Treatment**

- There is no specific treatment to alter the course of acute viral hepatitis.
- Supportive management including hydration, feeding, control fever and pain if present is required.
- Fulminant cases may require specific antiviral medications

**Note**: Refer all suspected and confirmed cases to next level of care with adequate expertise and facility for proper management and disposal.

#### 10.3.1.2. Chronic viral Hepatitis

This is a chronic inflammatory reaction that on going beyond 6months from the acute infection. Most common causative agents are HBV, HCV, and HDV which potentially leads to liver fibrosis, cirrhosis and portal hypertension, hepatocellular carcinoma and hepatic failure.

**Diagnostic Criteria**

- Usually asymptomatic
- Right upper quadrant abdominal pains.
- Fatigue, malaise, anorexia, low grade fever; jaundice is frequent in severe disease.
- Ascites, variceal bleeding, encephalopathy, coagulopathy, and hypersplenism.
- Uticaria, athritis, vasculitis, polyneuropathy, glomerulonephritis, thyroditis PLUS
- Serological evidence of specific viral antigen/ core antibodies and quantitative PCR assays.

**Pharmacological Treatment**

**HBV**

**A:** Tenofovir (PO) 300mg once daily for life

**OR**

**S:** Entecavir (PO) 0.5mg–1mg once daily for life

**OR**

**A:** Lamuvidine (PO) 100mg once daily for life

**HCV**

**S:** Ledpasvir 90mg in divided doses (PO) for 12–24 weeks

**Plus**

**S:** Sufosbuvir 400mg in divided doses (PO) for 12–24 weeks

**Plus**

**S:** Ribavirin 600mg–1000mg in divided doses (PO) for 12–24 weeks

**Note:** Refer cases to the next level care with adequate expertise and facility for proper management

### 10.3.2 Portal Hypertension

This is high blood pressure in the hepatic portal system which includes the portal veins and its branches which drains from most of the intestines to the liver. It is indicated when the hepatic venous pressure gradient exceeds 7mmHg, while liver cirrhosis remains the

most common cause which in our local setting is commonly caused by chronic viral hepatitis followed by heavy alcohol intake.

**Diagnostic Criteria**

- Ascites, Splenomegaly
- Esophageal varices, and hematemesis
- Swollen veins of the anterior abdomen(caput medusa) and hemorrhoids PLUS
- Radiological evidence of shrunken liver, with typical features of cirrhosis.

**Pharmacological Treatment**

**Ascites**

**C:** Spironolactone 50mg – 400mg (PO) once daily incrementally till ascites resolves

**AND**

**B:** Furosemide 40mg–160 mg (PO) once daily or in divided doses incrementally till ascites resolves

**AND**

**A:** Propranolol 40mg–160mg (PO) once daily incrementally until portal venous pressure is stabilizes to normal values

**OR**

**C:** Carvedilol 6.25mg–12.5mg (PO) once daily, incrementally till portal pressures stabilizes to normal

**AND**

**S:** Albumin 25% infusion (IV) – in refractory ascites and large volume parecentecis. Give 25g stat, repeat at 15–30min interval at max dose of 250g/48 hourly

**Bleeding Esophageal Varices**

**S:** Octreotide Inj (SC) 50 µg–100 µg 8 hourly for 3 days

**AND**

**S:** Band ligation of beeding esophageal varices (EVL); 3 – 6 shoots per session.

**OR**

**S:** Inj sclerotherapy (Histo Acryl Glue Inj 5%; Ethanolamine oleate 5%); given 2mls -5mls per varix up to 20mls per session.

**AND**

Blood transfusion (PRBC, PLT concentrates and FFP) as appropriate.

**Hepatic Encephalopathy**

**S:** L-Ornithine L-Aspartate (Herpemez) granules (PO) 9g/day in divided dose for 4–12 weeks

**AND**

**C:** Lactulose 20mls (PO) 12 hourly for bowel ceasing

**AND**

**B:** Metronidazole (IV) 400mg 8 hourly for 7days

**AND**

**A:** Ceftriaxone (IV) 1g 12 hourly for 7days (if evidence of spontaneous bacterial peritonitis)

Fluid deficit correction and electrolytes replacements as appropriate

**Hepatorenal Syndrome**

**S:** Terlipressin (IV) 0.5–2mg 6 hourly for 14 days

**Plus**

**S:** Albumin 5% albumin infusion (Dose 1g/kg up to 100g/day) Plus fluid deficit correction.

## 10.3.3 Cholestatic Jaundice

Cholestasis is a pathologic state of reduced bile formation or flow which can be hepatocellular (Intrahepatic), where an impairment of bile formation occurs or ductular (extra hepatic), where impedance to bile flow occurs after it is formed. Intrahepatic causes of cholestasis include viral hepatitis, alcohol, primary biliary cirrhosis, drug toxicity, Hodgkin's lymphoma and pregnancy. Extrahepatic causes include choledocholithiasis, carcinoma, and ascariasis of the biliary tree.

**Diagnostic criteria**

- Jaundice,
- Dark urine,
- Pale stools, and
- Generalized body itching/pruritis. PLUS
- Laboratory evidence of elevated serum levels of total bilirubin, direct bilirubin, alkaline phosphatase, gamma-glutamyl transferase, and transaminanses. WITH
- Supporting radiological evidence of dilated intra or extra hepatic biliary radicles.

**Pharmacological Treatment**

**Definitive treatment**:

- Identify and treat specific cause

**Supportive treatment**:

**S:** Cholestyramine (PO) 4–16gm/day

**OR**

**S:** Ursodeoxycholic acid (PO) 20–30 mg/kg/day

**Surgical intervention** is indicated for extra hepatic cholestasis**.**

**Note**

Refer cases to the next level of care with adequate expertise and facility for proper evaluation and management of prolonged and unresponsive cholestatic jaundice.

# CHAPTER ELEVEN
# OBSTETRICS, GYNECOLOGY AND CONTRACEPTION

## 11.1 BLEEDING IN PREGNANCY

Bleeding during pregnancy is common, especially during the first trimester. Bleeding can sometimes be a sign of something serious, therefore it is important to know the possible causes and take adequate measures.

**Abortion**
It is a spontaneous loss of a fetus before it is viable (has the potential to survive outside the womb). The World Health Organization (WHO) defines it as expulsion or extraction of an embryo or fetus weighing 500mg or less, aproximately 24 weeks of gestation. Clinical features will depend on the types of abortion.

### 11.1.1 Threatened Abortion

**Diagnostic criteria**
- Mild vaginal bleeding
- Mild/no lower abdominal pain or back ache
- Cervix closed on digital examination

**Management of threatened abortion in Dispensary & Health Centre**
- Adequate bed rest at home
- Avoid strenuous activities and sexual intercourse until all the symptoms have subsided
- Schedule a follow up within 7 days
- Tell the woman to come immediately if;
    - Bleeding becomes heavy
    - Experiences offensive discharge
    - Severe abdominal pain

**Referral** Refer to higher-level health facility with adequate expertise and diagnostics if:
- Bleeding recurs
- Experiences fever
- Experiences offensive discharge
- Experience severe abdominal pain

**In the Hospital:**
- Perform ultrasound to confirm gestational age and foetal viability
- Admit the patient and manage appropriately if;
    - The foetus is dead
    - Bleeding recurs
    - Fever
    - Foul smelling vaginal discharge
    - Severe abdominal pain

### 11.1.2 Inevitable Abortion

Abortion is said to be inevitable when it is not possible for the pregnancy to continue and the cervix is dilated, but all the products of conception are in situ.

**Diagnostic Criteria**

- Moderate or severe per vaginal bleeding which may be accompanied with clots
- Severe lower abdominal pain
- Significant draining of liquor if membranes have ruptured or the membranes may be intact.
- The cervix is dilated with evidence of imminent expulsion of products of conception.
- Fundal height may correspond with gestational age
- Presence of uterine contractions

**Management of inevitable abortion in Dispensary & Health Centre**

- Apply Airway, Breathing, Circulation and Dehydration (ABCD) principles of resuscitation
- Check Hb level.
- Give IV Ringers Lactate (RL)/Normal Saline (NS) 2litres
- Perform Manual Vacuum Aspiration (MVA) in health centre if gestation age is below 12 weeks
- Augment the process by administering oxytocin 20 IU in 500mls RL/NS at 40–60 drops/minute if gestation age is above 12 weeks
- Manage as incomplete abortion if after augmentation some products of conception remain in the uterus
- Manage as complete abortion if all product of conception are expelled

**Referral**

Refer to hospital if MVA is not possible and/or bleeding is persisting.

**In the Hospital**

- Apply Airway, Breathing, Circulation and Dehydration principles of resuscitation
- Obtain blood for Hb , grouping and cross–matching
- Give IV RL/NS 2liters
- Give blood transfusion if indicated
- Perform Manual Vacuum Aspiration (MVA) if gestation age is below 12 weeks
- Augment the process by administering oxytocin 20 IU in 500mls RL/NS at 40–60 drops/minute if gestation age is above 12 weeks
- Manage as incomplete abortion if after augmentation some products of conception remain in the uterus
- Manage as complete abortion if all product of conception are expelled

### 11.1.3 Incomplete abortion

Some of the products of conception have been retained in the uterine cavity and there is persistent lower abdominal pain, continuing per vaginum bleeding and open cervix.

**Diagnostic Criteria**

- Cramping lower abdominal pain
- Slight to profuse per vaginal (PV) bleeding accompanied with clots/products of conception
- Clots/ products of conception protruding through the cervical
- Fundus smaller than dates
- The cervix is dilated and products of conception may be felt in the cervix on digital examination

**Management of incomplete abortion in dispensary & health centre**

- Apply Airway, Breathing, Circulation and Dehydration principles of resuscitation
- Check hemoglobin level
- Give IV RL/NS 2lts
- Perform digital evacuation of products of conception
- Perform MVA in health centre if gestation age is below 12 weeks

**Pharmacological Treatment**

**A:** Oxytocin 10 IU IM

**OR**

**A:** Misoprostol 600µg PO start

**After evacuation give:**

**A:** Amoxicillin PO 500mg 8 hourly for 5 days

**AND**

**A:** Metronidazole PO 400mg 8hourly for 5 days

**AND**

**A:** Paracetamol 1g 8 hourly for 5 days

**Referral**

Refer patient to hospital level with an escort of a nurse if bleeding continues

**Management in a Hospital**

- Apply ABCD principles of resuscitation
- Obtain blood for HB, grouping and cross–matching
- blood transfusion if indicated
- Give IV RL/NS 2lts
- Digital evacuation of products of conception
- MVA if gestation age is below 12 weeks
- Evacuate uterus in theatre with sharp curette under general anesthesia if pregnancy is more than 12 weeks

**Pharmacological Treatment**

Continue as above

**Patient education**.

Counsell and provide appropriate contraception.

### 11.1.4 Complete Abortion

Products of conception are completely expelled

**Diagnostic Criteria**

- Minimal or no PV bleeding
- Uterus smaller than dates and often well contracted. Cervix may or may not be closed

**Pharmacological treatment**

**A:** Amoxicillin PO 500 mg 8 hourly for 5 days

**AND**

**A:** Metronidazole PO 400mg 8 hourly for 5 days

**AND**

**A:** Iron + folate (FeFol) one tablet twice daily for 3 months and reassess after every 4 weeks

**If patient is in shock**;

- Shout for help and mobilize resources
- Apply ABCD principles of resuscitation
- Give IV RL/NS 3liters or more in the first hour
- Insert an indwelling urethral catheter
- Give IV ampicillin 1g and metronidazole 500mg start
- Obtain blood for HB, grouping and cross match.

**Referral:** Refer patient to hospital with an escort of a nurse

**Management in a hospital** [16]

If patient is stable continue as above; if patient is in shock, perform as above and give blood transfusion if indicated

**Pharmacological treatment**

**A:** Start or continue with IV Ampicillin 1g 6 hourly for 24–48 hours

**AND**

**A:** Metronidazole (IV) 500mg 8 hourly for 24–48 hours

**Then change to**:

**A:** Amoxicillin (PO) 500mg 8hly for 5 days

**AND**

**A:** Metronidazole (PO) 400mg 8hly for 5 days

**AND**

**A:** Iron + Folic acid (Fefol) one table twice daily for 3 months and reassess after every 4 weeks

**Patient Education**.

Counsell and provide appropriate contraception.

### 11.1.5 Septic Abortion

It is an abortion complicated with infections.

**Diagnostic Criteria**

- Abdominal pain following history of abortion
- Fever may be present
- Foul smelling PV discharge which may be mixed with blood.
- May be in shock or/and jaundiced
- Tender uterus, there may be rebound tenderness
- Cervix is usually open

**Management of septic abortion in dispensary & health centre**

- Apply ABCD principles of resuscitation
- Give IV RL/NS 3liters or more in the first hour
- Insert an indwelling urethral catheter
- Obtain blood for Hb

**Pharmacological Treatment**

**A:** Ampicillin 1g IV 6 hourly for 24–48 hours

**AND**

**C:** Metronidazole IV 500mg 8 hourly for 24–48 hours

**AND**

**A:** Gentamicin 80mg IV 12 hourly for 7 days

**Referral:** Refer patient to hospital with an escort of a nurse.

**Management in the Hospital**:

- Full Blood Count ? (FBC)
- Give blood transfusion if indicated
- Perform endocervical swab for culture and sensitivity
- Evacuate the uterus with sharp wide curette under general anesthesia

**Pharmacological Treatment**

Treat as above and when the patient is stable continue with;

**A:** Amoxicillin 500mg 6 hourly for 7 days

**A:** Metronidazole (PO) 400mg 8 hourly for 7 days

If no response with the above antibiotics within 3 days;

- Adjust according to culture and sensitivity results. if no culture sensitivity services switch to

  **A**: Ceftriaxone IV 1g 12 hourly for 5 days

  **AND**

  A: FeFol one tablet twice a day for 3 months and review after every 4 weeks

**Patient Education**

- Counsel and provide appropriate contraception.

## 11.1.6 Molar Pregnancy /Abortion

It happens when tissue that normally becomes a fetus instead became an abnormal growth in the uterus. Once diagnosed it should be treated right away.

**Diagnostic Criteria**

- Vaginal bleeding
- Uterus that is larger than gestational age? (GA) and fetal parts not palpable.
- Severe nausea and vomiting
- Vaginal discharge of tissue that is grape like
- Very heavy vagianal bleeding when the mole abort spontenously

**Referral:** Resuscitate and refer the patient to higher level facility for appropriate management.

### 11.1.7 Missed Abortion

Fetus die in utero but its not expelled out

**Diagnostic criteria**

- History of amenorrhea
- Regression of the pregnancy symptoms
- Uterine size smaller than dates
- Mild per vaginum bleeding

**Investigations**

- Abdominal pelvic ultrasound
- FPC?

**Pharmacological Treatment**

- Induce abortion with misoprostol if it is more than 12 weeks
- Evacuate if it is less than 12 weeks

**After evacuation give;**

**A:** Amoxicillin (PO) 500mg 8hly for 5 days

**AND**

**A:** Metronidazole (PO) 400mg 8hly for 5 days

**Patient education**.

Counsell and provide appropriate contraception.

| NOTE:Refer to higher level health facility with adequate expertise and diagnostics/equipment |
|---|

## 11.2 ECTOPIC PREGNANCY

Ectopic pregnancy (EP) is defined as a pregnancy in which the implantation of the embryo occurs outside the uterine cavity, most frequently in one of the two fallopian tubes or, more rarely, in the abdominal cavity.

**Diagnostic criteria**

**Unruptured ectopic pregnancy**

- Sporting in early pregnancy
- Abdominal and pelvic pain

**Ruptured ectopic pregnancy**

- Acute abdominal and pelvic pain
- Hypotension
- Fast and weak pulse
- Abdominal distension and tenderness
- Shoulder tip pain

**Investigations**

- Perform ultrasonography
- Hb level
- Grouping and cross-matching

**Referral**

- Ectopic pregnancy is a medical emergency; refer the patient immediately.
- At referral health facility, if the rupture is diagnosed perform surgery with blood transfusion depending on the amount of blood loss.

## 11.3 ANTEPARTUM HAEMORRHAGE

It is the bleeding from the birth canal after the 28$^{th}$ week of gestation. The main forms are placenta praevia and abruption placenta.

### 11.3.1 Placenta Praevia

It is an obstetric complication in which the placenta embeds itself partially or wholly in the lower segment of the uterus.

**Diagnostic criteria**

- Sudden onset of bright red fresh painless bleeding after 28 weeks of gestation

**Management**

- If asymptomatic – Bed rest and follow up every 2 weeks
- If complete placenta praevia
  - Admit for fetal lung maturation ≥ 24 weeks of gestation
  - Deliver by Cesarean section at 37–38 weeks of gestation
  - 30–60mg of elemental iron and 400µg (0.4mg) folic acid supplements
  - Do FBC and Blood group and cross match, blood coagulation tests
  - Monitor fetal heart rate
  - Ultrasound for fetal wellbeing and localization of the placenta
- If >34 weeks of gestation and minimal hemorrhage and no uterine contractions: Expectant management
- If there is uterine contractions;
  - Complete placenta praevia or malpresentation: Deliver by Cesarean section.
  - Partial or marginal placenta praevia: Carefully perform amniotomy for vaginal delivery if the head is engaged.

**Major Recommendations**
If <34 weeks of gestation

- Fetal lung maturation give

**B:** Dexamethasone6 mg IM every 12 hours for 48 hourly

- If there is uterine contractions tocolyse with
  **C:** Nifedipine short acting (PO) 20mg start, then continue with
  **C:** Long acting nifedipine 20mg 8 hourly

- If premature rupture of membrane:
  **A:** Ampicillin 2g start dose, then
  **A:** Amoxicillin tabs 500mg 8 hourly for 5–7 days, while close monitoring for bleeding

- In case of any hemorrhage, the patient should report to the doctor for immediate action
  - Avoid vaginal examination
  - For any risk of premature delivery, the patient must be managed in a center with neonatal care facilities

## 11.3.2. Placental Abruption

It is bleeding from the placental site due to premature separation of a normally situated placenta from 28 weeks of gestation.

**Diagnostic Criteria**

- Vaginal bleeding: May pass dark blood or clots. Sometimes bleeding can be concealed
- Abdominal pain is moderate to severe but may be absent in small bleeds
- The uterus is enlarged and very tender, painful and sometimes hard
- Fetal demise or fetal distress may be present
- Uterine lower segment tender on vaginal examination

**Investigations**

- Ultrasound: Fetal wellbeing, localize retro placental clot
- Full blood count and cross–match
- Renal function test and electrolytes
- Liver function tests
- Proteinuria if pre-eclampsia is suspected
- Fibrinogen tests if available
- Coagulation profile

| **NOTE:** The diagnosis of placental abruption is mainly clinical |
|---|

**Management**
**Maternal resuscitation**

- Insert large bore 2 IV lines and give Normal Saline/Ringers Lactate.
- Transfusion if necessary
- Give oxygen 6L/min

- Insert a urinary catheter to monitor input/output
- If Disseminated Intravascular Coagulation: Give fresh frozen Plasma 1 Unit/hour, give packed cells 2–4 units
- Monitor blood pressure, pulse, bleeding, hourly, full blood count, clotting profile every 2 hours

**Obstetrical Management**

- If the fetus is alive and viable: emergency Caesarean section
- If the fetus is dead: Normal vaginal delivery is preferable
- Perform artificial rupture of membrane,
- If no spontaneous labor: induce with uterotonics (Oxytocin infusion 5IU in dextrose 5% 500 ml beginning with 10 drops/min)
- Do active management of third stage of labor and uterine massage
- Emergency Caesarean section should be considered if:
  - Worsening of maternal condition
  - Failure/Non progressing vaginal delivery
- Prophylactic antibiotics: Ampicillin IV 2g start, if necessary

### 11.3.3 Postpartum Haemorrhage (PPH)

It is loss of more than 500 ml of blood from the genital tract in the first 24 hours after vaginal delivery and more than 1000 ml after Caesarean section.

**Prevention**

The use of uterotonics for the prevention of PPH during the third stage of labour is recommended for all births. (**Strong recommendation, moderate quality evidence**)

**Pharmacological Treatment**

**A:** Oxytocin 10 IU IM

**OR**

**C:** Ergometrine 0.25mg IM

**OR**

**A:** Misoprostol 600µg PO start

**Note**

- Caution should be exercised when opting for ergot derivatives for the prevention of PPH as these medicines have clear contraindications in women with hypertensive disorders. Thus, it is probably safer to avoid the use of ergot derivatives in unscreened populations
- Misoprostol ( 600µg PO) is regarded an effective medicine for the prevention of PPH

**Prevention of PPH – Cord management and Uterine massage**

- Controlled cord traction (CCT) is recommended for vaginal births
- In settings where skilled birth attendants are unavailable, CCT is not recommended
- Late cord clamping (performed approximately 1 to 3 minutes after birth) is recommended for all births while initiating simultaneous essential newborn care.

- Sustained uterine massage is not recommended as an intervention to prevent PPH in women who have received prophylactic oxytocin.

**Prevention of PPH in Caesarean sections**

- Oxytocin (IV or IM) is the recommended uterotonic drug for the prevention of PPH in Caesarean section
- Cord traction is the recommended method for the removal of the placenta in Caesarean section

## 11.4 PREMATURE RUPTURE OF MEMBRANES (PROM)

It is the rupture of membranes (breakage of the amniotic sac) before the onset of labor. If rupture occurs before 37 weeks it is called preterm premature rupture of membranes (PPROM). Prolonged PROM is a case of premature rupture of membranes in which more than 24 hours have passed between the rupture and the onset of labour. Prolonged PROM for more than twelve hours is a risk of ascending infection which can lead to chorioamnionitis (infection of chorion, amnion and amniotic fluid.

**Diagnostic Criteria:**

Leakage of watery fluid per vagina confirmed by performing a sterile speculum examination.

**Investigations**

- Ultrasound for fetal wellbeing, amount of liquor and gestation age.
- Perform culture (e.g. possibility of UTI, STI etc.)

**General Management**

If PROM at term: Delivery within 24 hours

**Pharmacological Treatment**

**A**: (IV) fluids Ringer's Lactate OR Normal Saline

**For PPROM**: If no sign of infection, wait for foetal maturity and give

**A:** Amoxicillin (PO) 500mg 6 hourly for 10 days

**OR**

**A:** Erythromycin (PO) 500mg 6 hourly for 10 days.

If there are signs of infections-pyrexia, foul smelling liquor (chorioamnionitis)

**A:** Ampicillin 1g (IV) start then 500mg 6hourly for 5–7 days

**OR**

**A**: Ceftriaxone 1g (IV) once for 5 days

**OR**

**A:** Benzyl Penicillin (IV) 2MU every 6 hourly for 5 days

**AND**

**A:** Metronidazole 500mg 8 hourly for 5 days

**For urgent Delivery Irrespective of Gestational Age**

**A:** Benzyl penicillin (IV) 2MU 6 hourly

**AND**

**B:** Chloramphenicol (IV) 500 mg 6 hourly until the patient is able to take oral medication.

## 11.5 ANTENATAL CARE

### 11.5.1 Anaemia in Pregnancy

It is hemoglobin levels less than 11 g/dl in early pregnancy and less than 10.5 g/dl in the 2nd and 3rd trimester of pregnancy. Mild anemia– hemoglobin: 8–11g/dl; Severe anemia– hemoglobin<7g/dl. Iron deficiency anemia during pregnancy has been associated with an increased risk of low birth weight, preterm delivery and perinatal mortality. Severe anaemia with maternal hemoglobin levels less than 6 g/dL has been associated with abnormal fetal oxygenation resulting in non-reassuring fetal heart rate patterns, reduced amniotic fluid volume, fetal cerebral vasodilatation and fetal death. Thus, maternal transfusion should be considered for fetal indications.

**Diagnostic Criteria**

- Tiredness, weakness, palpitations and dyspnea
- Exercise intolerance
- Pallor of skin and mucous membranes
- Dizziness, faintness, headache
- Intermittent claudication (ache, cramp, numbness or sense of fatigue)

**Note:**Some patients with anaemia in pregnancy may be asymptomatic

**Investigations**

- Full blood count and blood cross-match - red cell morphology
- Red blood cell electrophoresis if haemoglobinopathies suspected
- Blood smear for malaria
- Stool and urine analysis
- HIV test

**Non-pharmacological Treatment**

- Iron rich diet (fish, eggs, fruits and vegetables etc.)
- Prevent and early treatment of malaria
- Investigate and treat associated worm infestations

**Pharmacological Treatment**

**Prophylaxis in Antenatal Care**

A**:** Ferrous sulfate **(PO)** 200 mg 2–3 times per day

**AND**

A**:** Folic acid **(PO)** 5mg once daily

**Note:**

- Ferrous sulfate should be taken in a full stomach and avoid to take it with tea/coffee
- Where vomiting is experienced reduce dosage to tolerable level

**If Hb is <7g/dl give**:

**A***:* Ferrous sulfate 200mg (PO), 8 hourly until Hb is 12g/dl

Check If Hb>7 to 11 g/dl change dose to:

**A**: Ferrous sulfate 200mg (PO) 12 houly for 4 weeks

**AND**

**A**: Folic acid (PO) 5mg once a day for 4 weeks

**AND**

**C**: Vitamin $B_{12}$ tabs (PO) 12 hourly for 4 weeks

**Referral**

Refer and transfuse in case of signs of severe anemia.

## 11.5.2 Hypertensive Disorders in Pregnancy

Hypertension is blood pressure (BP) 140/90 mmHg or greater, measured on two occasions at least four hours apart or elevated systolic BP >30mmHg, or diastolic BP 15mmHg from the baseline.

**Chronic Hypertension**

This is hypertension that is present at the booking visit or before 20 weeks or if the woman is already hypertensive before conception. Most women with chronic hypertension are asymptomatic. New onset chronic hypertension should have further evaluation to find underlying cause e.g. renal artery stenosis, chronic renal disease, Cushing syndrome etc.

**Pharmacological Treatment**

**B:** Methyldopa 250–500mg (PO) 8 hourly

**AND**

**C:** Nifedipine 10mg (PO) 12 hourly

**Pregnancy induced hypertension**

Gestational hypertension or pregnancy-induced hypertension (PIH) is the development of new hypertension in a pregnant woman after 20 weeks gestation without the presence of protein in the urine or other signs of preeclampsia**.**

**Non-pharmacological Treatment**

- Adequate rest at home and avoid strenuous activities
- Eat a normal balanced diet and plenty of oral fluids
- Schedule antenatal visits every 2 weeks up to 32 weeks and every week thereafter
- Recommend to deliver in the hospital and should be delivered at 37 completed weeks of gestation

**Pharmacological Treatment**

For mild hypertension 140–149 mmHg systolic and/or 90–99 mmHg diastolic; Moderate hypertension 150–159 mmHg and/or 100–109 mmHg.

**B:** Methyldopa 250–500mg (PO) 8 hourly

**OR**

**C:** Nifedipine 10mg (PO) 12 hourly

**OR**

For moderate hypertension you may give:

**C:** Labetalol 100mg (PO) twice a day

**C:** Labetalol 100mg (PO) twice a day

**Severe hypertension**

Severe hypertension is Blood Pressure (BP) of 160/110 mmHg or higher. Admit the patient to hospital until blood pressure is 159/109 mmHg or lower

**C:** Hydralazine 10mg IV start; recheck the BP after 20 minutes if DBP is more/equal to 110mmHg give another dose of 5–10mg hydralazine IV.

**AND**

**B:** Methyldopa 500mg (PO) 8 hourly

**OR**

**C:** Nifedipine 20mg (PO) 12 hourly

**THEN**

**C:** Labetalol tabs 100mg (PO) twice a day

**Referral**

Refer to the next level in case there is no improvement

**Pre-eclampsia**

Is diagnosed when blood pressure is ≥ 140/90 mmHg after 20 weeks of pregnancy plus proteinuria of 300 mg per 24 hours or >2+ on urine dipstick

**Diagnostic Criteria**

- Most patients are asymptomatic, but symptoms may include headaches, dizziness, blurred vision, and epigastric pain.
- Blood pressure of ≥ 140/90 mmHg
- Proteinuria (≥ 300mg per 24 hours)
- Generalized edema

**Investigations**

- Proteinuria (qualitative/quantitative 24 hour urine collection)
- Obstetrical Ultrasound and Doppler
- Urea, creatinine, electrolytes, liver function test and uric acid
- FBC and clotting profile
- Funduscopic

**Mild pre–eclampsia**

This is diagnosed when 90 mmHg ≤ diastolic BP < 110 mmHg; Proteinuria 1+ or 2+

**Non–pharmaceutical Management**

Pregnancy < 37 weeks of gestation

- Hospitalization and close monitoring
- Bed rest
- Monitoring BP, diuresis, proteinuria, fetal movement and fetal heart beats (every day)

- Antenatal corticosteroids (dexamethasone Inj. 6mg 12hourly for 48hours) if indicated

Pregnancy >37 weeks of gestation: admission and deliver.

**Severe pre-eclampsia (critical care):**
This is diagnosed when BP ≥ 160/110 mmHg (especially diastolic ≥110 mmHg), Proteinuria ≥+++or ≥ 1g/24h, severe headache, epigastric pain, blurring of vision +/_vomiting

**Pharmacological Treatment**

**C:** Hydralazine injection: initial dose of 5 mg IV in 10ml sterile water over 4 minutes. Followed by boluses 5–10mg as needed every 20 minutes until when the diastolic BP is less than 110mmHg)

**OR**

**A:** Nefedipine: 20 mg (PO) 8 hourly until BP is stabilized

**OR**

**A:** Nefedipine: 10 mg (PO) short acting if diastolic blood pressure is ≥ 110mmhg

**OR**

**C:** Labetalol if hypertension is refractory to hydralazine
Give 10–20mg intravenously bolus repeat each 10–20 minutes, with doubling doses not exceeding 80 mg in any single dose for maximum total cumulative dose of 300 mg.

**Prophylaxis for Seizures**
Anti-convulsion treatment of choice is magnesium sulfate (Refer to eclampsia section) LoE=1

**Obstetrical Management**
If at term deliver immediately when stable, preferably vaginal delivery

## 11.5.3 Eclampsia

Eclampsia is a condition peculiar to pregnancy and post-partum periods, characterized by elevated BP and tonic-clonic convulsions which are not caused by epilepsy, severe malaria, meningitis, hypoglycemia or other causes of convulsions. It is common in nonwhite nulliparous women from low socioeconomic status. Majority (50%) occur preterm. Eclampsia may occur without prior elevation of BP.

**Diagnostic Criteria**
- Signs of severe pre-eclampsia (BP > 160/110mm Hg)
- Loss of consciousness
- Tonic-clonic seizures, coma

**Investigations**
- Full blood count and cross-match
- Ultrasound
- Urea and creatinine + electrolytes
- Liver enzymes tests
- 24h urine collection for proteinuria
- Clotting profile

- Blood smear to exclude malaria
- Blood sugar estimation to exclude hypoglycemia.

**Pharmacological Treatment**

**A: Magnesium Sulfate (**$MgSO_4$)

- Loading dose 4g IV slowly using one 20mls syringe
- Draw 8mls of 50% $MgSO_4$
- Add 12mls water for injection to make it 20mls of 20% of $MgSO_4$ and
- Give IV slowly over 5 minutes OR use two 10mls syringes
- Draw 10mls (5gms) of 50% $MgSO_4$ into each syringe
- Add 1ml of:

**C:** 2% lignocaine in each syringe then give deep IM into each buttock

**Maintenance dose for 24hours**:

Infusion of $MgSO_4$ 1g per hour (in 200–300 ml of Ringer's Lactate), or 5g undiluted 50% of $MgSO_4$ injection (add 1ml of lignocaine 2%) apply deep intra-muscular (IM) injection into each buttock every 4hrs for about 24 hrs after delivery or the last seizure whichever come last.[16]

- The infusion should only be given if patellar reflexes are present, respiration rate is ≥ 12 per minute, and urine output is >100mls in 4 hours.
- Seizure prophylaxis should be continued for 24–48 hours post delivery

**If convulsions recur within 15 minutes give**;

A: Magnesium sulfate 2g. Draw 4mls of 50% of $MgSO_4$ (2gm), add 6mls of water for injection to make it 10mls of 20% $MgSO_4$ then give IV slowly over 5 minutes[16].

**Antidote for magnesium sulfate toxicity**

C: Calcium gluconate 1g slow IV bolus in 2 to 3 minutes

**Note:** Contra–indications of magnesium sulfate are; myasthenia, respiratory insufficiency, cardiomyopathy, oligo– anuria. Monitor respiratory rate (> 16 breaths/min), urine output, consciousness, deep tendon reflexes and magnesium sulfate serum levels (where possible)

**Obstetrical management**

Patients with eclampsia should be delivered within 12 hours after the onset of seizures, even if the foetus is premature. Expectant management is contraindicated. If not in labour, induce labour with misoprostol 50µg PO or 25µg vaginally and repeat every 4 hours up to a total of four doses maximum [11, 5]

- If failure of induction, immediate Caesarean section is indicated
- If the pregnancy is 32–34 weeks and no labor - stabilize and administer IM steroids for lung maturity and vaginal delivery is preferred after 24–48 hours of treatment, give:

  **A:** Dexamethasone 6 mg IM 12 hourly in 48 hours

If the pregnancy is less than 32 weeks Caesarean section is preferred as the success of induction

### 11.5.4 Antiphospholipid Antibody Syndrome (APLAS) in Pregnancy

It is an autoimmune disease characterized by the presence of maternal circulation of one or more auto antibodies against membrane phospholipids. It is an acquired condition.

**Diagnostic Criteria**

- Recurrent pregnancy loss (≥3 unexplained first trimester losses) or ≥1 unexplained second trimester pregnancy loss
- Unexplained venous or arterial thrombosis or myocardial infarction
- Autoimmune thrombocytopenia
- Unexplained Intra Uterine Growth Restriction (IUGR), abruption placenta and severe early preeclampsia (No agreement among experts, remains controversial in all three)[7]

Diagnosis depends on correct clinical staging and serologic tests.

**Investigations**

At least 2 tests confirming the presence of circulating antiphospholipid antibodies is required to make the diagnosis of APLAS. Women with recurrent pregnancy loss (≥3 pregnancy losses) before 10 weeks gestation should be screened for APLAS.

**Serology tests**:

- Anticardiolipin Antibody (ACL)
- Lupus Anticoagulant (LAC). (tests include activated PTT test, Dilute Russel viper venom test, Kaolin clotting time)

**Pharmacological Treatment**

- Depends on the clinical features. The target international normalized ratio (INR) for vitamin K antagonist (VKA) therapy in APS should normally be 2.5 (target range 2.0–3.0) (**1A**).
- For women with APS with recurrent (≥3) pregnancy loss, antenatal administration of heparin combined with low dose aspirin is recommended throughout pregnancy (**1B**). In general, treatment should begin as soon as pregnancy is confirmed.
- For women with APS and a history of pre-eclampsia or fetal growth restriction (FGR), low dose aspirin is recommended.
- Women with aPL should be considered for post-partum thromboprophylaxis (**1B**).

**Recurrent Pregnancy loss**

**D:** Prophylactic Unfractionated Heparin 5000– 10000 SC

**OR**

**D:** Low Molecula Weight Heparin (Enoxaparin) 30–40mg SC daily

**OR**

**D:** Dalteparin 2500–5000u SC daily starting in first trimester

**Patients with Thrombosis** such as stroke or pulmonary embolism need therapeutic anticoagulation.

**D:** Unfractionated Heparin (SC) 5,000 bolus and subsequent 15,000– 20,000 doses at 12 hourly interval

**OR**

**D:** Low Molecular Weight Heparin (Enoxaparin) SC 1mg/kg 12 hourly

**Note**:

- The aPTT needs to be checked and is best done midway between the 12–hourly doses, once every 24 hours.
- A target of 1.5–2.5 times the control should be aimed

**Referral**

Refer immediate to a level where monitoring of the treatment through lab testing is available.

## 11.5.5 Deep Vein Thrombosis in Pregnancy

It is one of the major causes of maternal deaths

**Diagnostic Criteria**

- Pain
- Swelling or redness of the calf or thigh
- Homan's sign (pain in the calf in response to dorsiflexion of the foot)

**Investigations**

- Venous ultrasound
- Venography

**Pharmacological Treatment**

**D:** Unfractionated heparin (UFH) is the treatment of choice[5]

Loading dose 100U/kg (or minimum of 5000 U) followed by initial infusion 15-25 U/kg/hour (or minimum of 1000U/hour)

**Note**: Check PTT every 4 hours and PTT should be maintained at 1.5–2.5 X control. Once steady state has been achieved measure PTT levels daily. Change heparin to SC route after 5–10 days

**Referral**

Immediate referral to a hospital where monitoring of the treatment through lab testing is available is recommended

## 11.5.6 Pulmonary Embolism in Pregnancy

It is blockage, usually a blood clot, prevents oxygen from reaching the tissues of the lungs; it can be life-threatening

**Diagnostic Criteria**

- Acute onset of shortness of breath (dyspnea)
- Pleuritic chest pain
- Cough and/or hemoptysis
- Low grade fever
- Tachypnea

- Diminished oxygen saturation
- Diminished breath sounds

**Investigations**
- Venous ultrasound
- Pulmonary angiography

**Pharmacological Treatment**

**D:** Unfractionated heparin (UFH) is the treatment of choice
- Loading dose 150 U/kg (or minimum of 5000 U) followed by
- Initial infusion 15–25 U/kg/hour (or minimum of 1000U/hourly)

**Note:** Check PTT every 4 hours and adjust infusion to maintained PTT at 1.5–2.5 X control. Once steady state has been achieved measure PTT levels daily. Change heparin to SC route after 5–10 days to avoid formation of hematoma.

**Referral**

Immediate referral to a health facility where monitoring of the treatment through lab tests is available is recommended

## 11.5.7 Vomiting in Pregnancy and Hperemesis Gravidarum

It is severe nausea and vomiting in early pregnancy requiring hospital admission and rehydration.

**Diagnostic Criteria**
- Weight loss
- Nausea and vomiting typically in early pregnancy
- Dehydration
- Altered general status (fast pulse, restlessness)

**Investigations**
- Full blood count
- Blood for urea, electrolytes and serum creatinine
- Urinalysis, micro urine and culture, ketonuria
- Liver function tests
- Thyroid function tests
- Obstetric ultrasound

**Non-pharmacological Treatment**
- Nil per oral (nothing by mouth) for 24–48 hrs.
- Input/output for 24–48 hrs.
- Monitor electrolytes for 24hrs
- Counselling
- Reassurance
- Emotional support
- Rest
- Life style adjustment
- Ensure adequate hydration
- Frequent small carbohydrate meal

**Pharmacological Treatment**

A: Ringers Lactate with Normal Saline according to daily needs and severity.

**AND**

C*:* Vitamin $B_1$ (Thiamine*)* 100mg per day mix in intravenous rehydration solution

**AND**

C:Metoclopramide: IM 5–10 mg 8 hourly till vomiting stops.

**OR**

A: Promethazine (IM) 12.5 mg twice daily

**Referral**: Depends on the status of the patient, refer to a hospital if vomiting is intractable and if there is a need for high volume replacement.

### 11.5.8 Heartburn in Pregnancy

Heartburn (also called acid indigestion or acid reflux) is a burning sensation that often extends from the bottom of the breastbone to the lower throat. It is caused by some of the hormonal and physical changes in pregnant women

**Management**

**Pregnant women should avoid:**

- Food and beverages that cause gastrointestinal distress
- Tobacco and alcohol
- Do not eat big meals, instead eat several small meals throughout the day
- Drinking large quantities of fluids during meals
- Do not eat close to bedtime, they should give themselves 2–3 hours to digest food before they lie down
- Sleep propped up with several pillows or a wedge. Elevating upper body will help keep the stomach acids where they belong and will aid food digestion.

**Pharmacological treatment**

**A:** Omeprazole (PO) 20–40mg per day

**OR**

**D:** Pantoprazole 40mg per day

**OR**

**A:** Magnesium trisilicate(PO) as needed until when the heartburn subsides.

### 11.5.9 Other Medical Disorders in Pregnancy

Other medical disorders in pregnancy/other gynecological disorders include diabetes mellitus, glucose intolerance, malaria, HIV/AIDs complications, Pelvic Inflammatory Diseases (PID) etc. All these complications are discussed under specific disease chapters

## 11.6 STIMULATION OF LABOUR AND MYOMETRIAL RELAXATION

Myometrial stimulants should be used with great care before delivery especially in porous women. Use in obstructed labour should be avoided.

Oxytocics are indicated for:–

- Augmentation of labour
- Induction of labour

- Active management of third stage of labour.
- Uterine stimulation after delivery

**Induction of Labour**

Indications/Contraindications

- The indication for induction must be documented, and discussion should include reason for induction, method of induction, and risks, including failure to achieve labour and possible increased risk of Caesarean section[5]
- If induction of labour is unsuccessful, the indication and method of induction should be re-evaluated.

**Pre-induction assessment**

- Health care providers should assess the cervix (using the Bishop score) to determine the likelihood of success and to select the appropriate method of induction.
- The Bishop score should be documented.
- Care providers need to consider that induction of women with an unfavorable cervix is associated with a higher failure rate in nulliparous patients and a higher Caesarean section rate in nulliparous and parous patients.

**Post-dates induction**

- Women should be offered induction of labour between 41+0 and 42+0 weeks as this intervention may reduce perinatal mortality and meconium aspiration syndrome without increasing the Caesarean section rate
- Women who chose to delay induction >41+0 weeks should undergo twice-weekly assessment for fetal wellbeing

**Options for Cervical Ripening/Induction: Unfavorable Cervix**

- Intracervical Foley catheters are acceptable agents that are safe both in the setting of a vaginal birth after Caesarean section and in the outpatient setting
- Double lumen catheters may be considered a second-line alternative

**Pharmacological treatment**

**B:** Misoprostol 25µg 8 hourly for 24 hours can be considered a safe and effective agent for labour induction with intact membranes and on an inpatient basis.

**Note:**

- Misoprostol should not be used in the setting of vaginal birth after Caesarean section due to the increased risk of uterine rupture
- Oxytocin should be started no earlier than 4 hours after the last dose of misoprostol

**Options for induction with a favorable cervix**

- Amniotomy should be reserved for women with a favorable cervix. Particular care should be given in the case of unengaged presentation because there is a risk of cord prolapse.

- After amniotomy, oxytocin should be commenced early in order to establish labour.
- In the setting of ruptured membranes at term, oxytocin should be considered before expectant management.
- Women positive for group B streptococcus (GBS) should be started on oxytocin as early as possible after ruptured membranes in order to establish labour within 24 hours.
- Both high- and low-dose oxytocin may be considered within a hospital protocol.
- Because of the various concentrations, oxytocin infusion rates should always be recorded in mU/min rather than mL/hr.
- Oxytocin induction maybe considered in the hospital setting of vaginal birth after Caesarean section.
- For induction of labour use: Oxytocin IV, the dose will depend on parity.

**Primigravida**

**A:** Oxytocin IV 5 IU in 500mls of fluid titrate at 15, 30, 60 drops per minute until desired uterine contractions are attained

**Multiparous**

**A:** Oxytocin IV starts with low dose e.g. 1.25 IU in 500mls of fluid titrate as above. Regulate the dose according to response.

**If no progress of labour is achieved give:**

A: Oxytocin (IV), initially 1U then 4U in 1 liter Normal Saline at 15, 30, 60 drops per minute until regular contractions lasting for more than 40 secondly are maintained. When 4U are not enough to cause maintained contractions, and it is first pregnancy, the dose can be increased to 16, 32 then 64U in liter of Normal Saline each time increasing the delivery rate through 15, 30 and 60 drops per minute.

**Augmentation of labour**

If labour progress is not optimum labour augmentation is necessary. Can be achieved by:

**A:** Oxytocin as above

**OR**

Artificial rupture of membranes (ARM) and oxytocin. If membranes are already ruptured and no labour progress the steps above should be followed; rule out obstruction before augmenting labour with oxytocin.

**Myometrial stimulation after delivery**

Drugs of choice:

**A:** Oxytocin (IM) 10 IU after delivery of the infant; when no response give oxytocin (IV infusion) 10–20 units in 1 liter of NS running at 10–20 drops per minute.

**OR**

**C:** Ergometrine (IM) 0.25–0.5 mg after delivery of the infant, in the absence of myometrium contraction and to prevent postpartum hemorrhage.

**OR**

A: Misoprostol 800–1000 microgram (µg) orally/rectally

**Note:** Use Ergometrine cautiously in hypertensive heart disease patients

**Myometrium relaxation**
It is done to relax the uterus in order to:

- Relieve fetal distress immediately prior to Caesarian section
- Stop contraction of uterine in premature labour
- Prevent uterine rupture
- Perform external cephalic version

**Pharmacological treatment**

**A:** Nefedipine 20 mg start, followed by 10–20 mg three–four times daily

**OR**

**B:** Salbutamol IV 2.5mg in 500mls of Ringers lactate and run 20–30 drops per minute and monitor contractions and maternal heart rate

**Note:**

- β -stimulants should never be used if the patient had an antepartum hemorrhage
- β -stimulants are contra-indicated for cardiac disease and severe anemia in pregnancy

### 11.6.2 Rhesus Incompatibility

Incompatibility between an infant's blood type and that of its mother, resulting in destruction of the infant's red blood cells (hemolytic anemia) during pregnancy and after birth by antibodies from its mother's blood.

**Investigation**
Test to detect antibody

**Treatment**
If the mother is Rhesus negative give

**C:** Anti D immunoglobin 300microgram (IM) within 72 hours of delivery

Abortion in Rhesus negative mother give

**C:** Anti D immunoglobin 100microgram (IM) within 72 hours of abortion

## 11.7 POSTPARTUM CARE

### 11.7.1 Mastitis

It is an infection/inflammation of the tissue of one or both of the mammary glands inside the breasts. Mastitis usually affects women who are producing milk and breast–feeding.

**Diagnostic Criteria**
May develop rapidly, breast becomes red and swollen, tenderness, warmth and burning sensation

**Non Pharmacologic treatment**

- Drinking plenty of liquids and resting
- Feed the baby more frequently. If an individual cannot feed the baby more frequently, expressing the milk more often can be helpful. During a feed, start with the affected breast. This ensures that it is drained more regularly and after a feed, gently express any leftover milk

**Pharmacological treatment**

**A:** Ibuprofen 500mg 8 hourly for 5 days

**OR**

**A:** Paracetamol 500–1000mg 8 hourly for 5 days

## 11.7.2 Abnormal Uterine Bleeding in Pre-Menopausal Women

Abnormal uterine bleeding (AUB) is a common condition affecting womenof reproductive age that has significant social and economic impact. Pre-menopausal abnormal uterine bleeding can be ovulatory, anovulatory, or anatomic

**Diagnostic Criteria**

**Ovulatory might be associated with**

- Premenstrual symptoms
- Dysmenorrhea

**Anovulatory**

- Irregular bleeding, often heavy
- endometrial hyperplasia

**Anatomic**

- Fibroids, polyps, or adenomyosis
- Often heavy bleeding, pain
- Uterus might be enlarged

**Investigations**

- A complete blood count (CBC)
- Pregnancy test
- Cervical and vaginal swab
- Ultrasound
- Testing for coagulation disorders should be considered only in women who have a history of heavy menstrual bleeding beginning at menarche or who have a personal or family history of abnormal bleeding
- Other investigations might be done on the basis of clinical suspicions

**Pharmacological Treatment**

The treatment will depend of the causative factor.

**B**: Mefenamic acid (250 mg)

**OR**

**A**: Ibuprofen (200–400 mg)1–2 tablets before or at beginning of menses, then 1 tablet every 6–8 hours for 5days

**C**: Tranexamic acid (500 mg–1000 mg every 6–8 hours as required

Combined oral contraceptives: Useful for anovulatory bleeding, might have benefit for ovulatory bleeding[11]

**A**: Medroxyprogesterone acetate (5–10 mg/d for 10–14 days initially and repeated for 10 days each month thereafter

**Note**

- AUB in the adolescent most commonly represents ovulatory dysfunction related to immaturity of the hypothalamic-pituitary-ovarian axis
- Selection of a medical therapy for AUB in adolescents should consider the need for contraception. Long acting reversible contraception may be considered first line therapy for both sexually active adolescents and, with individualized counseling, non-sexually active adolescents

**Surgical management**

AUB not responding to medical treatment may be due to intracavitary lesions such as submucosal fibroids. AUB secondary to submucosal fibroids may be managed by hysteroscopy myomectomy.

## 11.7.3 Dysmenorrhea

It is a painful menstruation preventing normal activities and requires medication. There are 2 types of dysmenorrhea:

**Primary (no organic cause).** Typically, in primary dysmenorrhea pain occurs on the first day of menses, usually about the time the flow begins, but it may not be present until the second day. Nausea and vomiting, diarrhea and headache may occur.

**Secondary (pathological cause)** e.g. PID and uterine polyposis and membranous (castoff endometrial cavity shed as a single entity (rare).

**Pharmacological Treatment**

**A:** Ibuprofen 200–600 mg (PO) 8 hourly (maximum 2.4 g/day)

**OR**

**A:** Acetylsalicylic acid 300–600 mg (PO) 4 hourly

**OR**

**A:** Diclofenac 50–100mg (PO) 8–12 hourly

**OR**

**C:** Mefenamic acid 500mg (PO) 8 hourly

**AND**

**A:** Hyoscine butyl bromide 20mg 8 hourly for 5days

Women with regular complaints can easily detect length of use during their periods (2–3 days usually sufficient).Treat the underlying condition if known

**Note**: For primary dysmenorrhea patients may be advised to start taking ibuprofen one or two days before menses and continue for three to four days during menses to minimize painful menstruation

## 11.8 CONTRACEPTION

### 11.8.1 Combined Oral Contraceptives (COS) and Iinjectables

Before initiating oral contraceptive pills:

- Check blood pressure
- Perform vaginal examination (to check normal size of uterus)
- Check for contraindications like deep vein thrombosis

Follow up:

- Instruct women always to inform the doctor or nurse that they are on contraceptives while attending clinic or hospital.
- Women on oral contraceptives need regular physical check-ups including blood pressure measurement every six months
- Need to withdraw COCs or Progesteron Only Contraceptives (POPs) in:
  - Pregnancy
  - Severe headaches especially associated with visual disturbances
  - Numbness or paresis of extremities
  - Unexplained chest pain or shortness of breath
  - Severe leg pains etc.

**The recommended oral contraceptives are:**

**A:** Ethinyloestradiol + Norgestrel Tablets 0.03mg + 0.3mg

**OR**

**A:** Ethinyloestradiol + Levonogestrel Tablets 0.03mg + 0.15mg

**OR**

**A:** Ethinyloestradiol + Desogestrell Tablets 0.03mg + 0.15mg

**OR**

**A:** Medroxyprogesterone acetate IM 150 mg every three months

**Note**

- Take the first pill on the 5th day of menstruation and then continue every day without any interruptions
- Check blood sugar and hypertension after every 6 months

**Caution!** Avoid use in women with severe hypertension and women without proven fertility

**Post-coital contraception ("morning-after pill")**

The method is applicable mostly after rape and unprotected sexual intercourse where pregnancy is not desired. Within 3 days (72 hours) of unprotected sexual intercourse, give:

**A**: Combined oral Contraceptive ethinyloestradiol 100 µg and levonorgestrel 500 µg (2 high dose COC tablets)

**OR**

**A**: Ethinyloetradiol 30–35 µg and levonorgestrel 150–250 µg –3 tablets (3 low dose COC tablets).

- Repeat this dose after twelve hours
- Advice to return to physician if menstruation does not occur within 3 weeks; give advice on contraceptive use

## 11.8.2 Implant Contraceptives

Implants are contraindicated to:

- Severe hypertension
- Thromboembolism
- Active liver disease
- Sickle cell anaemia
- Genital bleeding
- Severe headaches

The following are the recommended implants:

**B**: "Implanon 68mg "containing etonogestrol in single silastic capsules is implanted in the left upper arm with local anesthesia. Is effective for 3 years

**OR**

**B:** Implanon NXT, 68mg is an implant containing etonogestrel in single silastic capsule with applicator is implanted in the left upper arm with local anesthesia. Is effective for 3 years

**OR**

**B:** Jadelle, "containing levonogestrel 75mg in two silastic capsules is implanted subdermal in the left upper arm with local anesthesia. Is effective for 5 years and is recommended for women who have completed their family or not ready for sterilization or those not able to take estrogen containing contraceptives.

**NOTE**:Use the WHO Medical eligibility criteria (MEC) wheel on providing FP methods

## 11.8.3 Infertility

Infertility is a condition of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse.[12]

I**nvestigation:** Not every fertility test will be done for every case**.**

**WOMEN:** For women, fertility testing may include basic gynaecologic examination

- VDRL tests
- Urine routine and microscopic
- Cervical mucus examination
- Abdominal pelvic USS-to look for polycystic ovaries, larger ovarian cysts, fibroids, and, sometimes, to confirm ovulation is taking place.
- HSG (hysterosalpingogram) to check that the fallopian tubes are open and not blocked, as well as to evaluate the shape of the uterus.

- Hysteroscopy- This is done if an HSG examination showed potential abnormalities or was inconclusive.
- Diagnostic laparascopy- This test is only done when symptoms point to possible endometriosis, as part of treatment for blocked fallopian tubes, or in some cases of unexplained infertility.
- Hormonal profile- FSH, LH,T3 & T4,Testosterone, prolactin, estradioland progesterone

**MEN:** Perform the following
- Semen analysis
- VDRL tests
- Hormonal profile-FSH,Testosterone, but sometimes also LH, estradiol, or prolactin

**Treatment** will depend on the underlying cause
**Non-pharmacological treatment**
- Weight reduction in obese clients.
- Educate the couple on the importance of having sexual intercourse during the fertile window
- Try to avoid smoking/excessive drinking

**Pharmacological treatment**
**Ovulation stimulation**;

**C**: Clomiphene citrate 50mg (PO) once per day for seven days from the 2nd–5th day of menstruation.(maximum 6 cycles)

**Polycystic Ovarian Syndrome (PCOS)**

**A**: Metformin 500mg 8 hourly (sometimes used during PCOS treatment, alone or along with fertility drugs)

**Hyperprolactinemia**

**B**: Bromocriptine 2.5–5mg once per day until the prolactin level is within the normal range

**Surgeries**:
- Tubal surgery for Tubal blockage
- Myomectomy for uterine fibroids
- Ovarian drilling is a possible surgical infertility treatment for PCOS–related infertility

**Referral**
Refer all patients with infertility to a gynecologist.

# CHAPTER TWELVE
# SEXUALLY TRANSMITTED INFECTIONS

## 12.0 INTRODUCTION TO FLOW CHARTS

Syndromic approach of managing STIs/RTIs entails the service provider to follow laid down steps in a flow chart which guides him/her in making rational management decisions for treating the client. These are therefore known as treatment flow-charts. They may also be known as treatment algorithms, treatment protocols or treatment decision trees. They guide the provider through a series of decisions and actions that need to be made. Each decision or action is enclosed in a box, with one or two routes leading out of it to another box, with another decision or action. Upon learning a patient's symptoms and signs, the service provider turns to the flow chart for the relevant syndrome and works through the decisions and suggestions it guides to manage the client accordingly. Each flow chart is made up of a series of three steps. These are:

- The clinical problem (the patients presenting symptoms and signs),
- The decision that needs to be taken,
- The action that needs to be carried out.

**Steps in using the flow charts:**

- Start by asking the patient for his/her symptoms
- Find the appropriate flow chart, stated in the clinical problem box with "Patient Complaints of."
- The clinical problem box usually leads to an action box, which asks you to examine the patient and/or take the history.
- Next, move to the decision box. After taking the history and examining the patient you should have the necessary information to choose Yes or No accurately.
- Depending on your choice, there may be further decision boxes and action boxes.

## 12.1 URETHRAL DISCHARGE SYNDROME (UDS)

- UDS refers to the presence of abnormal secretions in the distal portion of the urethra, usually accompanied with symptoms and signs.
- The major pathogens that cause urethral discharge are *Neisseria gonorrhoeae* and *Chlamydia trachomatis*. In syndromic management, treatment of a patient with urethral discharge should adequately cover these two organisms.
- The common symptoms and signs of UDS include urethral discharge, burning or painful micturition, itchy urethra and increased frequency and urgency of micturition.
- Persistent or recurrent symptoms of urethritis may be due to drug resistance, poor compliance or re-infection. In some cases there may be infection with *Trichomonas vaginalis* (TV).
- Male patients complaining of urethral discharge and/or dysuria should be examined for evidence of discharge. If none is seen per inspection, the urethra should be gently milked from the ventral part of the penis towards the meatus.

- Delayed or inadequate treatment may result into orchitis, epididymitis, urethral stricture and/or infertility.

**Management and Treatment of UDS** (see flow chart 12.1)

## 12.2 VAGINAL DISCHARGE SYNDROME (VDS)

- VDS refers to change of colour, odour and/or amount of vaginal secretions, usually accompanied with symptoms and signs.
- The common signs and symptoms are abnormal vaginal discharge, burning or painful micturition, itchy vulva, increased frequency and urgency of micturition and/or painful coitus.
- A spontaneous complaint of abnormal vaginal discharge is most commonly due to a vaginal infection. It may also be the result of muco-purulent STI-related cervicitis. *T. vaginalis, C. albicans* and Bacterial Vaginosis are the commonest causes of vaginal infection while *Neisseria gonorrhoeae* and *Chlamydia trachomatis* cause cervical infection. The clinical detection of cervical infection is difficult because a large proportion of women with gonococcal or chlamydia infections are asymptomatic.
- The symptom of abnormal vaginal discharge is therefore highly indicative of vaginal infection, but poorly predictive for cervical infection. Due to the high prevalence of gonorrhea and chlamydia, all women presenting with VDS in Tanzania should receive treatment for both vaginal and cervical infections.
- Delayed or inadequate treatment of VDS may result to endometritis, salpingitis, oophoritis or ectopic pregnancy.
- **Note:** gonococcal or chlamydial cervical infection may be asymptomatic
  **Management and Treatment of VDS** (see flow chart 12.2)

## 12.3 LOWER ABDOMINAL PAIN SYDROME OR PELVIC INFLAMMATORY DISEASE (PID)

- PID is defined as the inflammation of the uterus, fallopian tubes, ovaries and pelvic peritoneum. It is also known as lower abdominal pain syndrome. It commonly occurs as a result of infection ascending from the cervix. It can also occur as a result of trans-cervical procedure.
- Common symptoms and signs of PID include lower abdominal pain and tenderness, painful micturation, painful coitus, abnormal vaginal discharge, menometrorrhagia, fever and sometime nausea and vomiting.
- Common etiologies of PID are *Neisseria gonorrhoeae*, *Chlamydia trachomatis* and Anaerobic bacteria
- Delayed or inadequately treated PID may lead to chronic lower abdominal pain, pelvic abscess, ectopic pregnancy, dysmenorrhea and infertility.

**Management and Treatment of PID** (see flow chart 12.3)

**In-patient treatment of PID**
All patients with PID who have fever of body temperature ≥ $38^0$C should be admitted for closer care. The recommended in-patient treatment options for PID are as follows:

**Regimen 1:**

**D:** Cefixime 400mg 6 hourly
**AND**
**A:** Doxycycline 100 mg PO or IV, 12 hourly
**AND**
**A:** Metronidazole, 400mg PO or by IV, 12 hourly

**Regimen 2:**

**A:** Inj Ceftriaxone, 1 gm IM, once daily
**AND**
**A:** Doxycycline, 100mg PO or IV, 12 hourly
**AND**
**A:** Metronidazole, 400 PO or IV 12 hourly

**Regimen 3:**

**S:** Clindamycin, 900 mg IV, 8 hourly
AND
**A:** Gentamicin, 1.5 mg/kg IV, 8 hourly

**NOTE:** For all three regimens, therapy should be continued until at least two days after the patient has improved and then be followed by doxycycline, 100 mg PO 12 hourly for 14 days.

- Patients taking metronidazole should be cautioned to avoid alcohol.
- Doxycycline 100mg is contraindicated in pregnancy.

## 12.4 PAINFUL SCROTAL SWELLING (PSS)

- PSS is the inflammation of the epididymis and testis, often accompanied with scrotal pain, swelling and tenderness. It is also known as epididymorchitis.
- The common aetiologies of PSS are *Neisseria gonorrhoea* and *Chlamydia trachomatis*
- Common symptoms and signs of PSS are scrotal pain, scrotal swelling and tenderness, scrotal oedema and fever.
- Among the common complications of painful scrotal swelling include infertility and scrotal abscess.

**Management and Treatment of PSS** (see flow chart 12.4)

## 12.5 ANO RECTAL SYNDROME (ARS)

- Ano rectal syndrome is defined as soreness, burning, itching or other irritation of the rectum together with redness in the area of anus. Sometimes it is accompanied by diarrhea and it may occur as a toxic side effect of oral administration of certain broad spectrum antibiotics.

- Ano-rectal syndrome may include a number of presentation. The most common include proctitis and rectal discharge.The most common sexually transmitted pathogens which cause ARS are *Neisseria gonorrhoeae, Chlamydia trachomatis, Treponema pallidum* and *Herpes simplex.*
- Proctitis is an inflammation of the rectal wall and is the most common reaction to an ano-rectal STI (due to gonorrhoea, syphilis, chlamydia or herpes). Anyone whose immune system is impaired is at increased risk of developing proctitis, particularly from infections caused by the herpes simplex virus or cytomegalovirus, or from reactivation of an earlier infection.
- Proctitis may be caused by *Salmonella spp., Shigella spp.,* or *Entamoeba histolytica* as a part of gastroenteritis, which may manifest as diarrhoea with fever, anorexia, and abdominal cramps. Antibiotics that destroy normal intestinal bacteria and allow other bacteria to grow in their place may also cause proctitis.
- Herpes proctitis may be mistaken for the rectal manifestation of ulcerative colitis or Crohn's disease. Proctitis typically causes painless bleeding or the passage of mucus (sometimes mistaken for diarrhoea) from the rectum. There may also be ineffectual straining to defecate ("tenesmus"), sometimes mistakenly described as "constipation" by patients. The anus and rectum may be intensely painful, with external and internal ulceration, when the cause is gonorrhoea, herpes, or cytomegalovirus infection. A proctoscopic examination (which should be done, if feasible) will reveal rectal pus, bleeding or ulceration.
- All cases of proctitis in MSM should be treated for gonorrhoea and chlamydia infections. Symptoms of diarrhoea, bloody stools, abdominal cramping, nausea, and/or bloating may indicate giardia infection or amoebic dysentery.
- Rectal discharge is a condition associated with intermittent or continuous expression of any discharge that is not stool or blood from the anus.
- Generally "rectal discharge" refers to either a mucous or purulent discharge. The discharge can occur for many reasons, including anal fissure, anal fistula (an abnormal connection between two organs) or abscess, other infections including sexually transmitted diseases, or chronic inflammatory diseases.
- When the definition of rectal discharge is related to STI, the following could be observed:
    - Purulent rectal discharge
    - Mucous rectal discharge
    - Watery rectal discharge

**Other non-STI causes of ARS include**:
Anal fissure, Fecal impaction, Food intolerance, Gastroenteritis (bacterial and viral), Inflammatory bowel disease (includes Crohn's disease and ulcerative colitis), Neurological damage, and Perirectal or perianal abscess.

Other symptoms might occur with rectal discharge includes gastrointestinal symptoms which vary depending on the underlying disease, disorder or condition. These may include:

- Abdominal pain or cramping, abdominal swelling, distention or bloating; bloody stool (blood may be red, black, or tarry in texture), burning feeling, change in bowel habits, constipation, diarrhea; fecal incontinence (inability to control stools), flatulence; pain, which may be severe, in the abdomen, pelvis, or lower

back, urgent need to pass stool and watery diarrhea including multiple episodes.

**Management and Treatment of ARS** (see flow chart 12.5)

## 12.6 OROPHARYNGEAL STIS

- Oral sex can lead to oropharyngeal STIs (infections of mouth and throat), including human papillomavirus, herpes, gonorrhea, among others. Clinically, it is difficult to diagnose gonococcal or chlamydial pharyngitis reliably.
- Additionally, service providers should be aware that pharyngeal gonorrhea can be more difficult to clear than urethral infections.
- Other oro-pharyngeal STIs (such as herpes and warts) can often be detected by physical examination and can be managed according to the treatment guidelines. It is recommended that whenever a patient is suffering from significant pharyngitis, and a history of unprotected oral sex makes pharyngeal gonococcal or chlamydial infection a likely risk, the patient should be treated syndromically.

**Treatment for sexually-transmitted Pharyngitis**

**D:** Cefixime, 400 mg PO stat (to treat gonococcal infection)

**AND**

**A:** Azithromycin, 1 g PO stat (to treat chlamydial infection)

**Management and Treatment of Oropharyngeal STIs** (see flow chart 12.6)

## 12.7 GENITAL ULCER DISEASE (GUD)

GUD is a loss of continuity of skin or mucous membrane producing one or more lesions in the genital area. The common aetiologies of GUD in Tanzania are *Treponema pallidum*, *Haemophilus ducreyi, Chlamydia trachomatis, Herpes simplex virus type 2 (HSV)* and *Calymmatobacterium granulomatis.* In many parts of Tanzania, genital herpes is another frequent cause of genital ulcer disease. Where HIV infection is prevalent, an increasing portion of cases of genital ulcer disease is likely to harbour herpes simplex virus.

Herpetic ulcers may be atypical and persist for long periods in HIV-infected patients. Clinical manifestations and patterns of genital ulcer disease may be further altered in the presence of HIV infection. Clinical differential diagnosis of genital ulcers is inaccurate, particularly in settings where several etiologies are common

**Management and Treatment of GUD** (see flow chart 12.7)

## 12.8 NEONATAL CONJUNCTIVITIS (OPHTHALMIA NEONATORUM)

Ophthalmia Neonatorum (ON) means inflammation of the conjunctiva of a newborn baby of less than 1 month of age. This is a potentially sight threatening condition. If the baby is older, the cause is unlikely to be an STI.

- The most common sexually transmitted pathogens which cause ON are Neisseria gonorrhoeae and Chlamydia trachomatis.

- Other non-STI causes of neonatal conjuctivitis include: Staphylococcus aureus, Streptococcus pneumoniae, Haemophilus and Pseudomonas spp, viral, chemical and physical iritation.
- Common symptoms and signs of neonatal conjunctivitis are reddish conjunctiva, oedema/swelling of the eyelids and purulent eye discharge

Prevention and control measures include screening of pregnant women, early treatment of VDS in pregnant women and routine eye chemoprophylaxis in the newborn by providing 1% tetracycline eye ointment to all newborns. Always:Examine the neonate and exclude other congenital diseases.

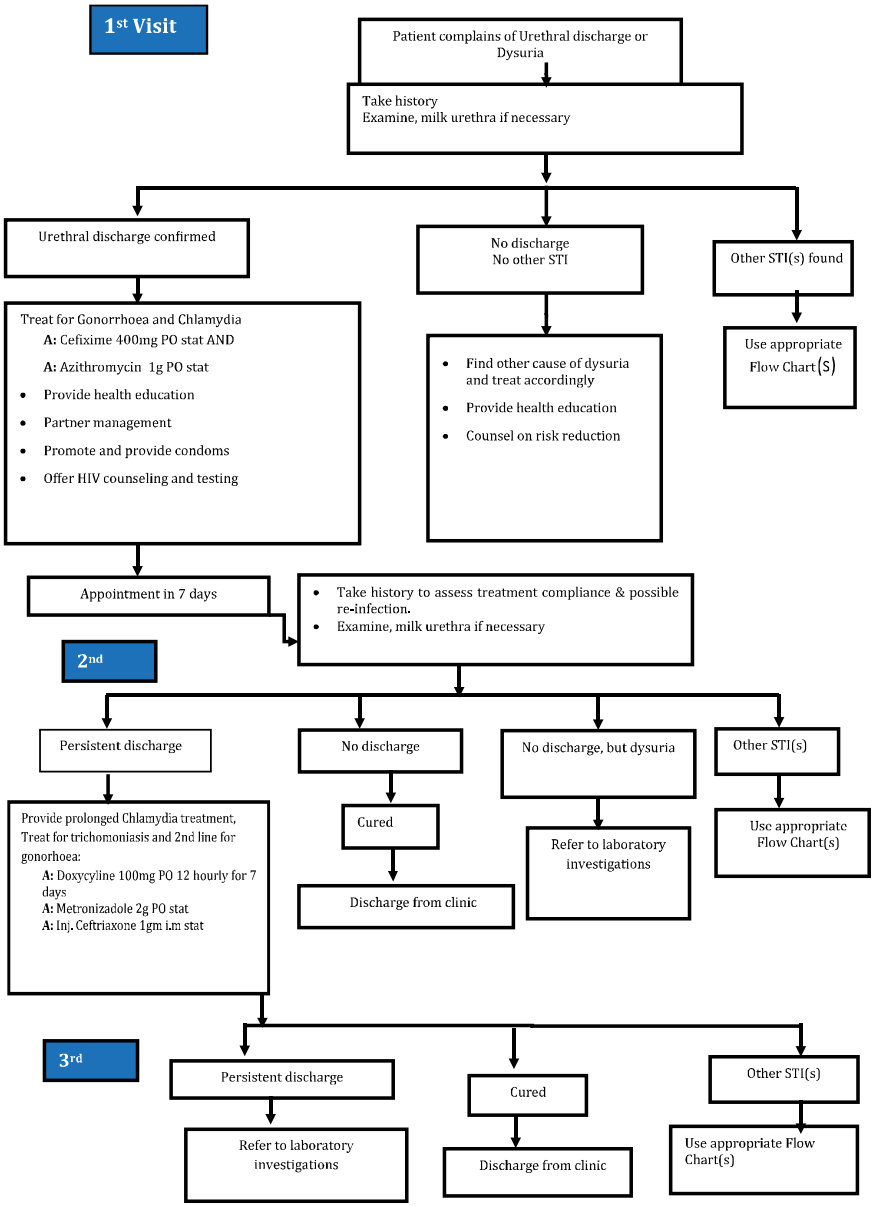
**Management and Treatment of Neontal conjuctivitis** (see flow chart 12.8)

## 12.9 INGUINAL BUBO (IB)

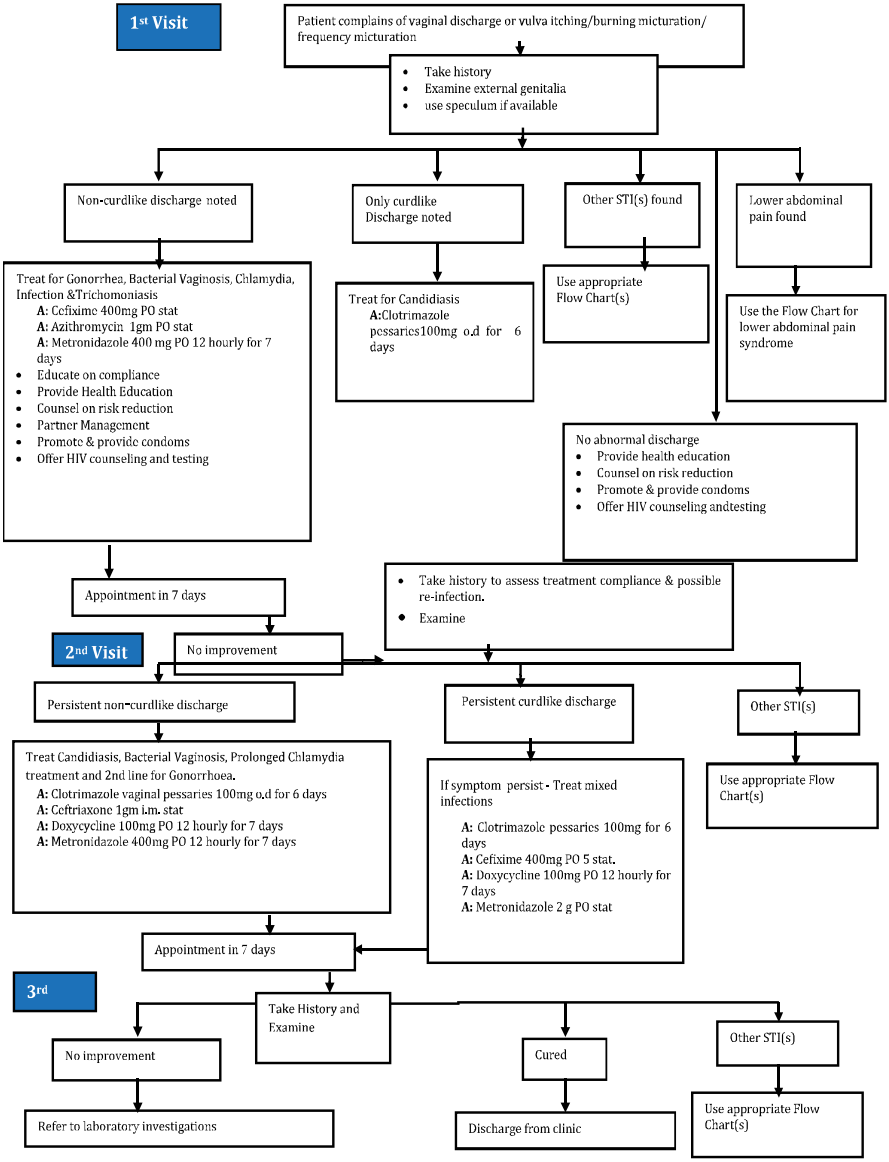
Inguino and femoral bubos are localized enlargements of the lymph nodes in the groin area, which are painful and may be fluctuant. They are frequently associated with lymphogranuloma venereum and chancroid caused by *Chlamydia trachomatis* and *Haemophilus ducreyi* respectively. In many cases of chancroid an associated genital ulcer is visible, but occasionally may not be. Non-sexually transmitted local and systemic infections (e.g. infections of the lower limb) can also cause swelling of inguinal lymph nodes. These should therefore be ruled out.
Common symptoms and signs of IB include swelling in the groin which are often fluctuant and associated with pain, fever and tenderness.

**Management and Treatment of Inguinal BUBO** (see flow chart 12.9)

## Flow Chart 12.1: MANAGEMENT OF URETHRAL DISCHARGE SYNDROME (UDS)

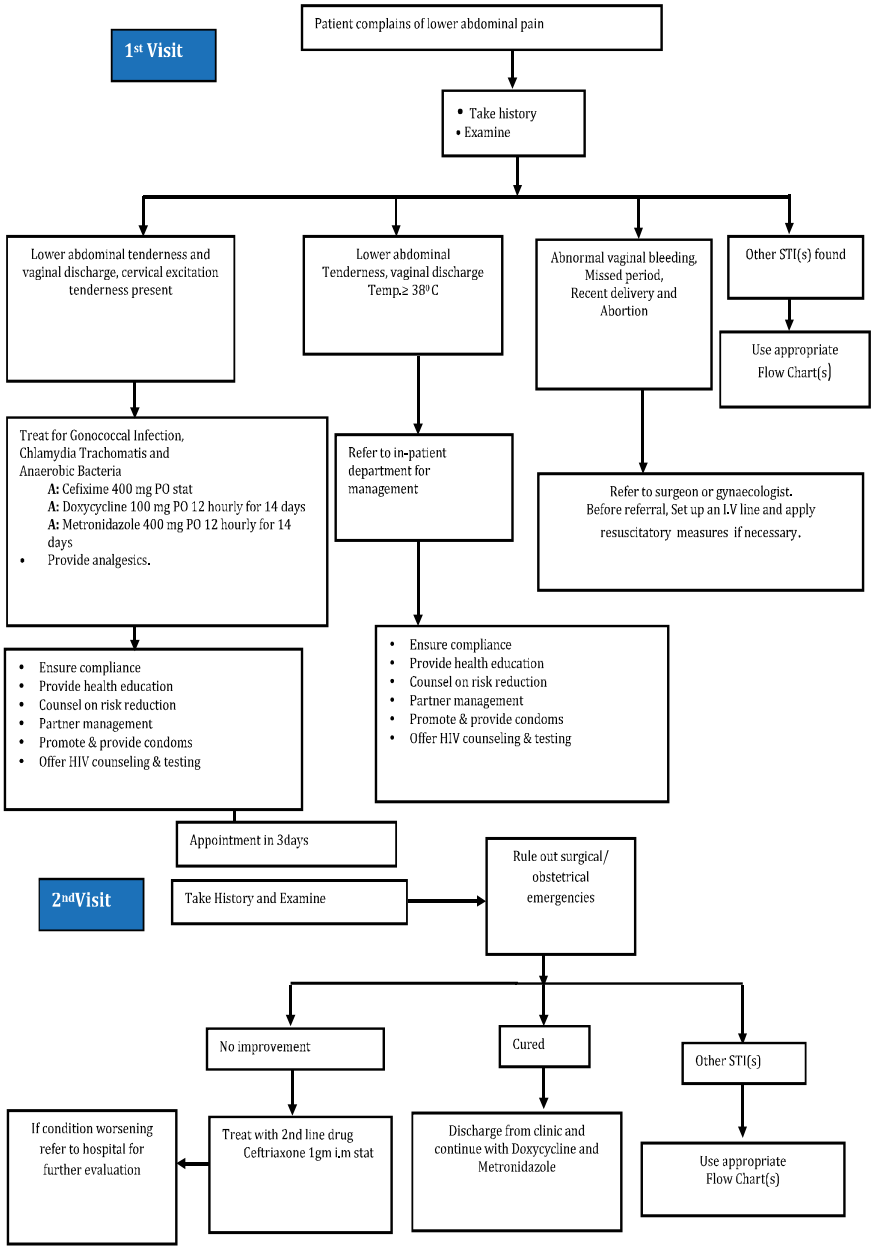


## Flow Chart 12.2: MANAGEMENT OF VAGINAL DISCHARGE SYNDROME (VDS)

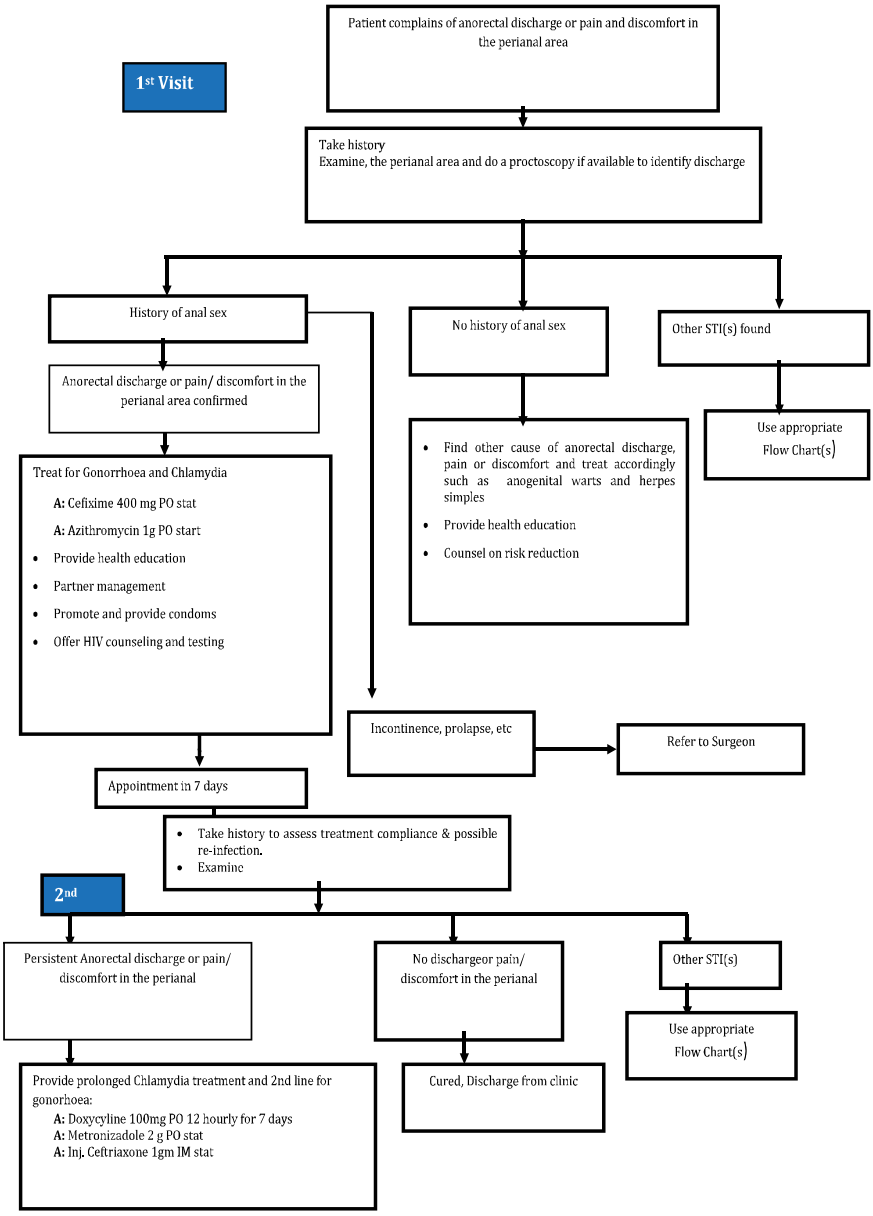



- Do not give Metronidazole in 1st trimester of pregnancy:
- Do not give doxycycline or ciprofloxacin in pregnancy or to lactating mother: Substitute with erythromycin 500 mg 8 hourly for 7 days and ceftriaxone 250 mg i.m. stat.

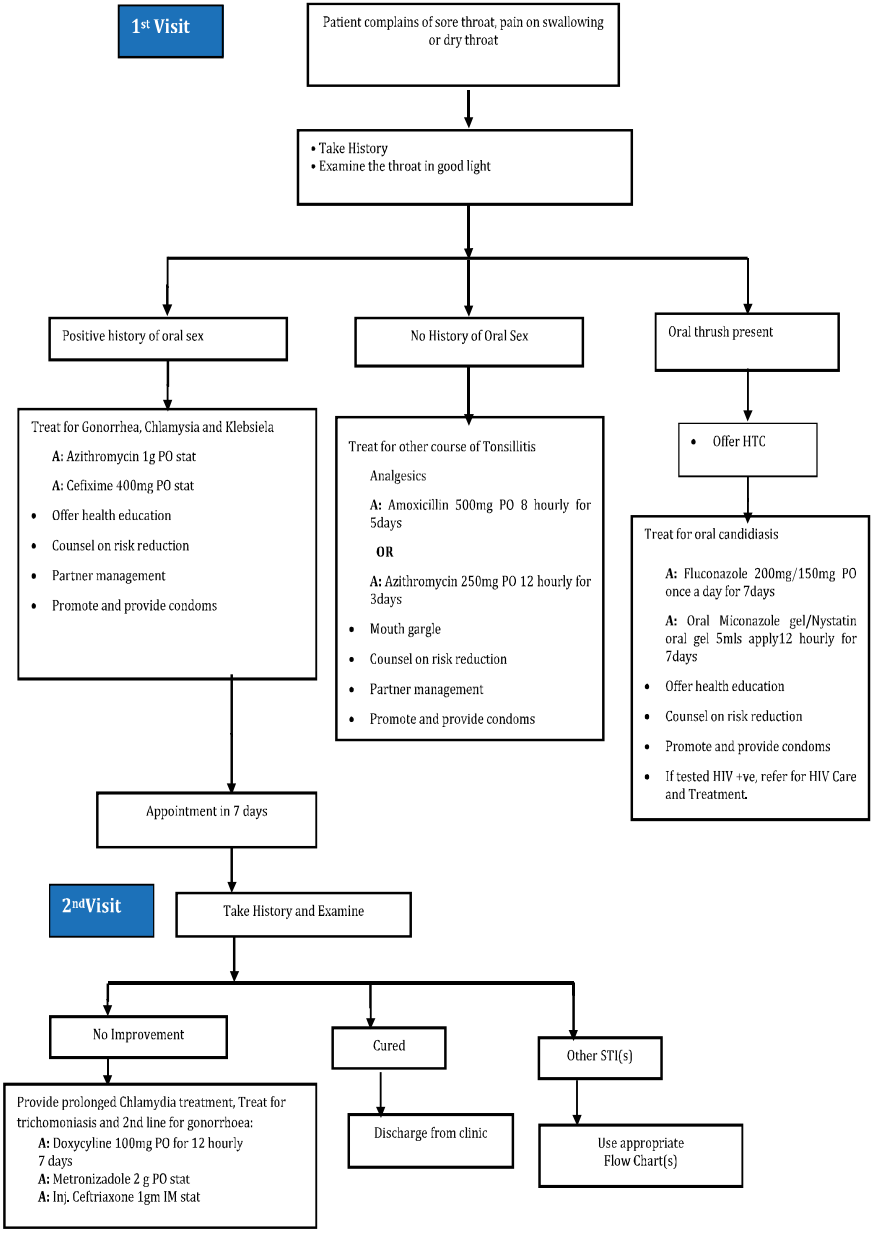
## Flow Chart 12.3: MANAGEMENT OF LOWER ABDOMINAL PAIN SYNDROME (PID)



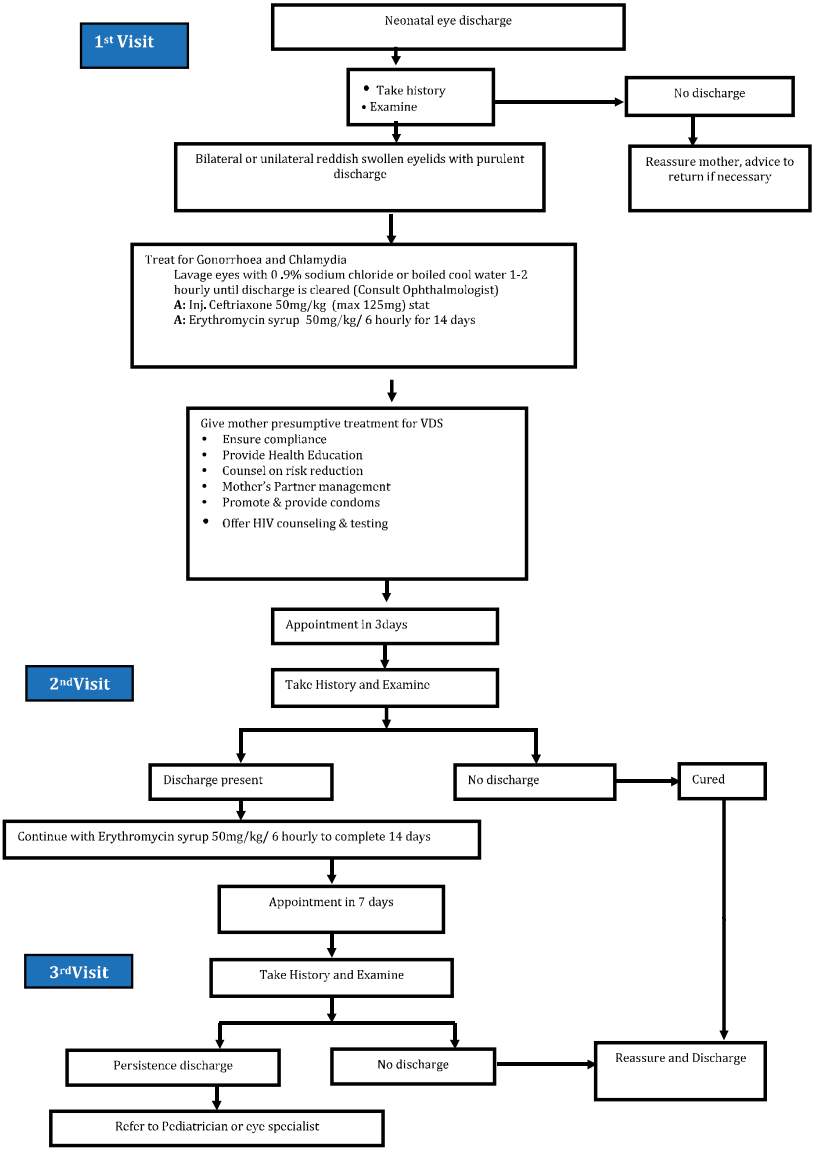
## Flow Chart 12.4: MANAGEMENT OF PAINFUL SCROTAL SWELLING (PSS)



## FLOW CHART 12.6: MANAGEMENT OF OROPHARYNGEAL SYNDROME

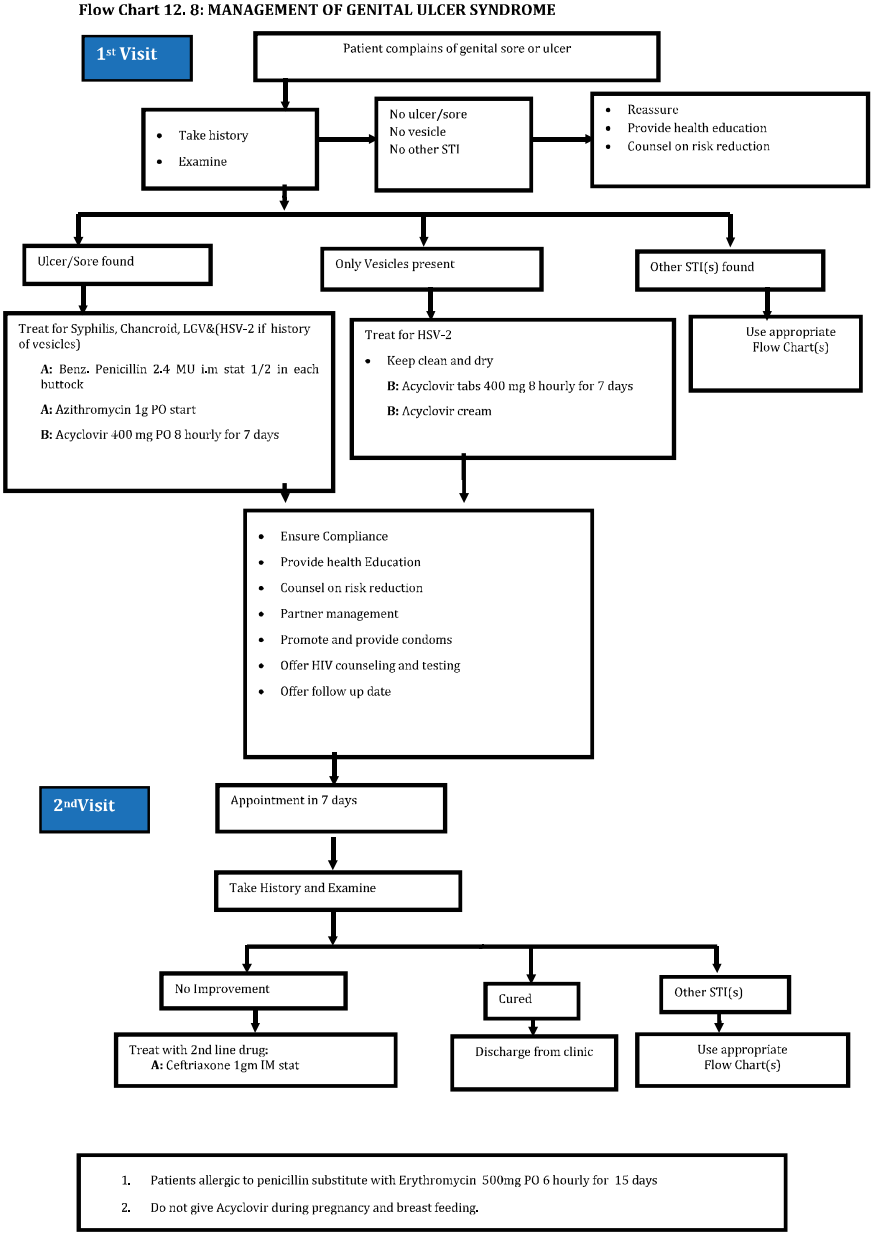


## Flow Chart12. 7: MANAGEMENT OF NEONATAL CONJUCTIVITIS

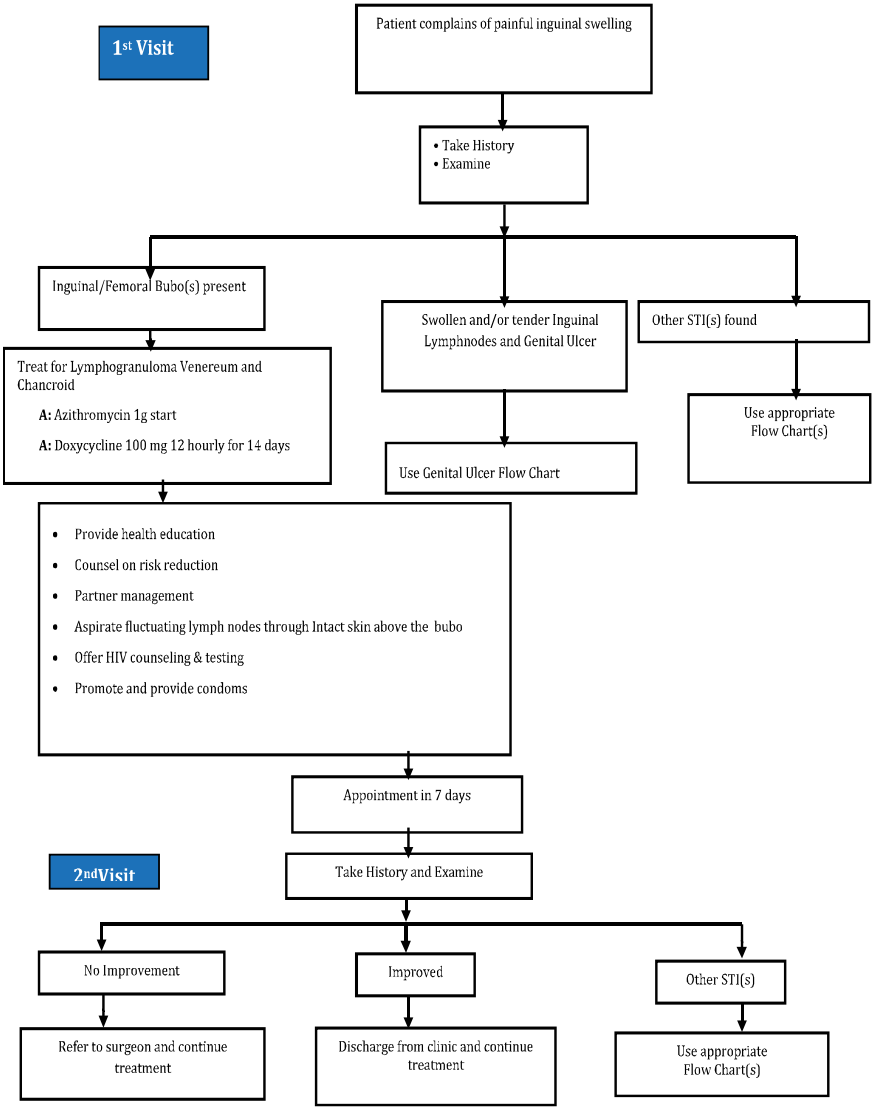



- Both parents be examined and treated as per flow chart for genital discharge syndrome.

## Flow Chart 12. 8: MANAGEMENT OF GENITAL ULCER SYNDROME



## FLOW CHART12.9: MANAGEMENT OF INGUINAL BUBOS (IB)




**Note: Do not incise the BUBO**

**Table 12.1 Management of Mixed Infections**

| Mixed Sexually Transmitted Infections | Drug treatment (new episode) |
|---|---|
| UDS + SSS | Ceftriaxone 250mg IM stat + Azithromycin, 1 g PO per week for 2 weeks + Metronidazole 2g PO stat + Supportive therapy: to reduce pain advice bed rest, scrotal elevation with a scrotal support (T-bandage) and analgesics |
| UDS + Balanitis | Cefixime, 400mg PO stat / Ceftriaxone 250 mg IM stat + Azithromycin 1 g PO stat / Doxycycline, 100mg PO 12 hourly for 7 days + Metronidazole, 2g PO stat + Clotrimazole cream, local application 12 hourly for 7 days |
| UDS + GUS | Cefixime 400mg PO stat / Ceftriaxone 250mg IM stat + Acyclovir 400mg PO 8 hourly for 7days + Benzathine Penicillin*, 2.4 MU IM stat + Azithromycin 1 g PO stat / Doxycycline*, 100mg PO 12 hourly for 7 days + Metronidazole, 2 g PO stat |
| VDS + LAP | Ceftriaxone, 250mg IM stat + Azithromycin, 1g PO per week for 2 weeks + Metronidazole, 400mg PO 12 hourly for 7–14 days. Clotrimazole pessary to be added, if vulvaloedema, itching, excoriations or curd-like discharge present |
| VDS + GUS (non-pregnant) | Cefixime 400mg stat / Ceftriaxone 250mg IM stat + Metronidazole, 2g PO stat + Benzathine Penicillin*, 2.4 MU IM stat + Azithromycin 1g PO stat / Doxycycline* 100mg PO 12 hourly for 7 days + Acyclovir 400mg PO 8 hourly for 7 days. Clotrimazole pessary to be added, if vulvaloedema, itching, excoriations or curd-like discharge present |
| VDS + GUS (pregnant, breastfeeding) | Cefixime 400mg stat / Ceftriaxone 250mg IM stat + Metronidazole 2g PO stat + Benzathine Penicillin* 2.4 MU IM stat + Azithromycin 1g PO stat / Erythromycin* 500mg PO 6 hourly for 7 days + Acyclovir 400mg PO 8 hourly for 7 days. Clotrimazole pessary to be added, if vulvaloedema, itching, excoriations or curd-like discharge present |
| LAP + GUS | Ceftriaxone 250mg IM stat + Metronidazole 400 mg PO 12 hourly for 7–14 days + Benzathine Penicillin*, 2.4 MU IM stat + Azithromycin 1g PO per week for 2 weeks / Doxycycline* 100 mg PO 12 hourly for 7–14 days + Acyclovir 400 mg PO 8 hourly for 7 days |
| SSS + GUS | Ceftriaxone 250 mg IM stat + Benzathine Penicillin* 2.4 MU IM stat + Azithromycin 1g PO per week for 2 weeks/ Doxycycline* 100 mg PO 12 hourly for 7–14 days + Acyclovir, 400 mg PO 8 hourly for 7 days |
| * In Penicillin-allergic patients: Give Doxycycline (non-pregnant women/men) or Erythromycin (pregnant women) for 14 days instead of 7 days | |

## 12.10 MANAGEMENT OF OTHER COMMON STI CONDITIONS

The following common STI conditions have been grouped together because of their different presentations and can easily be diagnosed through laboratory investigations and clinical observation. However, others are not related to sexual transmission but they affect genital parts, e.g. Balanoposthitis, while other some conditions which are transmitted through close sexual intimacy may not affect genital parts only e.g. Pediculosis and Scabies.

**Early Syphilis:** This refers to primary, secondary or latent syphilis of not more than two years duration. Give:

**A:** Benzathine Penicillin 2.4 MU, I.M single dose given as two injections at each buttock.

**OR**

**A:** Azithromycin (PO) 1gm start

**Alternative regimen for penicillin allergic non-pregnant patients**

**A:** Doxycycline 100 mg PO 12 hourly for 15 days

**Late Syphilis**

This refers to Syphilis infection of more than 2 years.

**A:** Benzathine Benzyl Penicillin 2.4 M.U once weekly for 3 consecutive weeks.

**A:** Azithromycin 2gm stat.

**Syphilis in Pregnancy**

Pregnant women should be regarded as a separate group requiring close surveillance, in particular, to detect possible re-infection after treatment has been given. It is also important to treat the sexual partner(s).

**A:** Benzathine Benzyl Penicillin 2.4 M.U, IM as a single dose

In case of late syphilis 3 doses of Benzathine Benzyl Penicillin should be provided.

**Congenital Syphilis**

All infants born to sero-positive mothers should be treated with a single intramuscular dose of benzathine penicillin, 50 000 IU/kg whether or not the mothers were treated during pregnancy (with or without penicillin). Treatment regimens for early congenital syphilis (up to 2 years of age), and Infants with abnormal cerebrospinal fluid:

**A:** Aqueous benzyl penicillin 100,000–150,000 IU/kg/day administered as 50,000 IU/kg/dose IV 12 hourly, for the first 7 days and every 8 hourly thereafter for a total of 10 days

**For congenital syphilis in children 2 or more years**

**A:** Aqueous benzyl penicillin, 200,000–300, 000 IU/kg/day by intravenous or intramuscular injection, administered as 50,000 IU/kg every 4–6 hours for 10–14 days

**The alternative regimen for penicillin allergic patients, after the first month of life**

**A:** Erythromycin, 7.5–12.5 mg/kg (PO) 4 times daily for 30 days.

**Syphilis and HIV Infection**
All patients with syphilis should be encouraged to undergo testing for HIV because of the high frequency of dual infection and its implications for clinical assessment and management.

**Genital Warts (Venereal Warts)**
Human papilloma virus (HPV) is a common sexually transmitted pathogen. Genital warts are painless but may lead to serious complications. The removal of the lesion does not mean cure of the infection. No treatment is completely satisfactory. Recommended regimens for venereal warts are as follows:

**Chemical Treatment (High level Health Facility Management)**
**Self patient Administered**

**D:** Podophllotoxin 10–25% solution or gel twice daily for 3 days, followed by 4 days of no treatment, and the cycle repeated up to 4 times. (total volume of podophyllotoxin should not exceed 0.5ml per day)

**OR**

**D:** Imiquimod 5% cream applied with a finger at bedtime, left on overnight, 3 times a week for as long as 16 weeks. The treatment area should be washed with soap and water 6–10 hours after application and hands must be washed with soap and water immediately after application.

**Note:** The safety of both podophyllotoxin and imiquimod during pregnancy has not been established.

**Provider Administered**

**D:** Podophyllin 10–25% in compound tincture of benzoin, applied carefully to the warts, avoiding normal tissue. External genital and perianal warts should be washed thoroughly 4–6 hours after the application of podophyllin. Podophyllin applied to warts on vaginal or anal epithelial surfaces should be allowed to dry before removing the speculum or anoscope. Treatment should be repeated at weekly intervals.

**OR**

**D:** Trichloroacetic acid (TCA) (80–90%) applied carefully to the warts avoiding normal tissue, followed by powdering of the treated area with talc or sodium bicarbonate (baking soda) to remove unreacted acid. Repeat application at weekly intervals.

**Physical Treatment (Available at higher centres)**

Cryotherapy with liquid nitrogen, solid carbon dioxide, or a cryoprobe. Repeat applications every 1-2 weeks

**OR**

Electrosurgery

**OR**

Surgical removal

**Treatment for Vaginal Warts**
Recommended regimens for treatment of vaginal warts are:

Cryotherapy (with liquid nitrogen)
**OR**
**C:** Podophyllin 10–25% (allow to dry before removing speculum)
**OR**
**D:** Trichloroacetic acid (TCA) (80–90%)

**Treatment for Cervical Warts**
Treatment of cervical warts should not be started until the results from a cervical smear test are known

**Management of Meatal and Urethral Wart**
Cryotherapy
**OR**
**C:** Podophyllin 10–25%

**Note:** Urethroscopy is necessary to diagnose intra-urethral warts, but they should be suspected in men with recurrent meatal warts. Some experts prefer electrosurgical removal.

# CHAPTER THIRTEEN
# SKIN DISEASES AND ALLERGIC REACTIONS

## 13.1 BACTERIAL SKIN INFECTIONS

Bacterial skin infections can range from *impetigo, folliculitis, furunculosis, erysipelas, cellulitis to recurrent boils*. All these skin conditions are caused by either *staphylococcus aureus* alone or together with *streptococcus,* but rarely *streptococcus* alone.

### 13.1.1 Impetigo

Is a contagious primary infection of the skin involving the stratum corneum of epidermis. It is particularly common in children and people in disadvantaged areas. Self-inoculation and small family or community outbreaks are frequent.

**Diagnostic Criteria**

- Polycyclic vesicles or blisters, which can contain pus
- Early lesions are isolated or confluent Erosions and yellowish crusts ("honey-colored")

**Note:** Impetigo is a clinical diagnosis and the typical location in children is around orifices, especially the mouth

**Non-Pharmacological Treatment**

- Improve person hygiene
- Hand washing
- Wash lesions with soap and water
- Remove crust

**Pharmacological Treatments**

Wet dressing with weak Potassium Permanganate (PP) soaks, 1:40000 (0.025%) solution 12 hourly for 3–4 days. Each session to last for 15 to 20 minutes

**A:** G.V paint 0.5% 12 hourly for 5 days

**OR**

**C:** Mupirocin 2% 12 hourly for 5–7 days

**OR**

D: Fusidine 12 hourly for 5–7 days

If severe or systemic symptoms are present (e.g. pyrexia) add an oral antibiotic:

**A:** Phenoxymethylpenicillin 500mg (PO) 6 hourly for 7 days; and for children: 25mg/kg given 6 hourly

**OR**

**A:** Erythromycin (PO) for 10 days; Adults 500mg 6 hourly; Children 25—50mg/kg 8 hourly

**OR**

**B:** Amoxicillin + Clavulanic acid 625mg (PO) 8 hourly for 5 days

### 13.1.2 Folliculitis

Folliculitis is an infection of the hair follicles commonly due to *Staphylococcus aureus*

**Diagnostic Criteria**

Clinical features depend on risk factors, which may result into *Pseudo-folliculitis, Carbuncles* aggregation and *Furuncle (boil).* The following are some of the clinical features:

- Scattered or extensive follicular pustules
- Macular or papulo-erythematous lesions, mainly located on thighs, buttocks, back and bearded area
- Papules and pustules
- Post-inflammatory hyperpigmentation
- Painful nodule with a central follicular pustule
- Necrosis and suppuration with discharge of necrotic core
- Permanent scars or small scars (depending on the risk factors)
- Firm, broad swollen, painful, fluctuant deep nodules
- Multiple drainage tracts
- Fever and general body malaise

**Non-Pharmacological Treatment**

- Suspected irritants should be avoided
- In *Pseudo-folliculitis* of the bearded area, shaving should be stopped for several weeks until improvement occurs. Hair should be left to grow to at least 1 mm long.
- Shaving with electric razors is preferred over manual razors for beard folliculitis. Cleaning with water and soap

**Pharmacological Treatment**

**A:** Potassium Permanganate soaks, 1:40000 (0.025%) solution 12 hourly for 3–4 days. Each session for 15 to 20 minutes

Apply:

**A:** Gentian Violet paint 0.5% 12 hourly for 5 days

**OR**

**B:** Silver sulfadiazine cream applied twice daily

OR

**B:** Mupirocin 2% 12 hourly for 5–7days

**OR**

**C:** Fusidic Acid 2% 12 hourly for 5–7 days

**Note:** If severe, or systemic symptoms are present (e.g. pyrexia) add an oral antibiotic

### 13.1.3 Abscess

Abscess is a collection of pus caused by *Staphylococcus aureus.*

**Diagnostic Criteria:**

- Painful pus filled nodule
- Inflammatory erythematous plaque.
- Fluctuant palpable swelling

- Fever is rare
- Lymphangitis and satellite nodes may be experienced

**Non-Pharmacological Treatment**

- By placing hot compresses over the swelling until it breaks

**Pharmacological Treatment**

**A:** Erythromycin (PO) for 7–10 days. Adults: 500mg 8 hourly; Children: 25–50mg/kg 8 hourly

**OR**

**B:** Flucloxacillin (P0) for 7–10 days. Adults: 500mg 6 hourly; Children: 25mg/kg 6 hourly

**Surgical Treatment**

- Incision and drainage

### 13.1.4 Erysipelas

Erysipelas is an acute superficial dermal infection commonly caused by *Streptococci.*

**Diagnostic Criteria**

- A prodrome of fever, chills, and malaise
- Locally, a large erythematous, swelling, well-demarcated, and usually raised lesion
- Regional adenopathy is frequent
- Superficial blistering secondary to edema,
- Superficial hemorrhage, may be sometimes be observed

**Non Pharmacological Treatment**

- Bed rest
- Elevation of the affected part
- Venous compression is recommended during the acute phase and subsequent weeks to reduce the risk of lymphedema
- Prophylaxis of deep venous thrombosis (DVT) should be considered depending on presence of other risk factors

**Pharmacological Traetment**

Weak Potassium Permanganate soaks, 1:40000 (0.025%) solution 12 hourly for 3–4 days, with each session lasting for 15–20 minutes

**B:** Silver sulfadiazine cream 12 hourly daily

**OR**

**C:** Mupirocin 2% 12 hourly for 5–7 days

**OR**

**C:** Fusidic Acid 2% 12 hourly for 5–7 days

**AND**

**A:** Phenoxymethylpenicillin (PO) for 5–7 days. Adults: 250–500mg 6 hourly; Children: 25mg/kg 6 hourly

**OR**

**B:** Flucloxacillin (PO) for 5–7 days. Adults: 500mg 6 hourly; Children: 25–50/kg 6 hourly

**Surgical Treatment**

- Incision and drainage (in case of secondary abscess formation)

**Referral**

If there are local or general signs of severity of developing necrotizing fasciitis ***refer*** the patient to a higher level health care facility with adequate expertise and facilities.

### 13.1.5 Paronychia

Paronychia is a painful infection that usually occurs at the nail fold. It may occur after injury or minor trauma, and is caused by *Staphylococcus aureus.* It may also occur as a result of fungal infection.

**Diagnostic Criteria**

- Painful nail
- Redness
- Swelling

**Pharmacological Treatment**

***Acute Paronychia***

**B:** Amoxicillin with clavulanic acid 625mg (PO) 8 hourly for 14 days.

**Chronic Paronychia (commonly due to fungal infection)**

**A:** Clotrimazole cream 1%, apply topically 12 hourly for 14 days

**AND**

**C:** Itraconazole tablets (PO) 200mg once daily for 14 days

**AND**

**S:** Clindamycin tablets 300mg (PO) 12 hourly for 14 days

***Note****: For both acute and chronic paronychia, incision and drainage may be needed*

## 13.2 FUNGAL SKIN INFECTIONS

### 13.2.1 Tinea Corporis (Body Ringworm)

Tinea corporis is a superficial fungal infection (dermatophytosis), commonly on the arms and legs, but may occur on any part of the body

**Diagnostic Criteria**

- Enlarging raised annular lesions with a central area of clearing
- Fine scales may be present
- Hair loss in areas of infection

**Pharmacological Treatment**

**A:** Benzoic Acid Compound (Whitfield's) ointment applied 12 hourly up to 2 weeks.

**OR**

**C:** Miconazole cream 2%, apply thinly 12 hourly a day. Continue for 5-7 days after clearing of lesions.
If extensive, use
**A:** Griseofulvin (PO) for 4 weeks. Adults: 500 mg 12 hourly; Children: 250 mg 12 hourly

### 13.2.2 Tinea Capitis

Is a superficial fungal infection (dermatophytosis), on the scalp. It is quite common in children.

**Diagnostic Criteria**

- Enlarging raised annular lesions with a central area of clearing
- Fine scales may be present
- Hair loss in areas of infection

**Pharmacological Treatment**

**A:** Benzoic Acid Compound (Whitfield's) ointment applied 12 hourly up to 2 weeks.

**OR**

**C:** Miconazole cream 2%, apply thinly 12 hourly a day. Continue for 5-7 days after clearing of lesions.
If very extensive, use
**A:** Griseofulvin (PO) for 4 weeks. Adults: 500 mg 12 hourly; Children: 250 mg 12 hourly

### 13.2.3 Pityriasis Versicolor

It is a common fungal infection caused by yeast.

**Diagnostic Criteria**

- Hypo/Hyper pigmented confluent patches
- Lesions have fine scales
- Commonly occurs on the chest, back, arms and occasionally neck and face

**Non Pharmacological Treatment**

- Encourage good personal hygiene

**Pharmacological Treatment**

**A:** Whitfield ointment, 12 hourly for 2 weeks

**OR**

**A:** Clotrimazole cream 12 hourly for 2weeks

**OR**

**C:** Miconazole nitrate 2% 12 hourly for 2 weeks

**AND (If very extensive)**

**C:** Itraconazole tablets 200mg once daily for 2 weeks

### 13.2.4 Tinea Pedis (Athlete's Foot)

It is a common fungal infection of the toes and is often the source of infection at other sites.

**Diagnostic Criteria**

- The acute form presents with erythema and maceration between the toes, sometimes accompanied by painful vesicles
- The chronic form is characterized by scaling, peeling, and erythema between the toes and can spread to other areas of the foot

**Prevention and Non-Pharmacological Treatment**

- Frequent change of socks/footwear,
- Use of cotton socks,
- Keep as dry as possible the spaces between toes after bathing always. Sseparating the opposing skin surfaces (e.g. with a piece of gauze) will help speeding healing

**Pharmacological Treatment**

**A:** Clotrimazole cream 1% apply 12 hourly for 2 weeks

**OR**

**C:** Miconazole cream 2%apply 12 hourly for 2 weeks

**OR**

**C:** Terbinafine cream apply once daily for 7days

**AND**

**A:** Gentian Violet once daily for 5 days for bacterial super infection

**Alternatively,**

**D:** Terbinafine (PO) 250 mg/day for 2 weeks

**OR**

**C:** Itraconazole (PO) 400 mg/day for 1–2 weeks

### 13.2.5 Candidiasis

It is a fungal infection mainly caused by yeast, *Candida albicans*. Candidiasis is usually precipitated by prolonged use of contraceptive pills, AIDS, pregnancy, diabetes, prolonged use of antibiotics, corticosteroid use, and being on immunosuppressive treatment

**Diagnostic Criteria (depending on the site of infection**)

- Erythematous, moist exudate in the skin folds and accompanying satellite pustules
- Nail affection leads to painful swelling of the nail bed and folds, with pus discharge and is made worse by contact with water
- Oral lesions are characterized by white, adherent mucosal plaques in buccal cavity including the tongue
- Vaginal candidiasis is characterized by itchy, curd-like whitish vaginal discharge, dysuria and dyspareunia
- Gastrointestinal candidiasis may be associated with painful swallowing (odynophagia). Characteristic lesions are seen on endoscopy.

**Pharmacological Treatment**

***Cutaneous candidiasis***

**A:** Clotrimazole cream 1% apply 12 hourly for 2 weeks

**OR**

**C:** Miconazole cream 2% apply 12 hourly for 2 weeks

**OR**

***Oral candidiasis***

**A:** Nystatin oral suspension- gurgle and swallow 4 times a day

- Newborns: 200,000–400,000 Units/day
- <2 years old 400,000–1,000,000 Units/day
  >2 years old 1,000,000–2,000,000 Units/day

**OR**

**C:** Miconazole 2 % oral gel apply every 8 hourls for 7 days

***Vaginal candidiasis***

**A:** Nystatin vaginal pessaries; insert one at night for 14 days

**OR**

**A:** Clotrimazole vaginal pessaries; insert one at night for 6 days

**OR**

**C:** Miconazole vaginal pessaries insert one at night for 3 day

**AND (if severe)**

**A:** Fluconazole (PO) 150 mg stat

***Gastrointestinal Tract (GIT) candidiasis***

**A:** Fluconazole (PO) 150 mg once daily for 14 days

**Referral**

If recurrent or unresponsive to treatment, refer to a higher level health care facility with adequate expertise and facilities

## 13.2.6 Onychomycosis

It is defined as infection of the nail plate by fungus. Patients with diabetes or peripheral neuropathy may be at a higher risk.

**Diagnostic Criteria**

- Yellowish discoloration of the nail
- Subungual hyperkeratosis
- Over time lesions become more prominent and spread until the entire nail is affected

**Pharmacological Treatment**

**D:** Terbinafine tabs (PO) 250 mg/day for 6-8 weeks. For toe nails the duration of treatment is generally 12–16 weeks.

**OR**

**C:** Itraconazole (PO) is given as pulsed dosing, 200 mg 12 hourly for 1 week of each month for 6 months

**OR**

**A:** Fluconazole (PO) 150-300mg once weekly for 6–12 months

**NOTE**: Treat for 2 months when treating fingernail infection, and 4 months for toenails infection

### 13.2.7 Mycetoma (Madura Foot)

Is a chronic infection of skin and subcutaneous tissue. It can be caused infection by fungi or bacteria. Once tests have established the etiology, the term Actinomycetoma is used for bacterial form, while Eumycetoma is used for the fungal form. Clinical presentation depends on the affected site and the disease can last for months to years.

**Diagnostic Criteria**

- First lesion: nodule
- Localisation: feet, legs, arms, buttocks, scalp, trunk
- Discharging sinuses where grains may be visible usually white yellow for Actinomycetoma or black for Eumycetoma
- Pain before rupture of discharging sinus

**Treatment of Actinomycetoma (bacteria form)**

**Pharmacological Treatment**

**A:** Co-trimoxazole (PO) 480mg–960mg 12 hourly for 5 weeks

**AND**

**A:** Streptomycin or Amikacin for 5 weeks

**OR**

**A:** Co-trimoxazole (PO) 480 mg–960 mg 12 hourly for 5 weeks

**AND**

**A:** Dapsone (PO). Adults: 100 mg once a day for 2–4 months; Children: 25–50 mg once a day for 5 weeks

**NOTE**: Regular blood tests must be done when co-trimoxazole is used for more than 14 days

**Treatment of Eumycetoma (Fungi fom)**

**Non-Pharmacological Treatment**

- Surgery where indicated
- Footwear and protective clothing in at-risk populations e.g. those in contact with contaminated cattle dung

**Pharmacological Treatment**

C: Itraconazole tabs 200mg (PO) twice daily for 5 weeks or longer (up to a year). Normally follows surgical removal

**Referral**

- In complicated cases refer to a higher level facility for eventual specialist care
- Radical surgery, involves wide margin excisions, and sometimes amputation

## 13.3 PARASITIC INFESTATIONS

### 13.3.1 Scabies

Scabies is an intensely pruritic and highly contagious infestation of the skin caused by mite *Sarcoptes scabies*.

**Diagnostic Criteria**

- Itchy vesicles and papules
- Short elevated serpiginous (S shaped track in the superficial epidermis (burrow)
- "Norwegian" scabies presents with extensive crusting (psoriasis form-like lesions) of the skin with thick, hyperkeratotic scales overlying the elbows, knees, palms, and soles

**Non-Pharmacological Treatment**

- Treat all members of the household at the same time to prevent reinfection, regardless of presence or absence of itching
- Advise patients to bath and dress in clean clothing, and changing bed linen at the same time of treatment

**Pharmacological Treatment**

**A:** Benzyl Benzoate Emulsion, BBE (25%, 12.5% and 6.25%)

- Adults and children over 2 years: Apply with fingers, from neck down to cover the whole body surface, while paying particular attention to all skin folds. Leave emulsion in place for 24 hours. Repeat the application after 3 days.
- Children aged 2 months to 2 years: Use same treatment as above, but leave the emulsion for 6–8 hours.
- Babies under 2 months:

**A:** Sulphur ointment 5%: Apply daily for 3 days

**OR**

**C:** Lindane lotion (1%) to be applied as BBE above

## 13.4 VIRAL INFECTIONS

### 13.4.1 Herpes Simplex

It is an acute viral infection caused by Herpes simplex virus hominis (types HSV1, HSV2 acquired by close contact with an infected individual

**Diagnostic Criteria**

- Preceding tingling sensation, discomfort and itching,
- Grouped vesicles forming on the skin, and mucous membranes, particularly the buccal area, gentalia, conjunctivae, and cornea,

**Non-Pharmacological Treatment**

Avoid scratching which often leads to secondary infection

**Pharmacological Treatment**

**B:** Acyclovir cream applied 4 hourly for 7–10 days

**OR** (especially if severe or recurrent)

**B:** Acyclovir (PO) 400mg 8 hourly for 7–10 days

***Note**: Benefit of systemic acyclovir is optimum when given within the first 48 hours of onset of sympoms*

## 13.4.2 Chickenpox

It is a highly infectious disease caused by *Varicella zoster* virus (VZV)

**Diagnostic Criteria**

- Red macular rash with a central vesicle (blister) on the trunk, oral mucosa and scalp
- Pustules and crusting
- Intense pruritus
- Occasional regional lymphadenopathy

**Pharmacological Treatment**

**B:** Acyclovir 800mg 5 times a day for 7 days

**AND**

**A:** Paracetamol 1g 8 hourly for 4–5 days

**AND**

**A:** Calamine lotion with 1% phenol, apply over the whole body for 24 hours for 4–5 days.

## 13.4.3 Herpes Zoster (Shingles)

It is due to resurgence or reactivation of the *Varicella zoster* virus infection which also causes chickenpox.

**Diagnostic Criteria**

- Severe burning pain
- Grouped vesicles overlying erythematous skin following a dermatomal distribution; typically lesions do not cross the midline

**Pharmacological Treatment**

**B:** Acyclovir (PO) 800 mg 5 times a day for 7–10 days

**Wound care**

**A:** Potassium Permanganate soaks (1:4000) 12hrly for 3–4 days

For Secondary infection (bacterial) apply

**B:** Gentamicin 1% ointment

**OR**

**C:** Mupirocin 2% cream 12 hourly

### 13.4.4 Post-herpetic Neuralgia
A complication of shingles (herpes zoster) whereby nerve fibers and the skin is affected

**Diagnostic Criteria**
Intense pain described as burning, stabbing, or gnawing.

**Pharmacological Treatment**

**A:** Amitriptyline (PO) 25 mg at night, may be increased to 150 mg at night

**OR**

**D:** Gabapentin 300–900 mg once or divided doses a day for two weeks

**Referral**

- Refer if there is no improvement of severe neuralgia.
- Refer immediately in case of herpes zoster ophthalmicus for atropinization

## 13.5 Eczema (Dermatitis) Conditions

### 13.5.1 Contact Dermatitis
Is a delayed hypersensitivity reaction following skin coming into contact with a particular chemical. This may be a dye, perfume, rubber, nickel, drugs, skin preparations containing lanolin, iodine, antihistamines, neomycin etc..

**Diagnostic Criteria**

- Red papulo-vesicular rash with ill-defined margins
- Itching, which may be severe
- Dry, cracked, scaly skin, if chronic
- Blisters, draining fluid (weeping) and crusting, with severe dermatitis
- Swelling, burning or tenderness

**Non-Pharmacological Treatment**
Avoid contact with allergen

**Pharmacological Treatment**

**C:** Betamethasone valerate 0.025% cream/ointment 12 hourly for two weeks

**Note:** Super potent and potent topical corticosteroids are first-line pharmacologic therapy. A single application with occlusion at night is often more effective than multiple daytime applications

### 13.5.2 Atopic Eczema
It is a dermatitis/Eczema on a background of atopy. Hence there is often a personal or family history of atopic disease (asthma, hay fever or atopic dermatitis).

**Diagnostic Criteria**
The clinical form may differ according to age:

***Infantile eczema ("milk crust")***

- Usually appears at 3 months of age with oozing and crusting affecting the cheeks, forehead and scalp.

***IMPORTANT**: If generalized exfoliative dermatitis develops. Refer to a higher level facility for possible specialist care*

***Flexural eczema***:

- Starts at 3–4 years,
- Affecting the flexural surfaces of elbows, knees and nape of the neck
- Thickening and lichenification
- Intense itching, particularly at night

**Note**: Eczema may evolve through acute (weepy), subacute (crusted lesions), and chronic (lichenified, scaly) forms.

**Non-Pharmacological Treatment**

- Education and explanation
- Remove any obvious precipitant e.g. skin irritants or allergens (avoid irritants e.g. medicated soap, wool and extremes of temperature).

- Avoidance of irritants/allergens
- Generous use of emulsifiers (skin moisturizers)
- Bath oils/soap substitutes

**Pharmacological Treatment**

**A:** Promethazine (PO) 25mg at bedtime increased to 50mg if necessary

**OR**

**A:** Cetirizine 10mg (PO) once daily

**OR**

**C:** Loratadine 10mg (PO) once daily

**AND**

**B:** Hydrocortisone 1% ointment 12 hourly (if mild disease, or on delicate skin surfaces)

**OR**

**C:** Betamethasone valerate 0.025% cream/ointment 12 hourly for two weeks

**For severe cases**

- Adjunct therapies
- Sedating antihistamines,
- Occlusive bandaging and
- Oral antibiotics
- Short course of systemic steroid (eg Prednisolone) therapy

***Note**: Never use topical antihistamines*

**IMPORTANT**

- Treat any infection (usually bacterial, but occasionally viral).
- Choice of skin preparations depends on whether lesions are wet (exudative) or dry/lichenified (thickened skin with increased skin markings).
    - If eczema is "weepy", use saline baths or bathe in: Potassium permanganate 1:4000 (0.025%) solution once daily for 2-4 days until dry. Where large areas are involved give a course of antibiotics for 5-10 days (as for impetigo)
    - After the lesions have dried, apply an aqueous cream for a soothing effect. A topical corticosteroid cream may be useful in the acute phase. Use the mildest topical steroid application possible.
- Start with mild topical steroid cream for wet lesions, and use ointment for dry skin lesions. Apply thinly, initially, two times a day.
- If the skin starts scaling (condition becomes chronic), add/apply an emollient such as: emulsifying ointment or liquid paraffin.

**CAUTION**: For lesions on the face use only 1% hydrocortisone cream, unless otherwise prescribed by a Specialist

**Note:** Potent topical corticosteroids may cause harmful cutaneous and systemic side effects especially if the use is prolonged or involves extensive body surface. Striae, acne, hyperpigmentation and hypopigmentation, hirsutism and atrophy may result. Therefore, avoid long term use; don't use on weepy or infected skin. Advise patients NOT to use them as cosmetics (eg for skin lightening purposes)

**Example of Classes of Topical steroids;**
Very Potent (0.05% clobetasol proprionate), Potent (0.1% betamethasone valerate), Diluted Potent (0.025% betamethasone valerate), Moderately Potent (0.05% clobetasol buterate), Mild (1% hydrocortisone)

## 13.6 ANAPHYLAXIS

It is an acute and often life-threatening immunologic reaction, frequently heralded by scalp pruritus, diffuse erythema, urticaria, or angioedema. Bronchospasm, laryngealedema, hyperperistalsis, hypotension, and cardiac arrhythmia may occur. Antiobitics (especially penicillins), other drugs, and radiographic contrast agents are the most common causes of serious anaphylactic reactions. Hymenoptera stings are the next most frequent cause, followed by ingestion of crustaceans and other food allergens.

**Prevention and Non-Pharmacological Treatment**
If acute (existing for less than 3 months), exclude drug reactions (e.g. penicillin), or infection

**Pharmacological Treatment**

**A:** Chlorpheniramine (PO) 4–16 mg once at night for 7–10 days

**OR**

**A:** Promethazine (PO): Adults, 25–50 mg at night for 7–10 days

**OR**

**A:** Cetrizine (PO) 10mg once daily for 7–10 days

**OR**

**C:** Loratadine (PO) 10mg once daily for 7–10 days

**Note:** Warn about drowsiness. If no improvement after 1 month or the problem becomes chronic, refer to higher level facility for possible specialist care with combination therapy (H1, H2 inhibitors).

## 13.7 PAPULOSQUAMOUS DISORDER

### 13.7.1. Psoriasis

It is an inherited inflammatory condition of the skin

**Diagnostic Criteria**

- Thick, silvery white scaly plaques affecting mainly scalp, sacral region and extensor body surfaces
- Usually symmetrically distributed, with a chronic relapsing course.

**Note:** Exclude precipitating factors e.g. alcohol, deficiencies of B12 or folate, stress, infections

**Non-Pharmacological Treatment**

Sun exposure to the lesions for half an hour or one hour daily may be of benefit

**Pharmacological Treatment**

**C**: Crude Coal tar 5% in Vaseline in the morning

**AND**

**C:** Salicylic acid 5% in Vaseline to de-scale ,apply at night

**AND**

**C:** Betamethasone ointment 0.025% in the evening.

**Alternatively:**

**B:** Dithranol 0.1% once a day

***Note:*** Systemic steroids are discouraged in this condition due to their rebound effect. If not responding well, refer to higher level facility for possible specialist care including use of systemic treatments (with methotrexate, cyclosporine, azathioprine etc).

### 13.7.2.Lichen Planus

It is an extremely pruritic chronic inflammatory skin condition.

**Diagnostic Criteria**

- Primary lesions are violaceous, shiny flat-topped papules
- Coalesce and evolve into scaly plaques
- Distributed over inner wrists, arms and thighs as well as sacral area.
- Post inflammatory hyperpigmentation is common.
- Scarring alopecia may result from lichen planopilaris (severe)

**Pharmacological Treatment**

**A**: Chlorpheniramine (PO) 4mg 6 hourly for 2 weeks

**AND**

**C**: Betamethasone valerate ointment 0.1% 12hrly for 2–4 weeks

**OR**

**D**: Clobetasol propionate ointment 0.05%–0.1% twice daily for 2–4 weeks.

**Note:** In severe case refer to specialist for systemic corticosteroid and topical application under occlusion

## 13.7.3 Acne

Acne is a multifactorial disease primarily of teenagers with follicular plugging and inflammation. It presents with polymorphic lesions including, papules, and lesions involving the face, chest, shoulders and back.

**Diagnostic Criteria**

- Open and closed comedones
- Pustules
- Nodular and cystic lesions involving the face, chest, shoulder and the back

**Non-Pharmacological Treatment**

- Avoid underlying precipitating factor e.g. stress, nuts, chocolate, overuse of ointments on skin, steroids, anticonvulsant drugs etc.
- Encourage a healthy lifestyle – exercise, sunshine exposure, etc.
- Use ordinary soap (harsh antibacterial cleansers or iodine-containing preparations may aggravate the acne)

**Pharmacological Treatment**

**Mild to moderate acne without scarring**

Apply

**A**: Benzoyl peroxide 2.5%–5% once nocte

**OR**

**A**: Retinoid 0.05% once nocte

***Moderate acne with scarring-***

**A**: Doxycycline 100mg daily for 1–3 month

**OR**

**A**: Erythromycin 250mg 6 hourly for 1–3 month

**AND**

**B**: Benzoyl peroxide or topical retinoid as above.

***Nodulocystic and/or conglobate acne***

**D:** Isotretinoin (PO) 0.025–0.5mg/kg for at least 3–6 months

***Acne fulminans***

**D:** Isotretinoin (PO) 0.025–0.5mg/kg for at least 4–6 months

**B:** Prednisolone (PO) 45mg start then 5mg reduction daily up to 0.

## 13.8 Drug Reactions

Drug reactions can be classified in many ways. One useful approach is to separate predictable reactions occurring in normal patients from unpredictable reactions occurring in susceptible patients.

**Predictable adverse reactions;**

- Over dosage (wrong dosage or defect in drug metabolism)
- Side effects (sleepiness from antihistamines)
- Indirect effects (antibiotics changing normal flora)
- Drug interactions (altered metabolism of drugs; most commonly involving the cytochrome P-450 enzymes)

**Unpredictable adverse reactions**

- Allergic reaction (drug allergy or hypersensitivity; immunologic reaction to drug; requires previous exposure or cross-reaction)
- Pseudo allergic reaction (non-immunologic activation of mast cells).
- Idiosyncratic reaction (unexplained reaction, not related to mechanism of action, without known or suspected immunologic mechanism).

Note: 80% of allergic and pseudo allergic drug reactions are caused by Beta-lactam antibiotics, aspirin, NSAIDs, and sulfonamides

### 13.8.1 Fixed Drug Eruption (FDE)

It is a cutaneous drug reaction that recurs at exactly the same site with repeated exposure to the agent.

**Diagnostic Criteria**

- Typically red-brown patch or plaque
- Occasionally may be bullous
- Most common sites are genitalia, palms, and soles, as well as mucosa
- Lesions are typically 5–10cm in diameter but can be larger
- Often multiple. Starts with edematous papule or plaque later becomes darker
- Resolves with post-inflammatory hyperpigmentation

*Note: When confronted with hyper pigmented macule on genitalia, always think of Fixed Drug Eruption*

**Non-Pharmacological Treatment**

- Avoidance of triggering agent;
- Use of topical corticosteroids may speed resolution

**Pharmacological Treatment**

- Systemic corticosteroid, eg Prednisolone or Hydrocortisone
- Topical corticosteroid (as in eczemas)
- Oral antihistamines

### 13.8.3 Stevens Johnson Syndrome (SJS)

It is a rare but serious problem most often caused by reaction to medicines. It causes the skin to blister and peel off.

**Diagnostic Criteria**

- Abrupt development of erythema multiform
- Patients almost invariably have a prodromal with fever, malaise, and arthralgia's
- Erosions, hemorrhage and crusts on lips, and erosions in mouth covered by necrotic white pseudo membrane
- Involvement of the eyes in 70–90% of cases: Erosive conjunctivitis, can lead to scarring
- Involvement of genitalia in 60–70% of cases, with painful erosions

**Pharmacological Treatment**

- Admission,
- Close monitoring (fluids, Nutrition and electrolytes)
- Topical disinfection
- Prompt treatment of secondary infection.

**Note:** Systemic corticosteroids, if employed should be early, later in the course they increase the risk of infection and slow healing

### 13.8.4 Toxic Epidermal Necrolysis (TEN)

It is a severe life-threatening disorder with generalized loss of epidermis and mucosa. HIV disease increases the risk of developing TEN.

**Diagnostic Criteria**

- Prodrome of fever, stinging of eyes, and discomfort in swallowing.
- Sudden appearance of diffuse macules or diffuse erythema,
- Early sites of cutaneous involvement are the presternal region of the trunk and the face, but also the palms and soles.
- Involvement of the buccal, genital and/or ocular mucosae (with erythema and erosions) occurs in more than 90% of patients, and in some cases the respiratory and gastrointestinal tracts are also affected.
- Then prompt progression with widespread erythema and peeling of skin; skin lies in sheets and folds on the bedding.

**Non-Pharmacological Treatment**

- A critical element of supportive care is the management of fluid and electrolyte requirements
- Wounds should be treated conservatively, without skin debridement

**Pharmacological Treatment**

Patient has to be admitted for close care

**B**: Prednisolone (PO) 1–2mg/kg daily for 5–7 days.

**A**: Intravenous fluid should be given to maintain urine output of 50–80 mL per hour with 0.5% Sodium Chloride supplemented with 20 mEq of KCl.

**Note:** Ophthalmologic monitoring is essential, as risk of scarring and blindness is significant. Topical sulfa containing medications should be avoided and systemic corticosteroids, if employed, should be used early to attempt to abort the immunologic reaction (first 24 hours). Later in the course, they probably increase risk of infection and slow healing.

## 13.9 OTHER SKIN DISEASES CONDITIONS

### 13.9.1 Pellagra

Is a disease caused by deficiency of a variety of specific factors, nicotinic acid being the most important. Cardinal signs: diarrhea, dermatitis (sites exposed to sun and pressure) and dementia.

**Diagnostic Criteria**

- Casal's necklace; hyper-pigmented scaling involving the neck region
- Hyper-pigmented scaly lesions on sun exposed areas

**Pharmacological Treatment**

Treat both adults and children

**C**: Nicotinamide (PO) 500mg once daily for four weeks or until healing is complete; In children give 5mg/kg per day for four weeks or until healing is complete.

**Note:** The diet should be rich in deficient nutrients as well as protein (meat, groundnuts, and beans)

### 13.9.2 Vitiligo

Is a condition presenting with patchy depigmentation of skin.

**Diagnostic Criteria**

- Depigmented patches commonly on the face, neck, trunk and extremities
- Mucosal surfaces particularly oral and genital areas can also be depigmented

**Pharmacological Treatment**

- There is no cure for vitiligo, but there are a number of treatments that can improve the condition.
- Treatment options generally fall into the following groups:
  - Sun blocks:

**C:** Sun Protective Factor (SPF) 30+ applied at 8 am and 2 pm

  - Skin camouflage
  - Topical steroids

**B**: Betametasone valerate ointment 0.1% 12 hourly for 2–4 months

**Note**: Counsel the patient about the condition

### 13.9.3 Pruritic Papular Eruption (PPE)

A skin condition characterized by itchy papular eruptions on the extensor area of the upper and lower limbs which is associated with HIV infection.

**Diagnostic Criteria**

- Papular lesions on the extensor areas
- Extremely itchy
- Excoriation
- Lesions heal with hyperpigmented scars

**Pharmacological Treatment**

**C:** Betamethasone valerate cream 0.025% 12 hourly for 3–4 weeks

**OR**

**D:** Dapsone 100 mg once a day for one month

### 13.9.4 Oculo-cutaneous Albinism

A congenital disorder characterized by the complete or partial absence of pigment (melanin) in the skin, hair and eyes.

**Diagnostic Criteria**

- Strabismus (crossed eyes)
- Photophobia (sensitivity to light)
- Nystagmus (involuntary rapid eye movements)
- Impaired vision or blindness.
- Astigmatism

**Non-Pharmacological Treatment**

- Genetic counseling is very important to prevent further occurrences of the condition.
- Protective clothing (long sleeved shirt, blouse, skirt and trousers and wide brimmed hats to prevent skin cancers)
- Sun protective glasses with special ultraviolet B (UVB) filters
- Advice on indoor income generating activities

**Pharmacological Treatment**

**C:** Sunscreen applications of SPF 30+ or above, applied twice a day at 8 am and noon

**Referral:** Refer the patient if suspected to have malignant lesions

# CHAPTER FOURTEEN
# EYE DISEASES AND CONDITIONS

## 14.1 MAJOR BLINDING DISEASES

Blindness according to WHO is defined as a visual acuity of less than 3/60 with the best correction available or central visual field of less than 10º in the better eye. In a simpler way, it is when someone fails to count fingers at a distance of 3 meters in the eye that is considered good with the best available corrective/distance spectacles. The definition is the same to children and infants though there are different methods for testing vision in young children until when they are at preschool age when normal visual acuity chart can be used. The common causes of blindness are Cataract, Glaucoma, Trachoma, Vitamin A deficiency (*discussed under nutrition chapter*), and Diseases of the Retina, uncorrected Refractive Errors and Low Vision.

### 14.1.1 Cataract

**Diagnostic Criteria**

- Cloudiness in the lens seen as a white mark behind the pupil and iris
- Conjunctiva and cornea are clear and the whole iris can be seen clearly

**NOTE:**

- Cataract may present in all age groups,blindness due to cataract is reversible
- Treatment is only by surgery
- Early treatment in children is mandatory

**Referral**

Refer all cases to eye surgeon for cataract surgery, available at some of the Districts, Regional, Zonal and National Hospitals. Children should be referred immediately to a Paediatric Eye Tertiary Centre, White pupil in children may be a tumor in the eye and late referral may lead to permanent loss of vision, squint, loss of eye or loss of life.

### 14.1.2 Glaucoma

Glaucoma is a syndrome characterized by optic nerve damage and peripheral visual field loss which may be associated with raised intraocular pressure. The main classes of glaucoma are open angle glaucoma and angle closure glaucoma.

**Note:** Glaucoma may be congenital, primary or secondary to other ocular conditions

#### 14.1.2.1 Primary Open Angle Glaucoma

**Diagnostic Criteria**

- Painless loss of peripheral vision leading to absolute glaucoma as the end stage
- Affects mainly adults of 40 years of age and above
- Cornea and conjunctiva are clear
- Pupil in the affected eye does not react with direct light in advanced stage
- The optic nerve is always damaged, this can be seen through fundoscopy
- One eye may be affected more than the other
- First degree relatives of glaucoma patients are at increased risk

**Note**

- Primary Open Angle Glaucoma does not have symptoms in early stages, hence routine intraocular pressure check up and fundus examinations should be done in all people of 40 years and above by a qualified eye care personnel
- All suspected cases of glaucoma should be referred to qualified eye care personnel for confirmation of diagnosis and treatment plan
- Surgical treatment is usually preceded by medical treatment

**Pharmacological Treatment**

This is initiated after a diagnosis is reached by an ophthalmologist, refill of some medicines can be done by Assistant Medical Officers in ophthalmology but with regular reviews at a health facility with eye specialist. Medical treatment should be life long unless there are conditions necessitating other interventions

**C:** Timolol 0.25% or 0.5%, one drop in the affected eye, instill 12 hourly.

**OR**

**D:** Betaxolol 0.25% or 0.5%, one drop in the affected eye, instill 12 hourly. Use lower strength in mild disease and those at risk of complications.

*In patients who comply to treatment and there is no good response*

**ADD**

**D:** Latanoprost 0.005% one drop, 24 hourly in the affected eye.

**OR**

**D:** Prostamide bimatoprost 0.03%, one drop, 24 hourly in the affected eye.

- *These may be used as first-line in patients with contraindication of beta-blockers.*
- *They can be used as a second-line drug in patients on beta-blockers if the target IOP reduction has not been reached.*

In patients who are intolerant to prostaglandin analogue or are not responding give:

**D:** Brimonidine 0.15–0.2%, one drop, 12 hourly, in the affected eye.

*Failure to respond give:*

**C:** Pilocarpine hydrochloride 2% or 4%, instill one drop in the affected eye 6 hourly.

**Note:** Pilocarpine causes long-standing pupil constriction so it should not be used unless a patient is prepared for glaucoma surgery or as an alternative topical treatment for patients who are contraindicated for Timolol use. Consult a specialist before using it.

*In severe cases or while waiting for surgery, use:*

**C:** Acetazolamide tablets (PO) 250 mg 6 hourly

**Note:** β-blockers are contraindicated to people who are known to have overt asthma as this group of medication may cause an acute asthmatic attack within a short time following instillation into the eye

**Laser Treatment**

- It may be indicated in addition to or instead of eye drops or surgery.
- Laser trabeculoplasty (Argon Laser Trabeculoplasty, Selective Laser Trabeculoplasty) or cyclophotocoagulation are different options among others

**Surgical Treatment**

It is done in all patients with poor compliance and when medical treatment is not useful.

**14.1.2.2 Angle Closure Glaucoma**

This is also known as Congestive glaucoma and commonly affect people aged 40 years and above.

**Diagnostic Criteria**

- Patients presents with acute sudden onset of painful red eye in the affected eye
- Severe headache and cloudiness of the cornea
- Shallow anterior chamber
- Fixed and semi-dilated pupil
- Severe elevated intraocular pressure.
- There is usually dramatic visual impairment and vomiting may be present
- It may be asymptomatic if IOP raises slowly

**Note:**

- Primary Angle Closure Glaucoma is an Ophthalmological Emergency
- Refer all patients with Congestive glaucoma to eye specialist after initial medical treatment

**Pharmacological Treatment**

Institute therapy and then refer the patient to eye specialist at the Regional, Zonal or National Hospital for investigations and proper management.
Try to achieve immediate IOP reduction

**First-Line Treatment**

**C:** Acetazolamide tablets, 500mg PO immediately as a single dose followed by 250 mg 6 hourly

**AND**

**C:** Timolol 0.25–0.5% eye drops, instill one drop 12 hourly in the affected eye

Use the above combined treatment until you have achieved your target IOP reduction, then continue with only Timolol eye drops for life unless patient has received surgical intervention and the IOP is reduced to normal level.

**Note:** Manage the associated pain and vomiting

**Second-Line Treatment**

If the above measures fail, use as a short term treatment, give systemic osmotic agents*:*

**C:** Intravenous 15–20% Mannitol 1.5–2mg/kg body weight to run slowly over 30–60 minutes

**OR**

**C:** Glycerol syrup (PO) 1–2 g/kg body weight, 50% solution as a single dose immediately.

These medicines have diuretic effects so they are only used as a single dose. They are also used in emergencies to prepare patients with high intraocular pressure for surgery as they lower intraocular pressure rapidly.

**Note:**

- Acetazolamide is a sulphur containing medicine, do not use in patients allergic to sulphur.
- Glycerol is a concentrated sugar solution, it should not be given in diabetic patients.

**Referral**

Management of advanced angle closure glaucoma is done by eye specialist. Hence, all patients with Angle Closure Glaucoma should be referred to eye specialist.

**14.1.2.3 Childhood Glaucoma**

- Presents from birth to 5 years.
- It is a syndrome where by the intraocular pressure is raised and cause abnormality of the eyeball and visual disturbances even blindness.

**Diagnostic Criteria**

- Patients presents with eyes bigger than normal for age (buphthalmos)
- Photophobia
- Tearing
- Cloudy cornea,
- Red conjunctiva though not severe.

**Surgical Treatment**

Treatment for congenital glaucoma is usually surgery, which is done by Pediatric Ophthalmologist or Glaucoma specialist.

**Referral**

Refer any child who has the above mentioned signs and you suspect that he/she is having congenital glaucoma to a specialist at a Paediatric Eye Tertiary Centre (National Hospital and Zonal Referral Hospitals).

**14.1.2.4 Secondary Glaucoma**

This presents as a complication of other eye diseases such as uveitis, hypermature cataract, trauma and retinal diseases. It may also be due to prolonged use of steroids.

**Diagnostic Criteria**

- Poor vision in the affected eye associated with
- High intraocular pressure
- Optic nerve damage
- New vessels on the iris if the cause is retinal diseases

**Pharmacological Treatment**

Management of these patients depends on the cause but it includes medical, surgical and laser. Institute these treatment as you refer these patients :-

**C:** Acetazolamide tablets, 500mg PO immediately as a single dose followed by 250 mg 6 hourly

**AND**

**C:** Timolol 0.25–0.5% eye drops, instill one drop 12 hourly in the affected eye.

Treatment of the preexisting eye disease is highly recommended.

**Referral**

Refer all patients suspected to have secondary glaucoma to a qualified eye specialist available at the Regional, Zonal or National Hospital.

## 14.1.3 Trachoma

It is a chronic conjunctivitis caused by infection with *Chlamydia trachomatis* (bacteria). It is one of the commonest causes of blindness worldwide. There is a chronic inflammation of the conjunctiva leading to scarring of the upper eyelid tarsal plate, entropion and in turn of eyelashes.

**Diagnostic Criteria**

- Patients presents with photophobia in early stages or re-infection
- Follicles in the upper tarsal plate seen as round and white nodules in active diagnostic.
- In late stages, in-turned eyelashes rub on the cornea leading to corneal ulcers
- Loss of vision due to Corneal scarring.

**Clinical Stages according to World Health Organization**

- Trachomatous Inflammation Follicular (TF) - Presence of at least 5 follicles on the upper tarsal plate
- Trachomatous Inflammation Intense (TI) – There is intense inflammation, the conjunctival blood vessels cannot be seen.
- Trachomatous Scarring (TS) – Presence of white scars in the upper tarsal plate
- Trachomatous Trichiasis (TT) – Presence of some eye lashes rubbing against the cornea
- Corneal Opacity (CO) – Presence of corneal opacity (scar) affecting the central cornea

**Non-Pharmacological Treatment**

- Face washing and total body hygiene to prevent transmission of disease from one person to the other
- Environmental improvement/hygiene

**Pharmacological Treatment**

**A:** Oxytetracycline ointment 3% once a day for 6 weeks

**OR**

**A:** Azithromycin 1g as a single dose for adults- for preventive chemotherapy in mass treatment campaign

**Table 14.1: Dosage of azithromycin in children**

| Weight (kg) | I-day regimen |
|---|---|
| < 15 | 20mg/kg once daily |
| 15 – 25 | 400mg (10 ml) once daily |
| 26 – 35 | 600 mg (15 ml) once daily |
| 36-45 | 800 mg (20 ml) once daily |
| > 45 | Dose as per adults |

**Note:** Preventive chemotherapy in mass treatment campaign is conducted only once a year

**Surgery**

Surgical correction of entropion in TT patients. This procedure can be done at a Dispensary or Health Centre and community level by a trained health worker.

## 14.1.4 Diseases of the Retina

Main diseases of the retina that cause blindness are Diabetic Retinopathy, Diabetic Macular Edema, Retinal Detachment and Age related Macular Degeneration.

### 14.1.4.1 Diabetic Retinopathy

- It is a complication of diabetes mellitus in the eyes
- It is a chronic progressive sight-threatening disease of the retinal blood vessels associated with the prolonged hyperglycaemia and other conditions linked to diabetic mellitus such as hypertension

**Diagnostic Criteria**

Diabetic retinopathy is mainly grouped into three stages/presentations:

- Background diabetic retinopathy
- Diabetic maculopathy
- Proliferative diabetic retinopathy

**Investigations**

- Perform fundoscopy in a well-dilated pupil (Direct or indirect ophthalmoscopy with or without biomicroscopy),
- Fundus photography,

- Optical Coherence Tomography and or Fluorescein Angiography done in specialized eye clinics

**Note**: Dilate the pupils with combined **C:** Tropicamide 1%/Phenylephrine 2.5% eye drops
**OR**
**C**: Tropicamide 1% with **C:** Cyclopentolate 1% eye drops to screen

**Pharmacological Treatment**
For glycaemic control give antioxidant in non-proliferative diabetic retinopathy
**C:** Multivitamin +carotenoids tablets once daily to a maximum of 3 months

For intravitreal anti Vascular Endothelial Growth Factor (VEGF) in Proliferative Disease
**S:** Bevacizumab 1.25 mg per 0.05ml stat
**OR**
**S:** Ranibizumab 0.5 mg per 0.05ml stat.

Repeat after every month to a maximum of 6 months. Re-assess on 3 monthly basis if there are signs of disease progression, restart treatment if any, with close follow up.

Note: These injections are only given by specialist eye surgeons.

**AND**
**S:** Injection Triamcenolone acetonide 0.05 ml intravitreal stat. Repeat after 3 months if it is necessary. This is indicated in Diabetic Macula Edema.

**Surgical Treatment**
- This is done in the proliferative stage
- It involves removal of vitreous and or blood, peeling of formed fibrovascular tissue and reattachment of retina if the retina is detached
- It is combined with retinal photocoagulation
- The vitreous cavity may be filled with temponade liquid such as silicon oil or expansile gas like sulfur perfluoropropane or hexafluoride depending on the level of complication
- It may also be combined with pharmacological treatment (Anti VEGF) mentioned above

**Laser Treatment**
Laser photocoagulation: Extent and type of this treatment depending on the stage of the disease

**Note:**
- Ophthalmologists should work together with Physicians to holistically treat the diabetic patient.
- Poorly controlled diabetes and diabetic retinopathy can lead to blindness
- All patients with diabetes mellitus regardless of their eye conditions, should have a thorough eye examination by available eye care personnel or an eye specialist at least once a year.
- Dilated eye examination and direct viewing of the retina by an

ophthalmologist or qualified eye care personnel is mandatory.
- Urgent referral of all diabetic patients with sudden loss of vision to eye specialist

#### 14.1.4.2 Age Related Macular Degeneration

It is a disease condition characterized by progressive macular changes that are associated with increase in age.

**Diagnostic Criteria**

- Drusens around macula area (yellowish excrescence in the retina)
- Affects elderly over 60 years
- Poor central vision, later can lead to blindness

**Investigations**

- Fundoscopy through a well-dilated pupil,
- Optical Coherence Tomography and or
- Fluorescein angiography.

**Pharmacological Treatment**

- This depends on clinical presentation.
- Intravitreal injection in the affected eye

**S:** Bevacizumab 1.25 mg per 0.05ml stat

**OR**

**S:** Ranibizumab 0.5 mg per 0.05ml stat.

Give Antioxidant in non-proliretative Diabetic Retinopathy

**C:** Multivitamin + Beta-carotenoids, Zinc Sulphate and Lutein, 1 tablet once daily to a maximum of 3 months

**Surgical Treatment**

Type of surgery depends on the presentation/ stage of the disease

### 14.1.5 Refractive Errors

This is a condition where one presents with poor vision either at near or distance at any age. There are mainly 4 types of refractive errors namely presbyopia, myopia, astigmatism and hyperopia. A patient may have more than one type of refractive error.

#### 14.1.5.1 Presbyopia

This is a disorder of refractive status commonly occurring in older people.

**Diagnostic Criteria**

- It usually starts after the age of 40 years
- The main complaint is difficulty in reading/writing or doing near works
- Diagnosis is only through refraction. Attendance to heath facility is also a good opportunity for screening of glaucoma and diabetic retinopathy

**Non-Pharmacological Treatment**

Convex lens spectacles for near vision

**14.1.5.2 Myopia (Short sightedness)**
This is a condition whereby patient has difficulty seeing far objects.

**Diagnostic Criteria**

- It is common in young age between 5–25 years
- The condition persists throughout life
- If not treated early, it may progress rapidly and lead to retinal complications
- It is diagnosed through refraction.

**Non-Pharmacological Treatment**
Concave lens spectacles for constant wear.

**14.1.5.3 Hypermetropia (Long sightedness)**
This is a condition where patients have difficulty in seeing near objects. It is less manifested in children as they have a high accommodative power.
**Diagnostic Criteria**

- Ocular strain
- Diagnosis in children should be reached after refraction through a pupil that is dilated

**Non-Pharmacological Treatment**
Convex lens spectacles for constant wear

**Note:** Spectacles should be given to :-

- Children who have only significant hypermetropia (more than +3.00 Diopter of Sphere both eyes), all children who present with squint and have significant hypermetropia and children with anisometropia
- Elderly who present with signs of ocular strain

**14.1.5.4 Astigmatism**
This is a condition where the cornea and sometimes the lens have different radius of curvature in all meridians (different focus in different planes). Some myopic and hyperopic patients may have astigmatism.

**Diagnostic Criteria**

- Poor vision at distance,
- Photophobia
- Headache (sometimes).
- Diagnosis is reached through refraction

**Non-Pharmacological Treatment**
Cylindrical lenses spectacles for constant wear.

## 14.1.6 Low Vision

Low vision is irreversible visual loss that cannot be corrected with surgeries or spectacles resulting in reduced ability to perform many daily activities. They have visual impairment even with treatment and or standard refractive correction and

**Diagnostic Criteria**

Inability to

- Recognizing people in the streets,
- Reading black boards,
- Writing at the same speed as peers and
- Playing with friends.

They have a range of visual acuity from less than 6/18 to perception of light and a reduced central visual field.

**Investigations**

- Assessment of these patients is by thorough eye examination to determine the causes of visual loss and
- Low vision assessment

**Non-Pharmacological Treatment**

- Assessment of the patients' visual function
- Accurate refraction and provision of spectacles if indicated
- Low vision devices such as optical devices (magnifiers, telescopes) and or non optical devices (reading stands and or reading slits) as per assessment results.
- Surgical intervention is indicated e.g if a patient has cataract

**Referral**

All children with low vision should be referred to Paediatric Tertiary Eye Centre (Muhimbili National Hospital and Zonal Referral Hospitals)

## 14.2 PAINFUL RED EYES

The eye conditions shown on Table 14.2 presents with an acute onset of red eyes: ocular trauma, corneal ulcer, uveitis and conjunctivitis. The Table also summarizes the diagnostics of red eyes.

**Table 14.2: Summary on diagnosis of Red Eyes**

| Disease Condition | Visual Acuity | Affected Eye | Cornea | Pupil | Pain | Discharge |
|---|---|---|---|---|---|---|
| Allergic/ viral Conjunctivitis | Good | Both | Clear | Normal | No | Watery/mucoid |
| Bacterial Conjunctivitis | Good | Both | Clear | Normal | No | Purulent |
| Ophthalmia neonatorum | Poor +/- | One/both | Cloudy +/- | Normal +/- | Yes | Copious purulent |
| Cornea ulcer | Poor | One/ both | Gray spot | Normal | Yes | Watery/purulent |
| Uveitis | Poor | One/ both | Clear or cloudy | Small & Irregular | Yes | Watery |
| Acute glaucoma | Poor | One | Cloudy | Mid dilated | Yes | Watery |

## 14.2.1 Ocular Trauma

These are eye injuries that may result from blunt or sharp objects or from chemical substances. The management of these injuries is guided by history from the patient and ocular findings by the clinicians. Classes of ocular trauma are as follows:-

### 14.2.1.1 Blunt Trauma/Perforating Eye Injury/Foreign Body

Establish the cause to determine the type of injury and whether there is penetration.

**Diagnostic Criteria**

- Corneal abrasion/laceration with or without an imbedded foreign body.
- Eye lids may also be involved.

**Investigations**

This is done after the first aid measures

- Test the visual acquity
- Examine the injured eye with slit lamp or magnifier including fluorescein staining to reveal foreign body or corneal laceration

**Non-Pharmacological Treatment**

- Provide first aid measures to the patients as per presentation
- If no penetration, irrigate the eye with clean water or Ringers Lactate to reduce chemical substance in the eye
- Remove foreign body if visible with a cotton bud or surgical blade if shallow.

**Pharmacological Treatment**

At the primary care:

**Corneal Abrasion:**

**A:** Chloramphenical eye ointment 1%, 8 hourly to the injured eye until no fluorescein staining

**Steps Guiding Management of Complicated Blunt Trauma**

Complicated blunt trauma is a trauma where the vision is poor, patinets experiences pain and there is hyphaema. It is best managed by eye specialist as surgery may be required in the management.

**Table 14.3: Steps guiding management of complicated blunt trauma**

| Findings | Action to be taken |
|---|---|
| No hyphema, normal vision | Observe |
| Hyphema, no pain | Refer |
| No hyphema, normal vision, pain | Paracetamol, observe for 2 days, refer if pain persist |
| Poor vision and pain | Paracetamol, refer urgently |
| Hyphema, pain, poor vision | Paracetamol, refer urgently |

#### 14.2.1.2 Deep Corneal or Scleral Injuries

- Apply an eye shield or pad with no pressure and refer immediately
- While waiting for referral, use the following in the affected eye:

**A:** Chloramphenical 1% eye drop, 2 drops **OR** ointment, stat

**AND**

**A:** Atropine 1%, 1–2 drops stat

**AND**

**A:** Tetanus toxoid 0.5 ml IM stat as prophylaxis

**AND**

**A:** Paracetamol 1 gm 4–6 hourly to a maximum of 4 doses in 24 hours, for 3 days in adults, the dosage in children is 10–14 mg/kg 4–6 hourly for 3 days.

**Referral indicated if**

- Intraocular foreign body is suspected
- There is globe or intracocular penetration evidenced by:
  - Poor vision,
  - Distorted pupil
  - Ocular contents of foreign body is seen
  - Circumferential subconjunctival haemorrhage
  - Hyphaema with or without raised intraocular pressure
- Conjuctival laceration requiring suturing (>1 cm)
- Laceration/perforation or diffuse damage to the cornea and sclera
- Chemical and thermal injuries
- Damage to ocular adnexa including eyelids
- Limited ocular movements

**Surgery**

This is done by a well trained eye specialist at the District, Regional, Zonal and National hospital. It should be done within 48 hours of injury.

**Note:**

- Eye ointment should be applied very gently and in the lower fornix (behind the lower eyelid).
- Do not apply pressure on the eye in perforating injuries of the eyeball
- Delay in surgical management of the injury may cause irreversible blindness or may necessitate removal of an eye

**Referral**

Immediately refer the patient to a health facility with eye surgeon at the District, Regional, Zonal or National hospital depending on the staff availability**.**

#### 14.2.1.3 Chemical Injuries/Burn

This is an Ophthalmological emergency. It occurs when chemicals such as acid or alkali (e.g household detergents, bleaching agents), snake spit**,** insect bite, traditional eye medicine, cement or lime cause a damage to the eye.

**Diagnostic Criteria**

- Diagnosis relies mostly with patients' history
- Patients may present with photophobia
- Inability to open the eyes
- Excessive tearing/watery eye
- Cloudiness of cornea with blurred vision
- Loss of conjunctival blood vessels
- Traces of chemical substance such as cement or herbs and blisters or loss of eyelid skin in open flame injuries.

**Non-Pharmacological Treatment**

If a patient gives you history of being in contact with the items mentioned above, the following should be done:

- Irrigate the eye with clean water or Ringers lactate continually for a minimum of 20–30 minutes to reduce chemical substances. Irrigate longer for severe alkali burn.
- Test the patients' vision and examine the patient's eye

**Pharmacological Treatment**

**C:** Tetracaine 0.5% eye drops, instill 2 drops in the affected eye. Repeat irrigation if possible. Evert the eye lids and remove the debris

**AND**

**A:** Chloramphenical 1% eye ointment, apply 6 hourly to prevent infection for 3 days.

**AND**

**A:** Paracetamol 1 gm 4–6 hourly to a maximum of 4 doses in 24 hours, for 3 days in adults, the dosage in children is 10–14 mg/kg 4–6 hourly for 3 days

**Referral**

Refer all cases within 12 hours to eye specialist at Regional, Zonal or National Hospital for more care.

## 14.2.2 Herpes Simplex Keratitis

It is an inflammatory condition of the cornea caused by Herpes Simplex Virus.

**Diagnostic Criteria**

- Acute unilateral painful eye
- Blurring of vision
- Reduced corneal sensation
- Dendritic corneal ulcer seen on staining with fluorescein

**Pharmacological Treatment**

**C:** Acyclocir 3%, ophthalmic ointment inserted in the lower conjunctival sac, 4 hourly. Continue for 3 days after ulcer has been healed.

**AND**

**B:** Acyclovir, oral, 400mg 8–4 hourly a day for 7–10 days depending on initial response as well as the extent of the ulcer.

**Note:** Topical cortecosteroids are contraindicated in the treatment of dendritic ulcers

### 14.2.3 Corneal Ulcer

This is a painful red eye condition resulting from a raw discontinuity to the corneal epithelium. It may be caused by infection (bacterial, viral e.g Herpes simplex virus and measles, fungal, trauma (physical or chemical) and nutritional (Vitamin A deficiency).

**Diagnostic Criteria**

- Painful and red eye of acute onset
- Excessive tearing
- Severe photophobia
- Poor vision
- Gray/white spot on the cornea staining with fluorocein
- Hypopyon (Pus or white cells in anterior chamber)

**Investigations**

In specialized eye unit, the following should be done:

- Examination of the eye with Slit Lamp Microscope
- Fluorescein sodium drops or a drop of local anesthetic on a fluorescein strip to assess the pattern of the ulcer and measure the size of corneal defect
- Corneal scrapping for Gram Stain and Potassium Hydroxide staining if bacterial and fungal organisms are suspected

**Pharmacological Treatment**

While waiting for laboratory results, give:

**C:** Ciprofloxacin 0.3%, ophthalmic drops, instil 1–2 drops 1–2 hourly for 3 days then reduce to 3–4 hourly.

**OR**

**D:** Ofloxacin 0.3%, ophthalmic drops, instil 1 drop 1–2 hourly for 3 days then reduce to 3–4 hourly

Give antifungal, if fungal infection is suspected or confirmed

**C:** Natamycin 5%, ophthalmic drops, instil 1 drop 1–2 hourly for 3–4 days (specialist use only). Then reduce to 1 drop 3–4 hourly. Continue for 14–21 days until resolution of infection

**OR**

**D:** Econazole 2%, ophthalmic drops, instil 1 drop 1–2 hourly for 3–4 days (specialist use only).

Then reduce to 1 drop 3–4 hourly. Continue for 14–21 days until resolution of infection

**OR**

**D:** Chlorhexidine 0.2%, ophthalmic drops, instil 1 drop 1–2 hourly for 3–4 days (specialist use only). Then reduce to 1 drop 3–4 hourly. Continue for 14–21 days until resolution of infection

Give antiviral if viral causes is suspected after the examination of the eye

**C:** Acyclovir 3% eye ointment 5 hourly a day until there is no corneal stain, then continue with treatment 8 hourly a day for a maximum of 10–14 days

**Note:** Treatment may be changed depending on corneal scrapping results

**Referral**
Refer to the next level of care where there is an eye specialist when there is hypopyon (white cells in anterior chamber)

## 14.2.4 Uveitis

This is Inflammation of the uveal tissue (Iris, choroid and ciliary body) and its adjacent structures. Majority of the cases are idiopathic where by other cases are due to autoimmune diseases e.g Rheumatoid Arthritis**,** Viral and systemic diseases like Tuberculosis, Leprosy, and Syphilis.

**Diagnostic Criteria**
It has three main clinical presentations namely acute, chronic and acute on chronic. The commonest form is anterior uveitis. In acute type, patients present with:-

- Painful red eye
- Excessive tearing
- Severe photophobia
- Visual acuity is usually reduced and the pupil is small or it may be irregular due to syneachia
- Slit lamp biomicroscopic examination reveals cells and keratic precipitates and hypopyon may be seen in the anterior chamber

**Investigations**
These are indicated in bilateral and granulomatous uveitis as they may not be helpful in unilateral and non granulomatous.
Blood tests:

- FBC
- ESR
- Antinuclear Antibody
- VDRL
- Urinalysis
- HIV Testing

**Imaging:** Chect X-Rays if Tuberculosis and Sarcoidosis are suspected.

**Pharmacological Treatment**
Treatment for uveitis is mainly steroids and specific treatment according to the cause. This should be initiated in a facility where workup and close monitoring can be done.
Give:
Steroidal Anti-inflammatory medicines

**D:** Dexamethasone 1% eye drops, 1–3 hourly in the affected eye for 6 weeks

**OR**

**D:** Prednisolone 0.5% or 1 % eye drops, 1–3 hourly in the affected eye for 6 weeks

**AND**

**B:** Prednisolone tablets 1mg/kg body weight, given in a tapering manner to maximum of 4–6 weeks

**AND**

**D:** Triamcinolone 20 mg subtenon start, it can be repeated after 4 weeks if need arise.

**AND**

**Pupil dilating eye drops**

**B:** Atropine eye drops or ointment 1% 12 hourly in the affected eye

**OR**

**C:** Cyclopentolate 1 % eye drops, 1–2 drops 8 hourly in the affected eye.

- Treatment for uveitis is to be continued for a maximum of 6 weeks

**Note:**

- Treatment of uveitis must involve various specialists
- Acute uveitis is a serious problem and the patient should be referred urgently for specialist treatment
- Recurrences may occur or acute disease may end up becoming a chronic uveitis

## 14.2.5 Conjunctivitis

This is an inflammation of the conjunctivae and one of the most common causes of red eyes. The cause of conjunctivitis may be bacterial, viral or allergy. Clinical features and treatment guideline depends on the type and cause of conjunctivitis.

**Note:**

- If conjunctivitis is due to an infection, counsel on the importance of frequent hand washing, use separate linen, towels and wash towels and avoid direct contact with infected materials or individuals
- Contacts lenses should not be worn in patients with conjunctivitis until the condition has resolved

### 14.2.5.1 Allergic Conjunctivitis

**Diagnostic Criteria**

- Patients present with history of itching of eyes, sand sensation, and sometimes mucoid discharge
- When examined,
  - the eyes may be normal or slightly red,
  - Conjunctival swelling in severe cases,
  - Limbal hyperpigmentation and papillae of the upper tarsal conjunctiva.
  - Normal iris, pupil and visual acuity.
  - Corneal complications in very advanced stages

**Non-Pharmacological Treatment**
Treatment of allergic conjunctivitis depends on the severity of the condition and age of the patient. In mild cases where the eyes are white,

- Avoid allergens
- Cold water compresses for 10 minutes four times a day

**Pharmacological Treatment**
Adults and children > 6 years of age:

**C:** Oxymetazoline 0.025% drops 6 hourly a maximum of 7 days

If no response within 7 days, use mast cell stabilizers such as:

**C:** Sodium chromoglycate 2% eye drops, instill 6 hourly per day (Doctor initiated)

Use may be seasonal (1–3 months) or long term.

Children 2–6 years of age:

**A:** Chlorpheniramine (PO) 0.1 mg/kg/dose 6–8 hourly

If no response within 7 days use

**C:** Sodium chromoglycate 2% eye drops, instill 6 hourly per day (doctor initiated)

- Use may be seasonal (1–3 months) or long term for the prevention of further attack, depending on the patient's exposure to the allergen.

**Persistent allergic Conjunctivitis in adults and children of >2 years of age:**
For long term use:
Children 2–6 years
**A:** Cetirizine (PO) 5 mg once daily

- Use may be seasonal (1–3 months) or long term

Children > 6 years of age and adults:
**A:** Cetirizine (PO) 5 mg once daily

- Use may be seasonal (1–3 months) or long term

> **NOTE:** Do not give antihistamine to children under 2 years of age as its effectiveness at this age group has not been proven.

**Referral**
Refer to eye specialist for further specialized care in case of the following:

- Moderate to severe allergic conjunctivitis
- No response
- Persons wearing contact lenses
- Children <2 years of age

At the specialized centre, the following treatment may be added depending on the patient's presentation:
Short term steroid eye drops (in severe cases with involvement of the cornea, apart from mast cell stabilizers, give

**D:** Dexamethasone 0.1%, 6 hourly for a maximum of 14 days.

**OR**

**D:** Prednisolone 0.5%, 6 hourly for a maximum of 14 days.

In very severe form of allergic conjunctivitis, give steroid injection

**D:** Triamcinolone acetonide 20 mg, subtenon injection, stat

**OR**

**D:** Methylprednisolone sodium acetate 20mg, subtenon injection, stat

**14.2.5.2 Viral Conjunctivitis**

The commonest causative organism is adenovirus. It may be unilateral but usually bilateral

**Diagnostic Criteria**

- It may be associated with upper respiratory tract infection
- Presents with morning crusting and watery eye discharge
- A burning, sandy or gritty feeling in the eyes
- Diffuse pink or red conjunctiva due to subconjunctival haemorraghes
- Photophobia if the cornea is involved
- Normal visual acuity
- Preauricular lymphadenopathy
- It appears in epidemics so there will be history of contact with patients with similar eye condition
- It is usually is self-limiting but the irritation and discharge get worse on 3 – 5 days before getting better and symptoms can persist for 2–3 weeks.

**Non-Pharmacological Treatment**

- Advise on correct cleansing or rinsing of eyes with clean water
- Cold compresses for symptomatic relief

**Pharmacological Treatment**

Children > 6 years and adults

**C:** Oxymetazoline 0.025% eye drops, instill 1–2 drops 6 hourly for a maximum of 7 days.

**AND**

Children

**A:** Paracetamol (PO) 10–15 mg/kg/dose 6 hourly when required.

Adults

**A:** Paracetamol (PO) 1g, 6 hourly when required

**Referral**

Refer all patients to a centre with eye specialist if there is

- No response after 5 days
- Unilateral red eye for more than one day
- Suspected herpes conjunctivitis
- Loss of vision
- Irregular pupil
- Haziness of cornea
- Persistent painful eye

**Note:** Viral conjunctivitis is very contagious so patients and members of the family should be alerted

**14.2.5.3 Bacterial Conjunctivitis**

Purulent conjunctival inflammation caused by bacterial infection

**Diagnostic Criteria**

It is characterized by:

- Mucopurulent discharge from one or both eyes
- Sore, gritty or scratch eyes and swollen lids
- Conjunctiva redness more at the fornices
- Eyelids may be swollen
- Matting of eye lashes in the morning with eyelids stuck shut

**Non-Pharmacological Treatment**

- Educate patient on personal hygiene to prevent spread
- Educate patient correct application of ophthalmic ointment
  - To wash hands thoroughly before applying ophthalmic ointment
  - Not to share the ophthalmic ointment and drops
- Eye swabs for Gram stain and for culture and sensitivity may be needed to tailor down treatment.

**Pharmacological Treatment**

**A:** Chloramphenicol 1%, ophthalmic ointment, applied 8 hourly for 5 days.

**OR**

**C:** Ciprofloxacin 0.3%, ophthalmic drops, instill 1 drop, 4 hourly for 2 days. Then reduce frequency to 1 drop 6 hourly for 5 days

**OR**

**D:** Ofloxacin 0.3%, ophthalmic drops, instill 1 drop 4 hourly for 2 days. Then reduce the frequency to 1 drop 6 hourly for 5 days

**AND**

Children

**A:** Paracetamol (PO) 10–15 mg/kg/dose 6 hourly when required. Adults:

**A:** Paracetamol (PO) 1 g 6 hourly when required.

**Referral**

Refer to eye specialist if no improvement after 2 days of treatment

**14.2.5.4 Ophthalmia Neonatorum/Neonatal Conjunctivitis**

This is acute bacterial infection of the eyes that affect newborn baby during the first 28 days of life. The infection is acquired from mother's birth canal secretions. It is characterized by inflammation of the conjunctivae, sticky eyes to abundant purulent discharge and eyelids oedema. Causative organisms are *Neisseria gonorrhoea, Chlamydia spp* and *Staphylococcus spp*.

**Diagnostic Criteria**

- Patients present with massive edema and redness of eyelids and with purulent and copious discharge from the eyes, clinical presentation ranges

from mild (small amount of sticky exudates) to severe form (profuse pus and swollen eye lids) depending on the causative organism

- There is usually rapid ulceration and perforation of corneal which eventually leads to blindness if treatment is delayed
- It usually presents 3–4 days of life
- Late and mild presentation is due to Staphylococcus or undefined
- Treat parents of a neonate with purulent discharge appropriately

**Non-Pharmacological Treatment**

Cleanse or wipe eyes of all newborn babies with a clean cloth, cotton wool or swab, taking care not to touch or injure the eye

**Pharmacological Treatment**

Screen women in the antenatal clinics and treat both parents for Sexually Transmitted Diseases. In Ophthalmia neonatorum, prevention is better than cure.

**A:** Apply Chloramphenicol 1% eye ointment to all newborn babies as soon as possible after birth.

**Sticky eye(s) without purulent discharge:**

**A:** Chloramphenicol 1% eye ointment, apply 6 hourly for 7 days

**Purulent discharge**

**Mild discharge without swollen eyelids and no corneal haziness:**

**A:** Compound Sodium Lactate eye wash, immediately then 2–3 hourly until discharge clears

**AND**

**A:** Ceftriaxone 50mg/kg IM immediately as a single dose

Given at District Hospital (Treatment to be initiated by Clinical Eye Care Professional eg. Assistant Medical Officer in Ophthalmology)

**OR**

**D:** Cefotaxime 50mg/kg IM immediately as a single dose

**Abundant purulent discharge and/or swollen eyelids and /or corneal haziness:**

**A:** Compound Sodium Lactate eye wash, immediately then hourly until referral

**A:** Ceftriaxone 50mg/kg IM immediately as a single dose

**OR**

**D:** Cefotaxime 50mg/kg IM immediately as a single dose

**Referral**: to Regional and Specialised Hospital.

**Note:**

- Ceftriaxone should not be used in neonates that are seriously ill or are jaundiced
- Ceftriaxone should not be administered if calcium containing intravenous infusion e.g Compound Sodium Lactate is given or is expected to be given

Treat both parents of newborns who develop purulent conjunctivitis after 24 hours of birth for N-gonorrhea and Chlamydia with

**A:** Ceftriaxone250 mg IM as a single dose

For Ceftriaxone IM injection: Dissolve Ceftriaxone 250 mg in 0.9 mL Lidocaine 1% without epinephrine (adrenaline)

**AND**

**A:** Azithromycin, oral, 1 g as a single dose

**NOTE**
For more details on prevention and treatment see the "Neonatal Conjuctivitis (NC) **Flow chart number 12.7** under the Sexual Transmmited disease chapter

**Referral:** Urgently

- Neonates with abundant purulent discharge and/or swollen eyelids and/or corneal haziness and
- Neonates unresponsive to treatment within 2 days.

## 14.3 STRUCTURAL ABNORMALITIES OF THE EYE

These includes:

- **Squint**: eyes are looking in different directions; one eye appears to be turned in or out, in children or in adult. Refer urgently all children who present with squint to Paediatric Eye Tertiary Centre (Muhimbili National Hospital, Kilimanjaro Christian Medical Centre And Mbeya Zonal Referral Hospital).

- **Ocular surface disease**: The most common ocular surface diseases are pterygium and Squamous cell carcinoma of the conjunctiva.

- **Eyelids abnormalities:** eyelashes rubbing on cornea (trichiasis), inturned eyelids (entropion), eyelids bent out too much (ectropion), drooping eyelids (ptosis), inability to close the eyes (lagophthalmos)

**Referral**
Refer all patients to health facilities with eye specialist for surgical intervention

**Note:** Abnormal tissues excised from eye patients should be subjected to pathology examination for proper diagnosis

## 14.4 OCULAR ONCOLOGY

### 14.4.1 Retinoblastoma

It is the commonest childhood malignant tumor of the eyes. It is diagnosed between the first 1–3 years of life.

**Diagnostic Criteria**

- White pupil reflex (leokocoria)
- Squint

- Rarely vitreous haemorraghe
- Hyphema
- Ocular/periocular inflammation
- Secondary glaucoma
- In late stages proptosis and hypopyon

**Pharmacological Treatment**

Staging and treatment is done in specialized centres in consultation with Pediatric Oncologist (Muhimbili National Hospital, Bugando Medical Centre, Kilimanjaro Christian Medical Centre and Mbeya Referral Hospital). The following are treatment modalities:

- Enucleation of the affected eye and the eye is taken for histology
- Chemotherapy
- External beam radiotherapy
- Plaque radiotherapy
- Cryotherapy and laser photoablation

**Note: Close follow up** is very important due to the following:-

- There is a chance of developing retinoblastoma in the fellow eye
- The risk is diminished with increase in age
- Also watch for secondary tumors like osteosarcoma

**Referral**

Refer all children presenting with a white pupillary reflex, squint and acute painful red eye to a qualified eye care personnel/ophthalmologist

## 14.4.2 Squamous Cell Carcinoma of Conjunctiva

Invasive squamous cell carcinoma of conjunctiva is the major and most common ocular malignancy of the eye. The tumour typically occurs on the bulbar conjunctiva, originating at the limbus, and often spreads onto the cornea, globe, orbit and nasolacrimal system. The cancer is a slow growing tumour of middle-aged to elderly people.

**Diagnostic Criteria**

- It manifests usually as a fleshy vascularized mass at the limbus. (temporal or nasally)
- In advanced stage, it may intrude the eye ball and extend to other ocular adnexa structures
- Definitive diagnosis is by histopathological assessment of excised tissue

**Non-Pharmacological Treatment**

- Check for HIV status of the patient as recurrences occurs most frequently in HIV positive patients
- Close follow up of patients for at least the first 12 months postoperatively to look for residual or recurrent tumors

**Pharmacological Treatment**

**S:** 5-fluorouracil (5FU) 50mg/mL, on a sponge, on the surgical bed for about 2.5 minutes then wash off with Ringers Lactate solution.

**OR**

**D:** Mitomycin C 0.2mg/mL, on a sponge, on the surgical bed for about 2.5 minutes then wash off with Ringers Lactate Solution.

**AND**

**C:** Dexamethasone + Chloramphenical eye drops, 0.1%–0.5 %, 6 hourly, for 3–4 weeks

**OR**

**C:** Dexamethasone + Gentamicin eye drops, 0.1–0.3%, 6 hourly, for 3–4 weeks
(These are post operatively until the wound is healed)

**THEN**

**S:** 5-fluorouracil (5FU) 1% eye drops, 4 times daily for 2–3 weeks

**Note:**

- 5-fluorouracil (5FU) is used after the excision wound has healed
- 5 FU eye drops may cause watery eye, discomfort or eye inflammation, manage accordingly

**Surgical Treatment**

- It depends on the tumor size, location, focality, and invasiveness
- Surgical excision of the mass with clear margin of 4 mm without touching the tumour is recommended, followed with topical adjunctive cryotherapy and or chemotherapy to the residual conjunctival and scleral bed
    - Double - four freeze-thaw cycles of cryotherapy to the remaining conjunctival margins, bed and limbus.
    - For tumors that are adherent to the sclera, perform a superficial sclerectomy and use cryotherapy to the base.
- A large or multicentric squamous conjunctival mass should be managed by a surgeon experienced in treating such lesions
- Removal of the eye ball and adnexa may be indicated for advanced stage
- Radiotherapy if required, for palliation after removal of the eye.

**Referral:**
All suspicious cases of Squamous Cell Carcinoma of Conjunctiva must be referred to eye specialist for proper evaluation and management.

## 14.5 DRY EYE

It occurs when there is inadequate tear volume or function.

**Diagnostic Criteria**

- Feelings of dryness, grittiness, burning and foreign body sensation, usually worse during the day
- Stringy discharge, redness and transient blurring of vision are also common. Exclude allergic conjunctivitis

**Non-Pharmacological Treatment**

- Control symptoms since the condition is not curable
- Educate patients to avoid unprescribed eye medications which may worsen the dryness and control their environmental factors by eg. blinking frequently during visual attentive tasks, avoid air conditioners

**Pharmacological Treatment**
**Tear substitutes give:**

**C:** Hydroxypropylmethylcellulose 0.7%, ophthalmic drops, 1 drop, 6 hourly.

## 14.6 HERPES ZOSTER OPHTHALMICUS

Occurs when Varicella Zoster Virus reactivates in the trigeminal ganglion and passes down the ophthalmic division of the trigeminal nerve

**Diagnostic Criteria**

- Presents with painful vesicular rash in the trigeminal V1 area–vesicles on the tip of the nose indicate nasociliary branch involvement and increases the risk of ocular involvement
- Some patients develop conjunctivitis, keratitis, uveitis, retinitis and cranial nerve involvement (oculomotor and optic nerves)
- Later, chronic ocular inflammation, loss of vision, post herpetic neuralgia
- All patients should be offered HIV testing

**Pharmacological Treatment**

**B:** Acyclovir (PO) 800 mg 4 hourly for 7–10 days

**AND**

**A:** Amitriptyline (PO) 25 mg at night for 3 months.

**Note:** Treatment should be initiated within 3 days of the onset of symptoms, except in HIV infected patients who should be treated if there are active skin lesions

**Referral**

Refer to eye specialist in case of:-

- Vesicles on the tip of the nose
- Fluorescein staining of the cornea shows corneal ulceration
- Decreased vision
- Red eye (uveitis or keratitis)
- Cranial nerve palsies

## 14.7 ENDOPHTHALMITIS

It is an infection of the ocular cavity. It is an ophthalmic emergency that can cause blindness that may occur secondary to bacteraemia (endogenous infection) or following penetrating eye injury of surgery

**Diagnosis Criteria**

- Loss of vision, may be associated with pain in the affected eye
- Blood culture should be done to identify the source and how it can be treated (for bacteraemia)
- In post injury or surgery, culture of specimens of aqueous or vitreous humour should be done

**Pharmacological Treatment**

Refer immediately to an ophthalmologist for treatment

**Endogenous Endophthalmitis**
Specialist initiated, vitrectomy often required

**A:** Ceftriaxone 2g IV once a day for 7 days

**Adjust antibiotics according to culture and sensitivity**

**AND**

**D:** Ceftazidime, 2.25 mg intravitreal ,repeat after 16–24 hours

**AND**

**D:** Vancomycin 1 mg intravitreal, repeat after 72 hours

**Administer using separate tuberculin syringes**

**Post-Surgical endophthalmitis**
Specialist initiated, vitrectomy often required

**D:** Ceftazidime2.25 mg intravitreal, repeat after 16 – 24 hours

**AND**

**D:** Vancomycin1 mg intravitreal, repeat after 72 hours

Administer using separate tuberculin syringes

In addition, if there is soft tissue involvement or as a prophylaxis after a penetrating injury:

**A:** Ciprofloxacin (PO) 750mg 12 hourly for 7 days.

## 14.8 RETINITIS

Is seen in advanced HIV infection with CD4 count of less 100 cells/$mm^3$

**Diagnostic Criteria**

- Presents with characteristic retinal appearance of necrosis (white exudates and haemorrhages at the edge of the exudates
- Visual loss is irreversible

**Pharmacological Treatment**

**S:** Ganciclovir 2 mg intravitreal, once a week

Once immune function has been restored with antiretroviral therapy, (CD4 > 100) and the features of active retinitis has been cleared, maintenance Ganciclovir can be stopped but monitor for recurrence.

**Referral**
Refer to Ophthalmologist for confirmation of diagnosis and treatment.

## 14.9 ORBITAL CELLULITIS

Orbital cellulitis is an infection of the soft tissues of the orbit posterior to the orbital septum. It may be a continuum of preseptal cellulitis, which is an infection of the soft tissue of the eyelids and periocular region anterior to the orbital septum. Orbital cellulitis may result from an extension of an infection from the paranasal sinuses or other periorbital structures such as the face, globe, or lacrimal sac, direct inoculation of the orbit from trauma or surgery or as a haematogenous spread from bacteremia

**Diagnostic Criteria**

- Fever, malaise, and a history of recent sinusitis or upper respiratory tract infection
- Proptosis and ophthalmoplegia are the cardinal signs of orbital cellulitis.
- Conjunctival chemosis, dyschromatopsia, and relative afferent pupillary defect
- Decreased vision
- Elevated intraocular pressure
- Pain on eye movement
- Orbital pain and tenderness: are present early
- Swollen eyelids, chemosis, hyperemia of the conjunctiva, and resistance to retropulsion of the globe may be present
- Purulent nasal discharge may be present
- For very ill children, vision may difficult to evaluate in very ill children with marked edema

**Investigations**

- Full Blood Count and ESR
- Blood culture
- Assessment of purulent nasal discharge or from the abscess (Swab for Gram Stain)
- CT Scan with Contrast and MRI will help differentiating it with other diseases but also identifying the source or extension of the disease

**Non-Pharmacological Treatment**

- Patients must be hospitalised
- Adequate hydration
- Lower the temperature
- Daily evaluation and monitor the vital signs
- Management of orbital cellulitis is done with consultation from other medical team (Neurosurgical (if brain extension is seen), ENT (for involvement of sinuses), Paediatrician (for paediatric patients) and Physicians

**Pharmacological Treatment**

The antibiotic will be tailored when the laboratory results are out

Adults, give:

**B:** Ampiclox 1 gm IV stat then 500 mg 6 hourly for 2 weeks

**AND**

**A:** Gentamicin 160 mg IV once a day for 7 days

**AND**

**B:** Metronidazole 500 mg IV 8 hourly for 7 days

**OR**

**D:** Cefutaxime 1–2 gm IV once a day for 7–10 days

**AND**

**D:** Vancomycin 15–20 mg/kg IV 8–12 hourly

Children more than one month old give:

**B:** Ampiclox 50 mg /kg IV 8 hourly for 7–14 days

**AND**

**A:** Gentamicin 7.5 mg/kg IV, once a day for 5 -7 days

**AND**

B: Metronidazole 7.5–15 mg/kg IV 6hourly for 7–10 days

**OR**

**D:** Cefotaxime 50 mg/kg IV once a day for 7–10 days

**AND**

**D:** Vancomycin 10 mg/kg IV 6 hourly for 7–10 day

**Note: Individual dose not to exceed 1 gm**

Children less or equal to one month old give:

**B:** Ampiclox 25–50 mg/kg IV 8hourly for 7–14 days

**AND**

**A:** Gentamicin 5 mg/kg IV once a day for 5–7 days

**Steroidal anti – inflammatory medicines**

To be given after 48 hours of antibiotic therapy. Give:

**B:** Prednisolone 1–2 mg /kg (PO) once a day to be tapered slowly.

**Analgesics/non-steroidal anti-inflammatory medicines**

Adults:

**A:** Ibuprofen tablets 400–800 mg (PO) 6–8hourly; not to exceed 3.2 g/day

**OR**

**A:** Paracetamol 1 gm 4–6 hourly (PO) to a maximum of 4 doses per 24 hours, for 3 days

Children:

**A:** Ibuprofen tablets 30–40mg/kg per day (PO) in 3–4 doses

**OR**

**A:** Paracetamol 10–14 mg/kg for 3 days

**Note:** Do not use Ibuprofen in patients with bleeding disorders or peptic ulcers

**Surgical Treatment**

Surgical drainage is only indicated when there is:

- A decrease in vision
- Development of an afferent pupillary defect
- Progression of Proptosis despite appropriate antibiotic therapy
- The size of the abscess does not reduce on CT scan within 48–72 hours after appropriate antibiotics have been administered
- If brain abscesses develop and do not respond to antibiotic therapy, then craniotomy is indicated
- Presence of a drainable fluid collection is evident on CT scan in patients older than 16 years

## 14.10 VISUAL PROBLEMS

Visual problems may be due to refractive errors, damage to the eye or optic nerve. This may be an indication of underlying diseases such as diabetes or hypertension.

**Investigations**

- Look for abormalities of the eye
- Determine visual acuity accurately in both eyes by Snellen chart
- If vision is diminished, (less than 6/12), perform the following

**Pin hole test**

- Make a hole of about 1mm wide in a piece of dark/black paper – you can push a hole in a paper or card with a pen tip
- Ask the patient to look through this hole at the Snellen chart
- If vision improves, this means that the patient has a refractive error

**Red Reflex Test**

The patient looks past the examiners head focusing on a distant target.

- With the ophthalmoscope at 0 (zero) the examiner keeps close to his eye and then focuses the beam of light so that it falls on the pupillary area of the cornea
- The examiner stands about 60 cm away from the patient.
- In normal individuals, the examiner should be able to see a red or pink colour (reflex) through the pupil which comes from the retina.

**Significance of absent red reflex**

If there is history of trauma or diabetes, the absence of a red reflex is probably due to:

- Retinal detachment
- A vitreous haemorrhage
- Mature cataract

If there are cataracts, one usually sees:

- Black shadows against the red reflex in immature cataract, or
- Absence of red reflex in mature cataracts

In a >50 years of age with no history of trauma, diabetes or previous eye disease, an absent red reflex is often due to cataract formation, especially with decreased visual acuity.

**Note:** Associated diabetes or hypertension should be adequately managed with referral, as surgery can only be considered with appropriately managed systemic disease

**Referral:**

**Urgent within 12–24 hours**

- Sudden loss of vision in one or both eyes
- Pain or redness in one eye only especially with visual and pupillary abnormalities
- Recent proptosis of one or both eyes or enlargement of the eye (buphthalmos) in children

- Hazy cornea in children
- Unilateral watery eye

**Within days**

- Squint of recent onset
- Suspected or previously diagnosed glaucoma
- Double vision following recent injury might indicate orbital fracture
- Leukocoria (white reflex from the pupil)
- Squint at an age if not previously investigated by ophthalmologist
- Visual loss in patients with systemic disease such as diabetes

**Non-urgent referral**

- Cataracts in adults
- Refractive errors in teenage and adults
- Longstanding blindness–first visit to health facility

## 14.11 ONCHOCERCIASIS (RIVER BLINDNESS)

Onchocerciasis is a tissue parasitic infestation caused by a filarial worm, *Onchocerca volvulus.* The microfilariae invade lymphatic system, subcutaneous and deep tissues producing acute inflammation and chronic inflammation at a later stage.

**Diagnostic Criteria**

They are caused by the chronic inflammation which presents with:

- Skin inflammation with papules
- Subcutaneous nodules
- Atypical skin lesions (scarred, saggy, hanging areas of skin, leopard skin)
- Skin nodules under the bony prominent areas
- Microfilaria in anterior chamber
- Scleritis and Keratitis leading to Impaired vision as well as blindness**.**

**Investigations**

- Rapid diagnostic test (OV-16 - Onchocerciasis IgG)
- Skin snip for microscopic examination
- Slit lamp eye examination**.**

**Pharmacological Treatment**

Treatment is done in consultation with dermatologists and infectious disease specialists. Apart from WHO recommended mass treatment campaign to community at risk with annual preventive chemotherapy which polarize/paralyze the worm, treatment depends on individual patient presentation.

**A:** Ivermectin 0.15 mg/kg (PO) once every 12 months for 12–15 years

**Note:**

- Patients with heavy ocular infestation require retreatment every 3 to 6 months.
- Treatment will only arrest progression of the clinical features but not revese them.

Dosage guidelines based on body weight

| Weight | Dosage |
|---|---|
| 15-25kg | 3mg |
| 26-44 kg | 6mg |
| 45 -64 kg | 9mg |
| 65- 84 kg | 12mg |
| 85kg or more | 0.15mg/kg |

**Surgical treatment**

Nodulectomy: It is done mostly for nodules located in the scalp to minimize the ocular complications.

# CHAPTER FIFTEEN
# EAR, NOSE AND THROAT DISEASES

Ear, Nose and Throat (ENT) is a specialty in medicine that deals with medical and surgical management of disorders affecting the ear, nose, throat, and the neck. Symptoms and diseases affecting this area are common and commonly lead to patients seeking medical care.

## 15.1 EAR CONDITIONS

### 15.1.1 Otitis External

It is an inflammatory condition of the pinna and external auditory meatus.

**Diagnostic Criteria**

- Itchy, dry and scaly ear canal and painful ear
- There may be a water or purulent discharge, debris and reduced hearing
- Pain may become extreme when the ear canal becomes completely occluded with edematous skin and debris.

**Non-Pharmacological Treatment:**

- Exclude an underlying chronic suppurative otitis media before commencing treatment.
- Do a thorough aural toilet at least once a week (ear suctioning under direct vision).
- Instruct the patient to thoroughly clean the ear with a dry cotton wick regularly and keep it dry.

**Pharmacological Treatment:**

**C:** Ciprofloxacin ear drops 3 drops 8 hourly for 7 days

### 15.1.2 Cerumen Impaction

Usually occurs following the use of cotton buds which hinder the natural movement of cerumen outwards

**Non-Pharmacological Treatment:**

- Remove using cerumen hook, syringing or suctioning under direct vision

### 15.1.3 Foreign Body in the Ear

Usually happens in children. Common foreign bodies include beads, stones and seeds (bean, maize, orange). In adults foreign bodies include cotton bud and insect

**Non-Pharmacological Treatment:**

- Restrain the child
- Remove using a cerumen hook under direct vision (if the child cannot be restrained, sedation is advised)
- An insect should be killed (by soaking the ear canal with normal saline or spirit) before removal

## 15.2 OTITIS MEDIA (ACUTE OR CHRONIC)

It is an inflammation of the middle ear cavity. It is considered acute when the inflammation is of less than 2 weeks duration, and chronic when the inflammation is of more than 2 weeks duration with tympanic membrane perforation.

**Diagnostic Criteria**

- Examine the pinna;
- Using an otoscope carefully examine the external auditory canal and the tympanic membrane

### 15.2.1 Acute Otitis Media

**Diagnostic Criteria**

- Previous upper respiratory tract infection
- Painful ear
- Restlessness
- Fever
- Hearing often reduced
- Inflamed, bulged tympanic membrane

**Non-Pharmacological Treatment:**

Acute otitis media should be treated with analgesics, antibiotics and/or paracentesis (to reduce pain and to obtain pus for culture and sensitivity)

**Pharmacological treatment**: [4, 5]

**A:** Phenoxymethylpenicillin (PO). Adults: 500mg 6 hourly for 10days; Children up to 5 years: 6 mg/kg 6 hourly for 10 days

OR

B: Amoxicillin+Clavulanic acid 375–625mg 12 hourly for 10 days

OR (for patients who are allergic to penicillin)

**A:** Azithromycin (PO). Adults: 500mg once daily for 5 days and Children 10mg/kg once daily for 5 days

**AND**

**A:** Paracetamol (PO). Adults: 1g 6 hourly for 3 days and Children: 10 mg/kg 6 hourly for 3 days

| Note: Treatment periods shorter than 10 days increase the risk of treatment failure |
|---|

**Referral:**

- Children with high fever, severe ear pain, headache, altered state of consciousness
- A chronically discharging ear that persists in spite of proper treatment.
- Foul smelling ear discharge
- Mastoiditis
- Otitis in the normal (or better hearing) ear combined with permanent hearing loss in the other ear

## 15.2.2 Chronic Suppurative Otitis Media

**Diagnostic Criteria**

- Discharge of pus from the ear
- Perforated tympanic membrane

**Non-Pharmacological Treatment**:

- Keep ear dry/avoid water into the ear
- Aural toilet – ear suctioning under direct vision, removal of debris
- Ear wicking regularly, with a dry cotton wick at home

**Pharmacological Treatment**

**C:** Ciprofloxacin ear drops, three drops12 hourly for 14 days

**AND**

**A:** Ciprofloxacin (PO). Adults: 500mg 12 hourly for 10 days and Children: 10–20mg/kg 12 hourly for 10 days

**OR**

**C:** Cefaclor (PO). Adults: 250mg 8 hourly for 10 days and Children 1–5 years: 125mg 8 hourly for 10 days

**Note:** Treatment of shorter than 10 days will result into treatment failure

## 15.2.3 Mastoditis with Sub-periosteal Abscess

It is due to infection of the mastoid air cells in the middle ear, a complication of chronic suppurative otitis media. It presents as a fluctuant painful swelling on the post auricular area. The overlying skin is also inflamed.

**Non-Pharmacological Treatment**

Aspirate the swelling before incision and drainage, and then referfor mastoidectomy at a zonal/national hospital

**Pharmacological Treatment:**

**C:** Ciprofloxacin ear drops, three drops, 12 hourly for 14 days

**AND**

**A:** Ciprofloxacin 500mg 12 hourly for 10 days; Children 10–20mg/kg 12 hourly for 10 days

**OR**

**D:** Cefaclor 250mg 8 hourly for 10 days. Children (1–5 years) 125mg 8 hourly for 10 days

Note: Treatment shorter than 10 days will result into treatment failure

### 15.2.4 Otitis Media with Effusion

It is a multifactorial, inflammatory condition in the middle ear with serous or mucous accumulation without ear discharge. It is a residual condition after acute otitis media.

**Diagnostic Criteria**

It is often discovered by chance.

- Little or no ear pain
- Gradual loss of hearing
- No ear discharge

**Non-Pharmacological Treatment**

- Close follow-up

Note: Otitis media with effusion with hearing loss that does not improve after 3 months should be referred to a specialist for myringotomy and grommets insertion

## 15.3 HEARING LOSS

A child with hearing loss should be detected and intervention started immediately after delivery. New born hearing screening is done using an otoacustic emission machine. Any child suspected of hearing loss (usually presenting with delayed speech development) should be referred to a zonal/national hospital immediately since early intervention has a better outcome.

## 15.4 NOSE/PARANASAL SINUSES CONDITIONS

### 15.4.1 Acute Rhinitis

It is a viral inflammatory condition in the nasal mucous membrane, usually part of a more wide-spread infection of the upper respiratory tract.

**Non-Pharmacological Treatment**

- Bed rest& warm drinks

**Pharmacological Treatment**

**A:** Ephedrine nasal drops (1% for adults and 0.5% for children) 1–2 drops into each nostril 6 hourly for not more than 5 days

**Note**: Oral drugs to reduce swelling of the mucous membrane, antihistamines and antibiotics are not indicated

## 15.4.2 Allergic Rhinitis

It is an irritation of the nasal mucosa by an allergen in a previously sensitized individual. Common allergens include house dust (mite's feaces), pollens, cockroach antigen, animal dander, moulds (in-door)

**Diagnostic Criteria**

- Itchy nostrils, throat, eyes
- Watery nasal discharge
- Nasal congestion
- Sneezing

**Investigations:**

- Anterior rhinoscopy – watery nasal discharge, nasal congestion

**Pharmacological Treatment:**

Avoidance of an allergen (if possible)

**A:** Cetrizine (PO) 10mg daily for adults until when symptoms have improved. Children aged 2–6 years: 5mg daily until when symptoms have improved

**AND**

**C:** Beclomethasone (two puffs each nostril once daily) until symptoms have improved

## 15.4.3 Adenoid Hypertrophy

It is hypertrophy of the lymphoid tissues in the nasopharynx; presenting with mouth breathing, snoring and otitis media with effusion. It is reported mainly in children.

**Investigations**: Nasopharynx lateral view X-ray.

**Pharmacological Treatment:**

**A:** Cetrizine (PO) 10mg nocte for 2 weeks. Children: 5mg nocte for 2 weeks

**AND**

**B:** Normal saline (Sodium chloride 0.9%) nasal spray/drops 4 hourly for 2 weeks

**AND**

**A:** Phenoxymethylpenicillin (PO) 500mg 8 hourly for 7 days. Children up to 5 years: 6 mg/kg 6 hourly for 10 days

**OR**

**C:** Azithromycin (PO) 500mg once daily for 3 days. Children: 10mg/kg once daily for 3 days

**OR**

**B:** Amoxicillin+Clavulanic acid (PO)

Adults: 625mg (500mg amoxicillin+125mg Clavulanic acid) 8 hourly for 7 days

Children: 375mg (250mg amoxicillin+ 125 Clavulanic acid) 12 hourly for 7 days;

**AND**

**A:** Paracetamol (PO) 1gm 8 hourly until fever is controlled:

Children 10 mg/kg body weight 8 hourly until fever is controlled

### 15.4.4 Acute Rhinosinusitis

It is the inflammation of the mucosal lining of the nose and paranasal sinuses of not more than 12 weeks duration. In sinusitis of dental origin, anaerobic bacteria are often found.

**Acute Purulent Rhinosinusitis**

Bacterial infection with pus accumulation in one or more of the paranasal sinuses

**Diagnostic Criteria**

- Anterior rhinoscopy – watery/purulent nasal discharge occasionally foul smelling
- Nasal congestion
- Plain paranasal sinuses X ray (Water's, Caldwell views)
- Mucosal thickening; air fluid levels

**Pharmacological Treatment**:

**A:** Phenoxymethylpenicillin (PO) 500mg 8 hourly for 7 days. Children up to 5 years: 6 mg/kg 6 hourly for 10 days

**OR**

**A:** Azithromycin (PO) 500mg once daily for 3 days. Children: 10mg/kg once daily for 3 days

**OR**

**B:** Amoxicillin+Clavulanic acid (PO)

Adults: 625mg (500mg amoxicillin+125mg Clavulanic acid) 8 hourly for 7 days

Children: 375mg (250mg amoxicillin,+125 Clavulanic acid) 12 hourly for 7 days;

**Note:** Treatment periods shorter than ten days increase the risk of treatment failure

**Referral**: To ENT Specialists

- Children with ethmoiditis presenting as an acute periorbital inflammation or orbital cellulitis must be hospitalized immediately
- Adults with pronounced symptoms despite treatment
- If sinusitis of dental origin is suspected
- Recurrent sinusitis (>3 attacks in a year) or chronic sinusitis (duration of illness of >12 weeks)

### 15.4.5 Nose Bleeding (Epistaxis)

Nose bleeding is a condition which is common in adults. It may be due to a local cause in the nasal cavity (e.g. trauma, tumor, foreign body, septal varisces, or septal deviation); or a systemic cause (e.g. blood disorders, vascular disorders, renal failure, hepatic failure, or use of anticoagulants (warfarin, heparin). Most cases of epistaxis are minor; do not require hospitalization. Patients with significant nose bleeding do require hospitalization.

**Non-Pharmacological Treatment**

- Stabilize the patient: put an open intravenous line, do blood grouping and cross matching
- Put the patient in a sitting position and advise the patient to pinch the soft part of the nose gently for 5 minutes

- Put on a gown, glasses, head light and sterile gloves and evacuate clots.Do a thorough head and neck examination
- Cauterize septal varisces (if any) using a silverex stick
- Do an anterior nasal packing by introducing into the nasal cavity as far posterior as possible sterile Vaseline gauzes (or iodine soaked gauzes if not available) using a dissecting forcep (if bayonet forcep is not available)
- Put rolled dry gauze on the collumela and plaster it

If the patient is still bleeding

- Do a posterior nasal packing using a Foley's catheter introduced through the nasal cavity into the oropharynx, balloon it with normal saline up to 10–15cc while pulling it outward to impinge on the posterior nasal choana, then do anterior nasal packing as above
- Put dry gauze on the nose to prevent necrosis of the collumela and fix the catheter on the nose with an umbilical clamp
- Almost all of the nasal bleedings will be controlled by this way

| Note: Remove the packs after 72 hours |
|---|

**Pharmacological Treatment (to prevent rhinosinusitis**)

**A:** Phenoxymethylpenicillin (PO) 500mg every 8 hours for 7 days. Children up to 5 years: 6 mg/kg 6 hourly for 10 days

**OR**

**A:** Azithromycin (PO) 500mg once daily for 3 days. Children: 10mg/kg once daily for 3 days

**OR**

**C:** Amoxicillin/Clavulanic acid (PO)
Adults: 625mg (500mg amoxicillin+125mg Clavulanic acid) 8 hourly for 7 days
Children: 375mg (250mg amoxicillin+125 Clavulanic acid) 12 hourly for 7 days;

**PLUS**

**A:** Paracetamol (PO) 1gm 8hourly until fever is controlled
Children 10 mg/kg body weight 8 hourly until fever is controlled

| NOTE: Putting an ice cube on the forehead, extending the neck or placing a cotton bud soaked with adrenaline in the vestibule will not help |
|---|

**Referral:** refer the patient to the next facility with adequate expertise and facilities if:

- he patient is still bleeding repack and refer immediately
- Failure to manage the underlying cause, refer the patient

### 15.4.6 Foreign Bodies in the Nose

This situation usually occurs in children.

**Non-pharmacological treatment**:

- Restrain the child before removal using a cerumen hook, if the child cannot be restrained sedation is advised

NOTE: A unilateral foul smelling nasal discharge in a child is due to a foreign body until proven otherwise

## 15.5 THROAT CONDITIONS

### 15.5.1 Pharyngotonsilitis

Pharyngotonsilitis is an acute inflammation of the pharynx and tonsils, which is characterized by fever and a painful throat.

**Pharmacological Treatment**

A: Phenoxymethylpenicillin (PO) 500mg 8 hourly for 7 days. Children up to 5 years: 6 mg/kg 6 hourly for 10 days

**OR**

**A:** Azithromycin (PO) 500mg once daily for 3 days. Children: 10mg/kg once daily for 3 days

**OR**

**B:** Amoxicillin/Clavulanic acid (PO)
Adults: 625mg (500mg amoxicillin+125mg Clavulanic acid) 8 hourly for 7 days
Children: 375mg (250mg amoxicillin+125 Clavulanic acid) 12 hourly for 7 days;

**AND**

**A:** Paracetamol (PO) 1gm 8hourly until fever is controlled
Children 10 mg/kg body weight 8 hourly until the fever is controlled

NOTE: Refer the patient with tonsillitis to the specialist for tonsillectomy if

- Chronic tonsillitis
- Recurrent tonsillitis (>3 attacks in a year or 5 or more attacks in 2 years)
- Obstructive tonsillitis (causing an upper airway obstruction)

### 15.5.2 Laryngitis

This is an infectious or non-infectious, acute or chronic inflammatory condition of the larynx. It becomes chronic when the condition lasts for more than 3 weeks. The picture of the disease is different in children and adults due to the small size of the larynx in children.

- Acute subglottic laryngitis occurs mainly in children under the age of seven, it is a viral infection
- Edema of the mucous membrane of the subglottic space causes breathing difficulties, especially on inspiration
- Laryngitis in children may require active treatment

**Acute Laryngitis**

Acute subglottic laryngitis occurs mainly in children under the age of seven, it is a viral infection.

**Non-Pharmacological Treatment**

- Parents should behave calmly and avoid frightening the child
- Bed rest
- Keep the air damp and cool
- Give extra fluid

**Pharmacological Treatment**

**A:** Epinephrine (adrenaline) inhalation effectively reduces symptoms

**Table15.1: Doses of Racemic Epinephrine Preparation**

| Age | Racemic Epinephrine (20 mg/ml) | 0.9% Saline |
|---|---|---|
| 0-6 months | 0.1 ml | 2 ml |
| 6-12 months | 0.15 ml | 2 ml |
| >12 | 0.2 ml | 2 ml |

NOTE: The total fluid volume is inhaled in 5 minutes with the use of inhalator

**Hospitalization**

If severe symptoms persist or worsen after epinephrine inhalation, hospitalization is indicated.

**Chronic Laryngitis**

**Non-Pharmacological Treatment**:

- Voice rest
- Stop smoking
- Rehydration
- Refer to specialist for laryngoscopy

## 15.5.3 Acute Epiglottitis (AE)

Epiglottitis is an acute infectious inflammation of the epiglottis, supraglottic and hypopharynx which occurs both in children and adults. It is commonly caused by *Haemophilus influenzae.* Epiglottitis is a potentially lethal condition especially in children. Edema of the epiglottis may cause acute airway obstruction.

**Diagnostic Criteria**

- Throat pain and difficulty in swallowing
- Drooling
- Husky voice
- Fever often high and with chills
- Patient prefers sitting posture with an extended neck
- Laborious inspiration
- Cough in some cases
- Anxiety

**Investigations:** Plain X-ray of the neck, lateral view characteristically presents with a positive thumb sign (edematous epiglottis).

**Non-Pharmacological Treatment**:

- Immediate hospitalization, preferably in the ICU
- Transportation: sitting, with oxygen supplementation
- Be prepared to treat respiratory failure (intubation or tracheotomy)

**Pharmacological Treatment**

**A:** Phenoxymethylpenicillin (PO) 500mg 8 hourly for 7 days. Children up to 5 years: 6 mg/kg 6 hourly for 10 days

**OR**

**A:** Azithromycin (PO) 500mg once daily for 3 days. Children: 10mg/kg once daily for 3 days

**OR**

**B:** Amoxicillin/Clavulanic acid (PO)
Adults: 625mg (500mg amoxicillin+125mg Clavulanic acid) 8 hourly for 7 days
Children: 375mg (250mg amoxicillin+125 Clavulanic acid) 12 hourly for 7 days;

**AND**

**A:** Paracetamol (PO) 1gm 8hourly until fever is controlled. Children: 10 mg/kg body weight 8 hourly

## 15.5.4 Recurrent Respiratory Papillomatosis (Laryngeal Papillomas)

It is the commonest benign laryngeal tumor of the larynx caused by Human papilloma virus (HPV), occurring in both children and adults. It has a higher recurrence rate in children than in adults, among adults it may turn into a malignancy.

**Diagnostic Criteria**

- Hoarse voice, audible respiration (inspiratory stridor)
- Progressive difficulty in breathing
- Progressive inspiratory stridor
- On and off cough

**Investigations**:

- Perform a thorough respiratory system examination
- Indirect laryngoscopy for papilloma croups on the larynx

**Non-Pharmacological Treatment**:

- If in distress, perform a tracheostomy first then refer

**Referral**:
Refer the patient to the next facility with adequate expertise and facilities

## 15.5.5 Foreign Bodies in the Throat

If the foreign body is suspected to be in the hypopharynx, esophagus, trachea or bronchus

- Take a thorough history and do a thorough physical examination
- Do chest X ray to confirm your diagnosis (though some foreign bodies are radiolucent)
- Refer to a zonal hospital for removal

## 15.6 ENT MALIGNANCIES

### 15.6.1 Cancer of the Larynx

It is the commonest ENT malignancy. Risk factors include cigarette smoking, alcohol intake, gastroesophageal reflux disease and human papilloma virus.

**Diagnostic Criteria**

- Progressive hoarseness of voice
- Difficulty in breathing (inspiratory stridor)
- Hemoptysis

**Referral**:
Refer the patient to the next facility with adequate expertise and facilities

NOTE: Any patient with progressive hoarseness of voice for more than two weeks should undergo laryngoscopy

### 15.6.2 Sino-Nasal Malignancy

Is a malignancy of the nose and paranasal sinuses.Risk factors include wood dust (both soft and hard), wielding dust, lather industry fumes, hydrocarbons fumes, and aflatoxin dust.

**Diagnostic Criteria**

- Nasal bleeding
- Nasal discharge
- Nasal obstruction
- Teeth loosening
- Cheek swelling
- Proptosis
- Hearing loss

**Referral:** Refer the patient to the next facility with adequate expertise and facilities

### 15.6.3 Naso-Pharyngeal Malignancy

It is a malignancy which arises from the nasopharynx. Risk factors include genetic predisposition, Epstein Bar virus, smoked and/or salted foods.

**Diagnostic Criteria**

- Cervical lymphadenopthy, usually bilateral
- Nose bleeding
- Hearing loss, tinnitus or ear pain

**Referral:** Refer the patient to the next facility with adequate expertise and facilities

NOTE: A patient presenting with cervical lymphadenopathy has nasopharyngeal carcinoma until proven otherwise

### 15.6.4 Hypo-Pharyngeal Malignancy

It is a malignancy which arises from the hypopharynx.Risk factors include cigarette smoking, alcohol intake and gastroesophageal reflux disease.

**Diagnostic Criteria**

- Progressive dysphasia
- Progressive odynophagia
- Hematemesis/hemoptysis
- Ear pain (referred otalgia)
- Cervical lymphadenopathy
- Difficulty in breathing (inspiratory stridor)

**Referral**: Refer the patient to the next facility with adequate expertise and facilities

# CHAPTER SIXTEEN
# ORAL AND DENTAL CONDITION

Oral disease conditions are common and range from dental caries, periodontal conditions, dental abscess and other acute bacterial infections, viral infections, fungal infections, traumatic injuries and tumors. The lesions affecting the maxillofacial region (perioral, jaws and face) are also considered. Clinicians should be able to identify conditions requiring immediate attention by the dentist, do the preliminary urgent and life saving measures where possible before referring the patient to a centre with a dentist/dental surgeon.

## 16.1 PERIODONTAL CONDITIONS

### 16.1.1 Gingivitis

Inflammatory changes in the gingival develop within a couple of days of undisturbed bacterial growth on the gingival margin of the erupted tooth in the oral cavity

**Diagnostic Criteria:**

- Gingival redness
- Swollen and shiny gingival tissue
- Increased tendency of the gingival to bleed on gentle probing or spontaneously, during tooth brushing or even on touch and on biting bread and fruits
- Bad breath from the mouth

**Prevention and non-pharmacological Treatment**

Counsel to perform proper oral hygiene care

Remove accumulated plaque and teach oral hygiene on systematic tooth brushing and other adjuvant means of oral hygiene (dental flossing, tongue cleaning on the dorsal part, use of mouth washes including saline mouth wash)

### 16.1.2 Periodontitis

This is the progression of the inflammation of gingival into the deep tissue affecting the periodontal membrane causing periodontal pockets, introduction of infection and destruction of periodontium. The damage of the periodontal membrane, periodontal ligaments and eventually alveolar bone leads to formation of pockets which eventually favours more pathogenic bacterial growth. As the destruction continues the teeth become loose and may eventually fall out.

**Diagnostic Criteria**

- Reddened, swollen gingiva
- Easily bleeding gingival on gently probing
- Periodontal pocket
- Loose/mobile teeth
- Bad breath from the mouth
- Gingival recession

**Investigation**: Mainly X-ray (orthopantomogram (OPG)) to determine extent of bone loss

**Non-pharmacological Treatment**

- Instruct and guide the patients on proper oral hygiene for proper plaque control
- Plaque control should be undertaken by the dentists by scaling and root planning (this may need several visits as may be necessary)
- Advanced treatment is required– if refractory/resistant to treatment or patient has systemic diseases/ conditions.

**Pharmacological Treatment**

Mouth wash: **Do not swallow**

**A:** Hydrogen peroxide 3% 6 hourly for at least for 5 days

**OR**

**A:** Chlorhexidine gluconate 0.2% 12 hourly at least for 5 days

**OR**

Use antibiotics only for refractory and severe cases as well as those with evidence of periodontal abscess formation:

**A:** Metronidazole (PO) 400mg 8 hourly for 8 days

**AND EITHER**

**A:** Amoxicillin (PO) 500 mg 8 hourly for 8 days

**OR**

**A:** Doxycycline (PO) 100mg 12 hourly for 10 days

**Note:** Patients with systemic diseases/conditions such as diabetes mellitus, liver and renal diseases, HIV/AIDS, and those who are pregnant or heavy smokers of cigarette are generally at increased risk of periodontal diseases and their management may need referral to a periodontal specialist.

## 16.1.3 Acute Necrotizing Ulcerative Gingivitis (ANUG)

It is a severe form of gingivitis and is characterized by rapid destruction of gingival tissue, particularly in the area of the interdental papilla. Patients usually present with soreness and bleeding of the gums and foul smell test (fetor-ex ore/halitosis). Acute Necrotizing Ulcerative Gingivitis (ANUG) is also called Vincent's gingivitis or Vincent's gingivostomatitis. It is common in malnourished children and immunocompromised individuals especially patients with diabetes and HIV/AIDS.

**Diagnostic Criteria**

- Painful and easily bleeding gingival swelling and erythema of the gingival margins
- Yellowish-white ulceration of the gingival
- Fever, malaise and regional lymphadenitis
- In some patients (especially malnourished children), ANUG may presents with extensive destruction of the face and jaws in the severe form known as Cancrum Oris or noma

**Pharmacological treatment**

Professional cleaning with Hydrogen Peroxide 3% (under local anesthesia)

**A:** Metronidazole 400 mg (PO) 8 hourly for 5 days

**AND**

**A:** Amoxicillin 500mg (PO) 8 hourly for 5 days

### 16.1.4 Stomatitis

This is generalized inflammation of the oral mucosal (including the gingiva) due to different aetiologies such as infections, chemical burn, radiation and allergy.

**Diagnostic Criteria**

- Oral sores and ulceration

**Pharmacological treatment**

Generally supportive

Mouth wash

**A:** Hydrogen peroxide solution 3% 6 houlry for at least 5 days

**OR**

**C:** Chlorhexidine 0.2% topical oral gel 12 hourly

**Note:** Mouth wash should not be used at the same time with the gel. Also should not be swallowed.

Oral analgesics can be added

**A:** Paracetamol (PO) 1gm 8 hourly for at least 3 days

**OR**

**A:** Ibuprofen (PO) 400 mg 8 hourly for at least 3 days

**OR**

**C:** Diclofenac (PO) 50 mg 8 hourly for at least 3 days

## 16.2 DENTAL CARIES

Dental caries are caused by bacteria of the dental plaque which feed on sugary food substrates producing acid as by-products which dissolve the minerals of the tooth surface.

**Diagnostic criteria**

- Early stage–asymptomatic
- Intermediate stage: black/brown spot which may be visible on any surface of tooth
- Cavities developing on tooth surface
- Pain/toothache elicited by hot, cold or sweet foods/drinks
- Late stage: pain may be spontaneous, intermittent, sharp and severe, even interfering with sleep.
- Tenderness on percussion of the tooth

**Investigation:** Periapical x-ray of tooth/teeth may need to be done especially to confirm extent of caries for treatment decision e.g. the caries contained in the dentine can be distinguished from pulpal caries.

**Prevention**

- Proper counseling to avoid frequent use of sugary foods and drinks
- Use fluoridated toothpaste to brush teeth at least twice a day
- Provide preventive measures to early lesions presenting as a spot on enamel without cavitation and softening

**Non-pharmacological treatment.**

- Lesion with cavitation but confined to dentine–filling/restoration of teeth with suitable filling materials (e.g. amalgam, composite, glass ionomer)
- Lesion involving the pulp (with or without periapical abscess), perform advanced tooth restoration by endodontic treatment wherever possible otherwise tooth extraction is done

**Pharmacological treatment**

Analgesics: for toothache

**A:** Paracetamol (PO) 1gm 8 hourly for 3 days

**OR**

**A:** Ibuprofen (PO) 400 mg 8 hourly for at least 3 days

**OR**

**C:** Diclofenac (PO) 50 mg 8 hourly for at least 3 days

## 16.3 ODONTOGENIC AND NON-ODONTOGENIC OROFACIAL INFECTIONS

### 16.3.1. Periapical abscess

This clinical condition arises as a complication of inflammation of the dental pulp or periodontal pocket. The condition may be acute and diffuse, chronic with fistula or localized and circumscribed. It is located in the apical aspect of the supporting bone.

**Diagnostic Criteria**

- The patient complains of tooth ache
- Pain during intake of hot or cold foods/drinks
- Pain on bringing the tooth on occlusion
- Tenderness on percussion (vertical percussion)
- Swelling of gingiva around the affected tooth

**Non-pharmacological Treatment**

- For posterior teeth: Extraction of the offending tooth under local anesthesia ( can perform root canal treatment for posterior teeth instead of tooth extraction under good clinical judgement)
- Lignocaine 2% with adrenaline 1:80,000 IU (to establish drainage) is the treatment of choice followed by analgesics.
- For anterior teeth (incisors, canine and premolars: extraction is carried out only when root canal treatment is not possible

**Pharmacological Treatment**

**A:** Paracetamol 1gm (PO) 6 hourly for 3 days.

Antibiotics may be given if the condition is chronic and depending on radiological findings such as bone radioluscence to depict bone resorption and periapical granuloma.

**A:** Amoxicillin 500mg (PO), 8 hourly for at least 7 days

**OR**

**A:** Erythromycin 500mg (PO) 8 hourly for 7 days (if allergic to penicillin)

**AND**

**A:** Metronidazole 400mg (PO) 8 hourly for 7 days

## 16.3.2 Infected Socket

A post extraction complication due to infection of the clot due to contamination (infected socket). The condition is painful and if not managed well could lead to osteomyelitis.

**Diagnostic Criteria**

- Severe painful socket 2–4 days after tooth extraction
- Fever
- Necrotic blood clot in the socket
- Swollen gingiva around the socket
- Sometimes there may be lymphadenopathy and trismus (inability to open the mouth)

**Non-pharmacological Treatment**

- Socket debridement under local anesthesia with lignocaine 2% and irrigate with hydrogen peroxide 3%. The procedure of irrigation is repeated the 2nd and 3rd day and where necessary can be extended to the 4th day if pain persists. On follow-up visits local anesthesia is avoided unless necessary.
- Patient is instructed to rinse with warm saline (5ml spoonful salt in 200mls cup of warm water) or 3% hydrogen peroxide or 0.5% povidone iodine 3–4 times a day

**Pharmacological Treatment**

Antibiotics should be prescribed to prevent progression to osteomyelitis:

**A:** Amoxicillin 500mg (PO) 8 hourly for 5–7 days

**OR**

**A:** Azithromycin 500mg (PO) once a day for 3 days

**AND**

**A:** Metronidazole 400mg (PO) 8 hourly for 5 days.

**Investigation**

Periapical X-ray of the socket may be necessary when there is limited improvement despite treatment.

**Referral:** Maxillofacial unit is considered in case of persistent pain and infection despite treatment for more than two weeks.

### 16.3.3 Dry Socket

This is a post extraction complication due to failure to form a clot (dry socket). The condition is very painful and it differs from an infected socket by lack of clotting and levels of severity of pain.

**Diagnostic Criteria**

- Severe pain 2–4 days post-extraction
- Pain exacerbated by entry of air on the site
- Socket devoid of clot
- Surrounded by inflamed gingiva

**Non-Pharmacological Treatment**

Treatment is under local anesthesia with lignocaine 2%, socket debridement and irrigation with hydrogen peroxide 3%. The procedure of irrigation is repeated the 2nd and 3rd day and where necessary can be extended to the 4th day if pain persists. On follow-up visits local anesthesia is avoided unless necessary. The aim of debridement in this case is to initiate bleeding and formation of fresh clot.

### 16.3.4 Dental Abscess

Dental abscess is an acute lesion characterized by localization of pus (caused by polymicrobial infection) in the structures that surround the teeth.

**Diagnostic Criteria**

- Fever and chills
- Throbbing pain of the offending tooth
- Swelling of the gingiva and sounding tissues
- Pus discharge around the gingiva of affected tooth/teeth
- Trismus (inability to open the mouth)
- Regional lymph nodes enlargement and tender
- Aspiration of pus for frank abscess

**Investigations:**

Pus for Grams stain, culture and sensitivity if the patient doesn't respond to initial antibiotic treatment.

**Non-pharmacological Treatment**

- Incision and drainage and irrigation (irrigation and dressing is repeated daily)
- Irrigation is done with 3% hydrogen peroxide followed by 0.9% Normal saline.
- Supportive therapy carried out depending on the level of debilitation (most patients need rehydration and detoxification using IV Normal saline 0.9% or IV Ringers Lactate)

**Pharmacological Treatment**

**A:** Amoxicillin 500mg (PO) 8 hourly for 5 days

**AND**

**A:** Metronidazole 400 mg (PO) 8 hourly for 5 days.

Severe cases

**B:** Amoxicillin Clavulanic acid 625mg (PO) 8 hourly for 5 days

**AND**

**A:** Metronidazole 400 mg (PO) 8 hourly for 5 days.

If patients are allergic to penicillins:

**A:** Erythromycin 500 mg (PO) 8 hourly for 5 days

Where parenteral administration of antibiotics is necessary (especially when the patient cannot swallow and has life threatening infection), consider

**A:** Ampicillin 500mg IM/IV 6 hourly for 5 days

**OR**

**A:** Ceftriaxone 1 gm IV once daily for 5 days[37]

**AND**

**B:** Metronidazole 500 mg IV 8 hourly for 5 days

**Note**: Incision and drainage is mandatory in cases of deeper spaces involvement followed by a course of antibiotics. The practice of prescribing antibiotics to patients with abscess and denying referral for definitive care until pus has established or resolved has been found to lead to more problems for orofacial infections **THEREFORE** early referral for definitive care is important.

**Criteria for Referral to Dental/Maxillofacial Surgeon**

- Rapidly progressive infection
- Difficulty in breathing
- Difficulty swallowing
- Fascia space involvement
- Elevated body temperature (greater than $39^0$ C)
- Severe jaw trismus/failure to open the mouth (less than 10mm)
- Toxic appearance
- Compromised host defenses

## 16.3.5 Ludwig's Angina

This is a serious life threatening generalized septic cellulitis of the fascia spaces found on the floor of the mouth and tongue. It is an extension of infection from mandibular molar teeth into the floor of the mouth covering the submandibular, sublingual and submental spaces bilaterally.

**Diagnostic Criteria**

- Brawny induration
- Tissues are swollen, board like, not pitted and no fluctuance
- Respiratory distress
- Dysphagia

- Tissues may become gangrenous with a peculiar lifeless appearance on cutting
- Three fascia spaces are involved bilaterally (submandibular, submental and sublingual)

**Non-Pharmacological Treatment**

- Quick assessment of airway
- Incision and drainage is done (even in absence of pus) to relieve the pressure and allow irrigation.
- Only when the airway distress is significant and there is evidence that it is not relieved by incision and drainage then tracheostomy is needed
- Supportive care includes high protein diet and fluids for rehydration and detoxification
- During incision and drainage pus should be taken for culture and sensitivity. Offending tooth should be removed at the same sitting if the patient can open the mouth.

**Pharmacological Treatment**

**A:** Ampicillin 500 mg IV 6 hourly for 5 days

**OR**

**B:** Amoxicillin + clavulanic acid 625mg (PO) 8 hourly for 5 days

**AND**

**B:** Metronidazole 500mg IV 8 hourly for 5 days

If allergic to penicillin use

A: Erythromycin (PO) 500mg 6 hourly for 5 days

**OR**

A: Ceftriaxone 1gm IV once a day for 5 days in case of severe infection.

Once the patient is able to swallow replace IV medicines with oral treatment.

**Note:** For this condition and other life threatening oral conditions consultation of available specialists (especially oral and maxillofacial surgeons) should go parallel with life saving measures.

## 16.3.6 Pericoronitis

Inflammation of the soft tissues covering the crown of erupting tooth and occurs more commonly in association with the mandibular third molar (wisdom) teeth. Impaction of food and plaque under the gingiva flap provides a medium for bacterial multiplication. Biting on the gum flap by an opposing tooth causes laceration of the flap, increasing the infection and swelling with a greater likelihood of traumatic biting.

**Diagnostic Criteria**

- High temperature
- Severe malaise
- Discomfort in swallowing and chewing
- Well localized dull pain, swollen and tender gum flap
- Signs of partial tooth eruption or uneruption in the region

- Pus discharge beneath the flap may or may not be observed
- Foetor-ox oris i.e. bad smell
- Trismus
- Regional lymph nodes enlargement and tenderness

**Non-Pharmacological Treatment**

- Excision of the operculum/flap (flapectomy) under local anesthesia
- Extraction of the third molar associated with the condition
- Grinding or extraction of the opposing tooth

**Pharmacological Treatment**

**A:** Mouth wash with hydrogen peroxide solution 3% 6 hourly for 5 days

**A:** Amoxicillin 500mg (PO) 6 hourly for 5 days

**AND**

**A:** Metronidazole 400 mg (PO) 8 hourly for 5 days

If severe (rarely) refer to section 3.3.4 on treatment of dental abscess

## 16.3.7 Osteomyelitis of the Jaw

This is an inflammation of the medullary portion of the jaw bone which extends to involve the periosteum of the affected area. The infection becomes established in the bone ending up with pus formation in the medullary cavity or beneath the periosteum obstructs the blood supply. The infected bone becomes necrotic following ischemia.

**Diagnostic criteria**

- In the initial stage there is no swelling.
- Malaise and fever
- Enlargement of regional lymph nodes
- Teeth in the affected area become painful and loose, thus causing difficulty in chewing
- Later as the bone undergoes necrosis the area becomes very painful and swollen
- Pus ruptures through the periosteum into the muscular and subcutaneous fascia and eventually it is discharged on to the skin surface through a sinus

**Investigations:**

X-ray – OPG (Orthopantomograph) or mandibular lateral oblique, water's view for maxilla/midface. The x-ray will show sequestra formation in chronic stage. In early stage features seen in x-ray include widening of periodontal spaces, changes in bone trabeculation and areas of radioluscency. Perform culture and sensitivity of the pus to detect the specific bacteria.

**Non-Pharmacological Treatment**

- Incision and adequate drainage to confirmed pus accumulation which is accessible
- Removal of the sequestrum by surgical intervention (sequestrectomy) is done after the formation of sequestrum has been confirmed by X-ray

**Pharmacological Treatment**

**A:** Amoxicillin 500mg 8 hourly for 5 days

**AND**

**A:** Metronidazole 400mg (PO) 8 hourly for 5days. If culture is available treat according to results.

For details on antibiotics see section 16.3.4 above.

**Referral:** Refer the patient to the next facility with adequate expertise and facilities.

## 16.4. FUNGAL INFECTIONS

### 16.4.1 Oral Candidiasis

This is a fungal infection of the oral mucosa caused by *Candida infection* mainly *Candida albicans*. Acute oral candidiasis (thrush) is seen most commonly in the malnourished, the severely ill, neonates and HIV-AIDS patients or patients on long term oral corticosteroid use. In chronic oral candidiasis dense white plaques of keratin are formed. Other risks for candidiasis include chronic diseases like diabetes mellitus, prolonged use of antibiotics and ill/poorly fitting dentures.

**Diagnostic Criteria**

Feature of candidiasis are divided according to the types as follows:

**Pseudomembranous**

- White creamy patches/plaque
- Cover any portion of mouth but more on tongue, palate and buccal mucosa
- Sometimes may present as erythematous type whereby bright erythematous mucosal lesions with only scattered white patches/plaques

**Hyperplastic**

- White patches leukoplakia-like which are not easily rubbed-off.
- Angular cheilitis (angular stomatitis)
- Soreness, erythema and fissuring at the angles of the mouth
- Commonly associated with denture mastitis but may represent a nutritional deficiency or it may be related to orofacial granulomatosis or HIV infection

**Pharmacological Treatment**

**A:** Nystatin (suspension) 100,000IU (1 ml) mixture held in the mouth for at least 3minutes before swallowing, 4 times a day (after each feed)

**OR**

**C:** Miconazole (PO) gel 25mg/ml 5–10mls in mouth –hold in the mouth for 60 seconds before swallowing .The treatment should be continued for 5 days after cure/clearance.

Where topical application has failed or candida infection has been considered severe use;

**A:** Fluconazole (PO) 150mg once daily for 7 days

**OR**

**C:** Itraconazole (PO) 200mg once daily 7 days

**Note:** Candidiasis has several risk factors; it is recommended that for HIV/AIDS patients with candidiasis the HIV guidelines should be referred to.

## 16.5 VIRAL INFECTIONS

**Herpes Simplex Virus**

This is a viral infection commonly affecting the lips and perioral soft tissues presenting as papulovesicular lesions which ultimately ulcerate. The condition is recurrent following a primary herpes infection which occurs during childhood leaving herpes simplex viruses latent in the trigeminal ganglia. The primary infection affects mainly the gingiva and palate.

**Diagnostic Criteria**

- A prodrome of tingling, warmth or itching at the site usually precedes the recurrence
- About 12 hours later, redness appears followed by papules and then vesicles
- These vesicles then burst, weep, dry, scab and then heal
- The length of the cycle is variable (5–12 days mean time being 7 days)

There are no investigations required unless patient has systemic diseases

**Non-Pharmacological Treatment**

- Adequate hydration
- Avoid salty and acidic drinks
- Cover lesions on the lips with Petroleum jelly and control any underlying cause

**Pharmacological Treatment**

This is an otherwise self-limiting condition but if persistent for 10 days or recurrent infection use medication:

For Herpes Labials

**B:** Acyclovir cream apply 4 hourly for 5 days

For Herpes Stomatitis

**B:** Acyclovir (PO) 200mg 6 hourly for 5 days

**A N D**

**B :** Acyclovir cream 12 houlry for 5 days

In immunocompromised patients

**B:** Acyclovir (PO) 400mg 5 times in 24 hours for 5 days

For oral facial lesions of herpes zoster treat with

**B:** Acyclovir (PO) 400–800mg 5 times a day for 5 days.

Pain control by analgesics

A: Paracetamol (PO) 1gm 8 hourly for 3 days

**OR**

C: Diclofenac (PO) 50mg 8 hourly for 3 days

**OR**

A: Ibuprofen (PO) 400 mg 8 hourly for 3 days

## 16.6 APHTHOUS ULCERATION

Aphthous or recurrent aphthous stomatitis (RAS) are painful recurrent mucous membrane ulcerations. Usually affect the non-keratinized oral mucous membrane.

**Diagnostic Criteria**

There are 3 types of aphthous ulcers as follows:

**Minor Aphthous Ulcers**

Small round or ovoid ulcers 2–4 mm in diameter, surrounded by an erythematous halo and some edema It occurs in groups of only a few ulcers (i.e. 1–6) at a time. Found mainly on the non keratinized mobile mucosa of the lips, cheeks, floor of the mouth, sulci, or ventrum of the tongue. Heal spontaneously in 7–10 days and have little or no evidence of scarring.

**Major Aphthous ulcers**

Painful ulcers on non-keratinized oral mucous membrane, they are large 1–3 cm edged ulcers, and several may be present simultaneously. There is marked tissue destruction which is sometimes constantly present. Healing is prolonged often with scarring

**Herpetiform ulcers**

These occur in a group of multiple ulcers which are small (1–5 mm) and heal within 7–10 days. Rationale of treatment is to offer symptomatic treatment for pain and discomfort, especially when ulcers are causing problems with eating

**Pharmacological Treatment**[33]

**S:**Triamcinolone acetonide cream 0.1% apply 12 hourly for 5days

**OR**

**B:** Chlorhexidine gluconate 0.2% mouthwash used 8 hourly for 5 days

If systemic therapy is required;

**B:** Prednisolone (PO) 20mg 8 hourly for 3 days then dose tapered to prednisolone (PO) 10mg 8 hourly for 2 days then 5mg 8 hourly for other 2 days.

**A:** Paracetamol (PO) 1gm 8 hourly for 3 days when required for pain

**Referral:** If the ulcers persist for more than 3 weeks after treatment, such lesions may need histological diagnosis after specialist opinion. Therefore, refer the patient to the next facility with adequate expertise and diagnostic equipments.

## 16.7 POST EXTRACTION BLEEDING

Commonly due to disturbing the blood clot by the patient through rinsing or inadequate compression on the gauze, though at times may be due to bony/tooth remnants.

**Diagnostic Criteria**
Bleeding socket can be primary (occurring within first 24 hours post extraction) or secondary occurring beyond 24 hours post extraction.

**Primary Bleeding Socket**

- Active bleeding from the socket
- The socket may or may not have blood clot
- Patient may be dehydrated and pale if has lost significant amount of blood
- Features of decreased pulse rate and volume, hypotension also if patient has lost significant amount of blood
- Examine the socket for trauma in surrounding bone

Secondary bleeding socket may show features of infection or trauma

**Non-Pharmacological Treatment**

- Ensure the patient airway, breathing and circulation are restored if required
- Check blood pressure and pulse rate and take quick history
- Give local anesthesia (lignocaine 2% with adrenaline 1 in 80,000 IU)
- Clear any clot available and examine the socket to identify source of bleeding
- If the bleeding was from soft tissue (which is common) remove any foreign body like bone spicule if found, smoothen any sharp edges
- Suturing of the wound only when necessary (like significantly traumatized gingiva)
- Check and repack the socket with gauze.
- Give proper instructions to follow (bite on gauze pack for 30 minutes, not to rinse or eat hot foods on that day at least for 12 hours and avoid disturbance to the wound)
- Packing can be done with materials which stimulate blood clotting like oxidized cellulose (e.g. surgicel/gauze) or thrombin-containing gel foam sponges

**Pharmacological treatment**
Analgesics may be needed:

**A:** Paracetamol (PO) 1gm 8 hourly for 3 days
**OR**
**C:** Diclofenac (PO) 50mg 8 hourly for 3 days
**OR**
**A:** Ibuprofen (PO) 400mg 8 hourly for 3 days
**AND**
**C:** Tranexamic acid 500 mg (PO/IV) 8 hourly for first 24 hours.

Intravenous fluid especially Normal saline 0.9% or Ringer's lactate in case of dehydration then followed by blood transfusion in case of hemoglobin below 7 g/dl in a patient who was otherwise healthy before tooth extract.

**Note**: Rule out bleeding disorders: if bleeding continued after 24 hours despite the steps above, consult a hematologist or available physician for further management

## 16.8 TOOTH SENSITIVITIES

Usually due to attrition of teeth, abrasion or gingival recession

**Non-Pharmacological treatment**
Recommend brushing teeth with desensitizing toothpaste for sensitive teeth.
**C:** Fluoride gel, apply 12 hourly

## 16.9 TOOTH ERUPTION, SHEDDING AND EDENTULOUSNESS

### 16.9.1 Eruption of Teeth

Eruption of deciduous /primary teeth usually starts at five months of age. Symptoms associated with it like fever and diarrhea are normal and self limiting unless any other causes can be established. The following conditions are usually associated with tooth eruption and should be referred to dental personnel: eruption cysts, gingival cysts of the newborn and pre/natal teeth.

**NOTE:** "nylon teeth" is a myth/belief existing in some traditions. These are conditions associated with the eruption of deciduous/primary teeth

### 16.9.2 Shedding of Deciduous/primary (milk) Teeth

Phenomenon of losing deciduous/primary teeth occurring between ages of 5–12 years is a normal physiological change. Deciduous/primary teeth should be left to fall out themselves unless the teeth are carious or there is any other indication. Parents should be counseled accordingly and be instructed to assist their children to loosen the already mobile teeth and when there is no success or the permanent teeth are erupting in wrong direction should consult a dentist. Most carious teeth will need management by a dentist. Early loss of primary teeth may lead to crowding of permanent teeth.

### 16.9.3 Edentulousness

It is the partial or full loss of natural teeth and subsequent resorption of the alveolar bone.

**Non-Pharmacological Treatment**
Design and construct dental prosthesis according to aesthetic and functional needs. Many materials can be used including: alginate impression materials, calcium chloride powered, acrylic and porcelain, (refer NEMLIT for dental supplies)

## 16.10 MALOCCLUSIONS

Malocclusion is any variation in the arrangement of teeth leading to abnormal occlusion to the extent that may be functionally harmful or aesthetically objectionable.

**Diagnostic Criteria**

Therearesevera lformsofmalocclusion

**Class I**

- The sagittal arch relationship is normal. The anterior buccal groove of the lower permanent molar should occlude with the anterior buccal cusp of the upper first permanent molar

**Class II**

- The lower arch is at least one half a cusp width too far distal to the upper

**Class III**

- The lower arch is at least one half a cusp width too far mesial to the upper

**Non-Pharmacological treatment**

- Reduce possibility of temporomandibular joint pain dysfunction syndrome especially in case of cross bites
- Reduce risks of traumatic dental injuries especially in overjet
- Reduce traumatic occlusion and gum diseases and caries especially in crowding
- Avoid psychosocial effects resulting from to lack of self esteem, self confidence personal outlook and sociocultural acceptability

Orthodontic appliances, either removable or fixed can be used to treat malocclusion. Simple removable appliances are very useful in our local settings especially for mild to moderate malocclusion in teenagers and include retainers or space maintainers.

Fixed orthopedic appliances (braces) are useful in malocclusion which has resulted in relapses of failure after use of removable appliances and moderate to severe malocclusion which cannot be managed by removable appliances. Adolescents and adult patients requiring fixed appliances should be referred to an orthodontist. Preventive orthodontic treatment by serial preventive extraction to create a space for anterior permanent teeth can be done by qualified dental personnel, if in doubt it is recommended to consult an available dental specialist.

## 16.11 TRAUMATIC DENTAL INJURIES

It may result in loosening, displacement and or loss of teeth, fracture of teeth and or bone, lacerations and bleeding. The commonest causes are falls (in sports and play) at home or school and motor accidents. Most affected are upper incisors.

**Diagnostic Criteria**

| Type | Presentation |
|---|---|
| Tooth concussion | Is an injury to supporting tissues of tooth, without displacement |
| Sublaxation | Is the partial displacement, but is commonly used to describe loosening of a tooth without displacement |
| Intrusion | Is the displacement of tooth into its socket often accompanied by fracture of alveolar bone |
| Luxation | Is the displacement of tooth laterally, labially or palatally. |
| Avulsion | Is the complete loss of tooth from the socket |

**Soft tissue Injuries**

**Abrasion**: where friction between an object and the surface of the soft tissue causes a wound. This wound is usually superficial, denudes the epithelium, and occasionally involves deeper layers.

**Contusion/Bruising**: indicates that some amount of tissue disruption has occurred within the tissues, which resulted in subcutaneous or sub mucosal hemorrhage without a break in the soft tissue surface.

**Laceration**: is a tear in the epithelial and sub epithelial tissues. It is perhaps the most frequent type of soft tissue injury, is caused most commonly by a sharp object

**Non-Pharmacological Treatment**

- Check for facial fractures and trauma to other sites, rule out evidence of head injury (amnesia, loss of consciousness, neurological signs)
- Intra-oral examination: Look for soft-tissue lacerations, dentoalveolar fractures and damage to teeth
- Check for tooth fragments which may be displaced in soft tissues
- Examine traumatized teeth for mobility and check mobility
- X-rays: (periapical x-ray) especially for suspected root fracture, and OPG x-ray for suspected alveolar bone fracture and jaw fracture
- Suture for any soft tissue wounds
- Extraction is treatment of choice for significantly traumatized primary/deciduous teeth with mobility and or displacement.
- Refer to a dentist, where available orthodontics or endodontic specialist depending on the need of advanced treatment

**Note*:*** Give tetanus toxoid (0.5% IU) if patient has not received vaccination in the previous 10 years.

**Referral**: to oral and maxillofacial surgeon for patients with complicated maxillofacial injuries

**Pharmacological Treatment**

Pain control by analgesics

**A:** Paracetamol (PO) 1g 8 hourly for 3 days

**OR**

**C:** Diclofenac (PO) 50 mg 8 hourly for 3 days

**OR**

**A:** Ibuprofen (PO) 400 mg 8 hourly for 3 days

Prophylactic antibiotics are indicated in cases of suspected contamination or extensive damage

**A:** Amoxicillin (PO) 500 mg 8 hourly for 5 days[6]

## 16.12 TUMOURS AND TUMOUR-LIKE CONDITIONS OF ORAL CAVITY AND FACIAL REGION

### 16.12.1 Benign odontogenic tumors

Each tumor presents with different cardinal features radiologically and on histopathological diagnosis.

**Ameloblastoma:**

- Recognized between ages of 30 and 50 years
- 80% form in the mandible and 70% develop in the posterior molar region and often involve the ramus
- Painless, slow growing tumor that may be solid or cystic
- Looseness of teeth, with roots resorption
- Gradual facial asymmetry due to enlargement and destruction of bone
- Continuous sheet of paper thin bone covering the tumor
- Radiographically the tumor presents with the following features: Multilocular radiolucency, honeycomb or soap bubble appearance

**NOTE**: Diagnostic confirmation of this tumor is through histopathology. Complete excision e.g. total resection of the jaw, segmental resection plus bone grafting is the treatment of choice. Hence refer the patient to a centre where there is Oral and Maxillofacial surgeon and Histopathology Unit.

**Calcifying odontogenic tumors**

- Most often found in the mandibular molar/premolar region, but 33% of cases are found in the maxilla
- It is associated with an unerupted or impacted tooth in 50% of cases
- Radiographically these lesions can be radiolucent, but more characteristically are mixed lucent and opaque masses, exhibiting a snow-driven appearance

**Non-Pharmacological Treatment**

Complete excision of the tumour with border of normal lobe should be curative, but recurrence follows incomplete excision.

**Amelobastic fibroma**

- Slower growing tumor than the simple ameloblastoma and does not infiltrate between bone trabeculae

- 75% of ameloblastic fibromas are found in the posterior mandible in the area of a developing tooth. It is benign and expansile, growing as a pushing front rather than invading surrounding tissues
- Radiographically: This lesion appears as a uniocular or bilocular radiolucency, most often in the posterior mandible. The radiographic appearance is identical to that of unicystic ameloblastoma, and both lesions should be differential diagnoses because they affect similar age groups and have similar clinical and radiographic appearances. Histologic examination differentiates the two.
- Conservative resection is effective, but if incomplete, recurrence follows

**Adenomatoid tumors (Adenoameloblastoma)**

- Two thirds of the cases occur in the anterior maxilla, one third occur in the anterior mandible, and it is never found posterior to the premolars
- Two thirds of the cases are associated with an impacted tooth (usually the cuspid)
- Present with mild swelling or in association with a clinically missing tooth
- Radiographically: This lesion generally appears as a well-demarcated radiolucency. In 75% of cases, it is associated with an unerupted tooth, usually the canine. It may contain radiopaque flecks, which represent calcified material. If associated with a tooth, it generally attaches to the tooth further apical on the root than the typical dentigerous cyst.

**Non-Pharmacological Treatment**

Enucleation is curative and recurrence is almost unknown.

**Odontogenic myxoma**

- Clinically indistinguishable from ameloblastoma
- The radiographic appearance of this lesion is not distinctive. It appears quite similar to ameloblastoma (eg, multilocular radiolucency)
- Confirmation is through Histopathology

**Non-Pharmacological treatment**

Wide excision is required.

Other tumors of which needed to be diagnosed through histopathogy are; Odonto ameloblastoma, Complex odontoma, Compound odontoma, Odontogenic fibroma, Cementoma and Cementifying fibroma.

### 16.12.2 Non odontogenic benign tumors (benign osteogenic tumors, arise from bone)

**Ewing's tumor**

**Diagnostic criteria:**

- Painful swelling accompanied with fever
- It is characterized by extraordinarily fast growth
- Radiographically: Poorly defined solitary osteolytic lesion, irregular moth–eaten appearance which may be undetectable in serial images for a long period. Histological diagnosis is needed

**Pharmacological Treatment**
The initial treatment is wide excision, if not possible radiation should be considered. Combination chemotherapy should be given.

**Pregnancy tumors**
**Diagnostic criteria:**

- They most commonly appear after first trimester, grow rapidly, and typically regress after delivery
- Found on the gingiva and arise predominantly
- They are exophytic, lobulated, or smooth surfaced lesion with a red to purplish color and a soft, spongy texture.

**Non-Pharmacological Treatment**
Surgical intervention is often not required. However, pregnancy tumors can be removed during the second trimester if they interfere with occlusion, are painful, bleed excessively, or are excessively large. Lesions excised during pregnancy often recur. After delivery, pregnancy tumors typically recede spontaneously but excision may be necessary for those cases which persist. Other non-odontogenic tumors are Osteomas, Myxomas, Chondromas, Central giant cell and Fibro-osteoma.

### 16.12.3 Benign Soft Tissues Non-odontogenic Tumors

**Diagnostic criteria**
**Haemangioma**

- Enlarged, vascular hamartoma appears as a painless, soft, smooth or lobulated, sessile or pedunculated mass but may ulcerate and possibly hemorrhage if traumatized
- The lesions present with deep red or bluish red in color and moderately firm to palpation.
- May occur on tongue, lips, buccal mucosa, gingiva, palatal mucosa, salivary glands, alveolar ridge, and jaw bone
- They occur early in life and may enlarge rapidly or progressively as the patient grows

**Non-Pharmacological Treatment**
Most true hemangiomas require no intervention as some congenital lesions may undergo spontaneous regression at an early age. However, 10–20% require treatment because of the size, exact location, stages of growth or regeneration and functional compromise. The potential for severe hemorrhage caused by the vascular nature of the lesion must be considered. Hence, refer the patient to a centre where there is Oral and Maxillofacial surgeon.
Other soft tissue non-odontogenic tumors are Papilloma, Fibroma, Fibrous Epulis, Peripheral Giant Cells, Lymphangioma, Lipoma and Pigmented nerves.

General non-pharmacological treatment of benign tumors

- Enucleation or excision is the treatment of choice depending on the type. Can be hemimandibulectomy, total mandibulectomy, hemimaxillectomy or total maxillectomy.

- Treatment of most of these conditions needs the expertise of an oral and maxillofacial surgeon and patients should be referred

### 16.12.4 Malignant soft and bone tumors

**Squamous cell carcinoma**
**Diagnostic criteria**

- A sore in the mouth that does not heal (most common symptom)
- Pain in the mouth
- Persistent lump or thickening of mucosa in the cheek
- Persistent white or red patch on the tongue, gums, tonsils, or lining of the mouth
- Difficult moving jaw or tongue
- Difficult chewing or swallowing
- Enlarged cervical lymph nodes may be present

**NOTE:** Take tissue biopsy of the lesion and send for histopathology investigation or refer the patient as early as possible to a centre where there is Oral and Maxillofacial surgeon and Histopathology unit.

Other malignant soft and bone tumors are Lymphosarcoma, Myosarcoma, Chondrosarcoma, Fibrosarcoma, Adenosarcoma, Adenocystic carcinoma and epidermoid carcinoma.

**Treatment**
Palliative – but this depends on stage of the tumor: stage I and II surgical excision (squamous cell carcinoma) with wide margin then curative radiotherapy. Others, surgical excision, radiotherapy followed by chemotherapy.

**Lymphomas**
These are group of neoplasms of varying degrees of malignancy which are derived from B-cells of lymphoid tissues, the lymphocytes and histiocytes in any of their developmental stages.

**Burkitt's Lymphoma** (African Jaw Lymphoma)
**Diagnostic criteria**.

- It shows close association and infection with the Epstein Barr virus. Confined almost exclusively to children between 2–14 years of age
- Rapidly growing tumor mass of the jaws, destroying the bone and causing teeth loosening with extension the maxillary, ethmoid and sphenoid sinuses as well as the orbit.
- Visceral organ involvement also occurs.
- **NB:** Diagnostic confirmation is through histopathology, hence, it is emphasized to do early detection and referral since Burkitt's lymphoma responds very quickly on chemotherapy. (For detailed management of malignant tumors please refer to the malignancy on **chapter twenty two**)

# CHAPTER SEVENTEEN
# MUSCULORSKELETAL DISORDERS

These are diseases or conditions affecting the muscles, tendons, nerves, bones and joints of the human body.

## 17.1 INFECTIONS

### 17.1.1 Osteomyelitis

Osteomyelitis is an infection of the bone, and is most common in children under 12 years. Staphylococci are the most frequent responsible organisms. Salmonella osteomyelitis infection is a common complication of sickle cell disease. Tuberculosis osteomyelitis occurs in association with having tuberculosis.

**Diagnostic Criteria**

- Fever, malaise and severe pain at the site of bone infection in acute osteomyelitis
- If the infection is close to a joint there may be a 'sympathetic' effusion

**Investigations**

- Total and differential WBC
- CRP
- Urinalysis, urine for culture and sensitivity
- Blood for culture and sensitivity
- Pus for culture and sensitivity
- Plain X-ray (Note: The first radiological sign appears 12–14 days after onset).

**Pharmacological Treatment**

**Table 17.1: Types of Bone Infection and Treatment**

| Condition | Treatment | Duration |
|---|---|---|
| Acute osteomyelitis | Surgical drainage (recommended in all cases presenting with history > 24 hours)<br>**B:** Cloxacillin (IV) 1–2 g 6 hourly **Or**<br>**S:** Clindamycin (IV) 600 mg 8 hourly.<br>See Notes on Acute Osteomyelitis in the text. | 6 weeks or stop at 3 weeks if X-ray normal |
| Chronic osteomyelitis | Surgery. Antibiotics not generally recommended | |
| Osteomyelitis in patient with sickle cell anemia | **A:** Ampicillin (IV) 2 g 6 hourly<br>**Plus**<br>**B:** Cloxacillin (IV) 1–2 g 6 hourly<br>**Plus**<br>**B:** Chloramphenicol (IV) 500 mg 6 hourly<br>(if salmonella is suspected) | 5 to 12 weeks<br><br>6 to 12 weeks<br><br>2 to 3 weeks |
| Septic arthritis | Surgical drainage<br>**B:** Cloxacillin or<br>**S:** Clindamycin as for acute osteomyelitis | |

| | | |
|---|---|---|
| Gonococcal arthritis | **A:** Benzyl penicillin (IV) 2.5–5 MU 6 hourly or (if penicillin resistant)<br>**S:** Kanamycin (IM) 2 g once daily | 6 days<br><br>7 days |
| Open fracture (no infection established | **B:** Cloxacillin (IV) 1 g 6 hourly<br>**Or**<br>**S:** Clindamycin (IV) 600 mg 8 hourly<br>**A:** Ceftriaxone 1 g 8 hourly | 3 days |

### 17.1.2 Tropical Pyomyositis

This is a condition whereby there is pyogenic infection of large muscle/muscles with extensive necrosis of the involved muscle. This condition occurs more commonly in the tropics.

The cause of tropical pyomyositis is uncertain since abscesses explored early are sterile but later culture of the pus usually yields Staphylococcus aureus.

**Diagnostic Criteria**

- Fever and painful induration/fluctuation of one or more of the large muscles, mostly in the lower limbs.

**Investigations**

- FBC
- ESR

**Surgical Treatment:** Drain the pus from abscess

**Pharmacological Treatment**

**Adults:**

**B:** Flucloxacillin 250mg **+** Amoxycillin 250mg PO 6 hourly for 14 days

**OR**

**A:** Erythromycin 500 mg PO 6 hourly for 14 days;

**Children:**

**B:** Cloxacillin25 mg/kg (IV) 6 hourly for 14 days

**OR**

**A:** Erythromycin 10 mg/kg 6 hourly for 14 days

## 17.2 INFLAMMATORY CONDITIONS

These are a group of diverse inflammatory conditions due to different causes which affect joints and other musculoskeletal tissues.

**General Guidelines**

- The first-line treatment is a non-steroidal anti-inflammatory drug (NSAID). This group includes medicines like aspirin, diclofenac and Ibuprofen, (provide dosage and scientific proof) but does NOT include paracetamol
- NSAIDs should be used cautiously in pregnancy, the elderly, and patients with asthma and liver or renal impairment.
- NSAIDS should be avoided in patients with bleeding disorders

- NSAIDS increases the risk of heart failure and stroke and should be avoided in patients with cardiovascular diseases and those who are at high risk
- NSAIDs should be avoided in patients with current or past peptic ulceration.
- NSAIDs should be taken with food
- If dyspeptic symptoms develop in a patient on NSAIDs, try adding magnesium trisilicate mixture. If dyspepsia persists and NSAID use considered essential antagonist
- Physiotherapy is a useful adjunct treatment in many inflammatory joint conditions

**Referral**:
For patients with serious rheumatic disease and peptic ulceration should be referred to higher level health facility with adequate expertise and facilities.

## 17.2.1 Rheumatoid Arthritis

Rheumatoid arthritis is an autoimmune condition whereby the immune system attacks the synovial membrane of joints, initially of the small joints but progressively involving the big joints. It has a wide range of clinical presentation depending on extent of joints involvement and severity of the condition.
It is a chronic multisystem disease of unknown aetiology

**Diagnostic Criteria**

- In the majority of patients with RA, the onset is insidious with joint pain, stiffness and symmetrical swelling of a number of peripheral joints
- The clinical course is however, variable.

**Investigations**

- Rheumatoid Factor (positive in about 30% of cases)

**Pharmacological Treatment**

**A:** Acetylsalicylic acid 1.2 g PO 6 hourly with food.

**OR**

**A:** Ibuprofen 400–800 mg PO 8 hourly. Continue for a long as it is necessary

**NOTE:** Patients with intractable symptoms may require special treatment at specialized centre

## 17.2.2 Gout

Gout is a recurrent acute arthritis of peripheral joints which results from deposition, in and about the joints and tendons, of crystals of monosodium urate from supersaturated hyperuricaemic body fluids. The arthritis may become chronic.

**Diagnostic Criteria**

- The main clinical features are those of an acute gouty arthritis, often nocturnal, throbbing crushing or excruciating pain.

- The signs resemble an acute infection with swelling, hot red and very tender joints.
- The first metatarsophalangeal joint of the big toe is frequently involved

**Investigation**
- Serum uric acid level.

**Non-Pharmacological treatment**
- In obese patient, reduce weight
- Avoid precipitants e.g. alcohol
- Institute anti-hyperuricaemic therapy e.g. **A:** Allopurinol give 100 mg daily. This may be increased up to even 600mg daily depending on response to reduce uric acid synthesis
- Prevention or reversal of deposition of uric acid crystals in males

**Note:** Aim is to maintain serum uric acid level below 8mg/dl (0.48mmol/l)

**Pharmacological Treatment**
**For acute attack give:**

**A:** Ibuprofen 400mg (PO) start then 200mg 8 hourly until 24 hours after relief of pain.
**C:** Meloxicam 7.5mg–15mg (PO) 12 hourly for 5 days
**C:** Piroxicam 10–20mg (PO) once a day for 5 days

### 17.2.3 Osteoarthritis

It is a common form of arthritis, characterized by degenerative loss of articular cartilage, subchondral bony sclerosis, and cartilage and bone proliferation subsequent osteophyte formation. Cause is unknown, but genetic, metabolic and biomechanical have been suggested. Gradual onset of one or a few joints involved.

**Diagnostic criteria**
- Pain is the commonest symptom
- Specific clinical features depend on the joint involved e.g. enlargement of distal interphalangeal joint (Bouchard's nodes)

**Investigation**
- Plain X-ray of involved joint/ joints

**Non-Pharmacological Treatment**
- Rest the joint. Use crutches or walkers to protect weight bearing joints in severe cases.
- Crepe bandage or braces also can be worn during the active phase of disease.
- Reduction of weight in obese patients
- Physiotherapy–exercise to the affected joints

**Pharmacological Treatment**

**A:** Acetylsalicylicacid 900 mg (PO) 6 hourly with food

**OR**

**A:** Ibuprofen 400mg (PO) start then 200mg 8 hourly

**OR**

**C:** Diclofenac sodium 50 mg PO 8 hourly for 3–5 days

NOTE: In severe cases surgery may be indicated e.g. hip joint replacement, knee replacement

## 17.3. LOW BACK PAIN

Low back pain is a common presenting complaint especially among the elderly. It may be a mild, transient symptom or chronic and disabling complaint. There are many causes of low back pain but a cause can usually be found from a good clinical history and physical examination. In some patients however, no cause will be found and these people are described as having nonspecific back pain. Acute ligamentous (sprain) lesions and muscular strain are usually self-limiting.

**Diagnostic Criteria**

Proper history and careful physical examination

- Acute ligamentous (sprain) lesions
- Muscular strain
- Chronic osteoarthritis

Other causes include:

- Back strain due to poor posture worsened by mechanical factors like overuse, obesity and pregnancy
- A protruding or ruptured intervertebral disk
- Traumatic ligament rupture or muscle tear
- Fracture
- Infection (e.g. tuberculosis or septic discitis)
- Malignancy e.g. metastases, multiple myeloma or spinal tumour, prostatic carcinoma
- Congenital abnormalities e.g. abnormal intervertebral facets, sacralization of L–5 transverse process
- Spondylolisthesis – i.e. Slipping forward of a vertebra upon the one below
- Narrowed spinal canal from spinal stenosis
- Psychogenic pain: The back is a common site of psychogenic pain. Inconsistent historical and physical findings on sequential examination may make one suspicious of this diagnosis
- Fibromyalgia rheumatica, connective tissue diseases (give dexamethasone 0.1mg/kg od)

**Table 17.2: Points of Distinction between Inflammatory and Mechanical Back Pain**

| | Inflammatory | Mechanical |
|---|---|---|
| ONSET | Gradual | Sudden |
| WORST PAIN | In the morning | In the evening |
| MORNING STIFFNESS | Present | Absent |
| EFFECT OF EXERCISE | Relieves pain | Aggravates pain |

**Features that suggest that back pain may be serious**

- Recent onset
- Weight loss
- Symptoms elsewhere e.g. chronic cough, weakness of the lower limbs, incontinence etc
- Localized pain in the dorsal spine
- Fever
- Raised ESR

**Investigations**

- X-ray is common
- CT scan and/or MRI in case of spinal stenosis
- FBC, ESR

**Non-Pharmacological Treatment**

Treat by relieving muscle spasm with bed rest in a comfortable position with hip and knees semi flexed; Physiotherapy

**Pharmacological Treatment**

**A:** Ibuprofen 400mg (PO) 8 hourly for 5 days

For severe pain

**C:** Diclofenac 75 mg IM 12 hourly by deep IM injection

**OR**

**C:** Diclofenac 50 mg rectal 8 hourly for 3 days

**C:** Diclofenac gel 12 hourly

**OR**

**C:** Tramadol, 50 mg (PO) 8 hourly for 3 days.

For chronic low back pain

- Weight reduction in the obese,
- Improving muscle tone,
- Physiotherapy,
- Improving posture.
- Surgical procedures may be necessary, e.g. in disc disease or spinal stenosis.

Give NSAID, (refer dose as for pain as above). AVOID narcotic analgesics. If symptoms persist, refer the patient.

Refer the patient to the next facility with adequate expertise and facilities

Several investigations including X-ray, CT SCAN, MRI, FBC, serum uric acid etc should be performed according to specialist protocol. Treatment may still be non surgical as above or otherwise.

**For radicular pain in chronic low back pain:**

**D:** Gabapentin PO 300mg nocte for 4 weeks
**C:** Vit $B_1$+$B_6$+$B_{12}$ 1tablets once daily for 4 weeks
**D:** Pregabalin 75mg nocte for 4 weeks

# CHAPTER EIGHTEEN
# TRAUMA & INJURIES

## 18.1 GENERAL MANAGEMENT OF TRAUMA

Trauma may occur as a result of motor vehicle crash, fights, fall, gunshot, sports, animal bites etc. and is associated with head, musculoskeletal, lacerations, visceral and neurovascular injuries. The aim of managing trauma is to prevent life threatening complications that may lead to increased morbidity and mortality. There is a systematic trauma protocol in place, Glascow coma score (level of consciousness), trauma score, ABCDE protocol, emphasizing on the primary survey, resuscitation and finally secondary survey.

**Diagnostic criteria**

- There is a history of trauma
- Level of consciousness
- ABCDE

**General Treatment**

**Community/Dispensary Level Interventions**

- Clear airway
- Minimize bleeding and dress wounds
- Assess cardiac function: arterial pulse, BP and capillary refill.
- Administer analgesics for pain control
  **A:** Diclofenac injections 75mg 8hrly
- Splint long bone fractures
  - ✓ Use available splint and neck collar
- If unconscious put in coma position and protect the spine.
- Consider anti-tetanus prophylaxis according to the protocol (see table below)
- Refer to the centres/health facilities where there is expertise.

**Health Centre Level Interventions**

- Manage as above, capitalizing on ABCDE Trauma Protocol, review the resuscitation therapy given before arrival
- Catheterize bladder in unconscious patient.
- Give IV Normal Saline or Ringer's Lactate
- Do not feed patient, if unconscious put an NGT tube and an oxygen face mask
- If there are open wounds do surgical debridement and dress:

Give **A:** Ampicillin 500 mg IV 6 hourly

**OR**

**B:** Chloramphenicol 500 mg IV 6 hourly

**OR**

**B:** Cloxacillin 500 mg IV 6 hourly

- Anti-tetanus prophylaxis according to the protocol (see table below)
- Anti rabies according to the protocol
- Refer if

- Comatose for ICU care and brain CT scan
- Open fracture if surgery not feasible
- Failed to resuscitate, need blood transfusion or laparotomy is necessary

**Hospital Level Interventions**

- Manage as above-primary and secondary survey, review the resuscitation management given before arrival to hospital
- Search systematically according to ABCDE Trauma Protocol for any signs of major injury such as:-
  - Head and Eye injury
  - Dental trauma
  - Fractured spine
  - Chest injuries
  - Internal abdominal/Pelvic injuries
- Manage accordingly. Emergency/casualty room set up is mandatory.
- Refer if specialist intervention is required

**Table18.1: ABCDE Trauma Protocol**

| | **Assess** | **Intervention** |
|---|---|---|
| A (airway) | Is it patent?<br>Any secretions?<br>Tongue fall?<br>Any mouth/nose bleeding?<br>Did patient drowned? Vomited? Aspirated? | Place an oral airway.<br>Raise the chin of mandible<br>Suctioning if required<br>Endotracheal intubation (ETT) |
| B (breathing) | Record the respiratory rate (normal 10-20/min adults; 30–60/min children)<br>Assess for chest asymmetry, abnormal movements or chest in-drawing<br>Locate the trachea centrality<br>Ensure air entry into both lungs by auscultation | Assist breathing by mouth to mouth, ambu bag or nasal prongs<br>If fails do ETT and mechanical ventilation<br>Place the chest tube in case of hemothorax, pneumothorax or tension types<br>Plaster the open chest wound |
| C(circulation) | Assess arterial pulse, BP and heart sounds for signs of shock | Treat shock accordingly<br>Set an I.V. line with isotonic fluids |
| D (Disability) | Assess level of consciousness using GCS scale | Treat the head injury accordingly |
| E (exposure) | Un-dress the patient to observe for signs of soft tissue injuries or fractures. Blunt injuries to the chest, abdomen or the dorsal spine may indicate the life threatening ailment underneath. | Catheterize<br>NGT insertion<br>Treat accordingly. Surgery may be indicated based on specialist requirement |

## 18.2 TRAUMATIC BRAIN INJURIES (TBI)

It is any episode of trauma to the head (brain). Mortality is high.

**Diagnostic criteria**

- Head injury may be associated with ophthalmic, ENT and dental injuries which are discussed separately.
- It is classified into two:
  - Involving scalp only
  - Traumatic brain injury

**Table18. 2: Illustration of Traumatic Brain Injuries**

| | |
|---|---|
| Mild Traumatic Brain injury | • Glasgow coma scale 13–14<br>• Involves a "brief" period of loss of consciousness<br>• Good progress with minimal or no long term sequel |
| Moderate Traumatic Brain Injury | • Glasgow coma scale 9–12<br>• Confused patient with focal neurological deficits but able to follow simple commands<br>• Some mild long-term sequel<br>• Good prognosis |
| Severe Traumatic Brain injury | • Glasgow coma scale <8 (This is the definition of coma)<br>• Unable to follow commands initially<br>• Significant long-term disability |

**Treatment**

**Community/Dispensary level Interventions**

- Clean and dress any wound
- If unconscious, ensure airway is patent
- Keep patient warm
- Put in coma position
- Prevent spinal injury by stabilizing the neck with neck collar
- Refer to the centres/health facilities where there is expertise

**Health Centre Interventions**

- Take full history from patient, relatives or whoever has brought patient where indicated, follow the ABCDE trauma protocol
- Ensure adequate oxygenation by mask or ETT
- Surgical debridement and suture wound as appropriate
- Record and monitor vital signs including pupil size and symmetry
- Give IV line Normal saline or Ringer's lactate (do not give dextrose infusion!)
- Catheterize
- Refer if moderate or severe TBI, seizure or pupil asymmetry.

**Hospital Level Interventions**

- History as above, follow the ABCDE trauma protocol
- Examine patient thoroughly, note the level of consciousness, pupils' asymmetry and any lateralizing signs
- Treat seizures by:
  - **A:** Diazepam inj. 10mg 8 hourly
  - **B:** Phenobarbitone inj. 100mg 8 hourly
  - **C:** Phenytoin inj 100mg 8 hourly
- Brain CT scan if GCS score is 9 or below (absolute indication), GCS 10–14 relative indication for CT scan
- Admit to ICU if GCS score is 8 and below, or refer if required
- Craniotomy is indicated for specialist cases e.g. intracranial hematomas, depressed skull fractures based on pupil asymmetry, lateralizing signs and brain CT scan
- Refer orConsult the specialist if indicated especially moderate and severe traumatic brain injury, pupil asymmetry is noted or evidence in brain CT scan

**Table 18.3: Use GLASGOW Coma Scale**

| SCORE | MOTOR RESPONSE | SCORE | VERBAL | SCORE | EYE |
|---|---|---|---|---|---|
| 6 | obeys verbal command | 5 | Oriented and Converses | 4 | Eye open spontaneously command |
| 5 | Localises painful stimulus | 4 | Disoriented and converses | 3 | Eye open to verbal command |
| 4 | Flexes limb to painful stimulars | 3 | Inappraite words | 3 | Eye open to pain |
| 3 | Abnormal flexion painful stimulare | 2 | Inappropriate sound | 2 | Eye open to pain |
| 2 | . Extension to painful stimulus | 1 | No response | | |
| 1 | No response | | | | |

**Severe Traumatic Brain Injury**

It is the most disabling condition that is associated with great mortality if not treated optimally. It is invariably followed by permanent disabilities. Multidisciplinary approach is of paramount importance. Long-term hospitalization followed by rehabilitation is advised. Comorbidity is very often observed.

**Treatment**

- ICU admission observing the neurocritical care and ABCDE protocol
- Craniotomy if indicated based on brain CT scan findings
- Rehabilitation upon discharge from hospital

## 18.3. INJURIES

Injury is an insult to the body with the resultant adverse effect. This can be brought up by physical insult, chemical/toxic injury or thermal injury. Usually the patient presents with symptoms upon arrival to the health facility which includes pain, bleeding, swelling or loss of function of the affected organ.

### 18.3.1 Soft Tissue injuries

**Diagnostic criteria**

- Pain only, traumatic swelling, bruises with intact skin, cuts, abrasions, puncture wounds or open wounds of varying size and severity
- Injury to internal organs must be recognized and referred, including subtle signs of organ damage, e.g.:
    - blood in the urine – kidney or bladder damage
    - shock – internal bleeding
    - blood or serous drainage from the ear or nose – skull base fracture
- An injury causing a sprain or strain may be initially overlooked. Exclude fractures by performing appropriate X-rays

**Note**

- Closed injuries and fractures of long bones may be serious and damage blood vessels
- Contamination with dirt and soil complicates the outcome of treatment

**Emergency management**

- Immobilize injured limb after reduction by POP cast or splint
- Monitor vital signs
- Monitor the arterial pulse and capillary refill below an injury on the limb with swelling.

**Wound care**

- Surgical debridement of the wound
- Suture or splint when needed
- Avoid primary suture if the wound is infected:
    - Dirty or contaminated
    - Crushed
    - In need of debridement
    - Projectile inflicted
    - Caused by bites

**Pharmacological Treatment**

**A:** Paracetamol 15 mg/kg PO 6 hourly per 24 hours

**AND**

**A:** Diclofenac 75 mg IM 6hourly if can't tolerate oral medication

**AND**

**B:** Cloxacillin 500mg IV 6 hourly for 7 days

**A:** Ceftriaxone 1gm IV 8 hourly

**B:** Metronidazole 500mg IV 8 hourly

**AND**

**A:** Tetanus prophylaxis**:** 0.5 mL Tetanus toxoid and 1 mL Tetanus immunoglobulin (Depending on the immunization protocol)

**Table18.4: Protocol in Provision of Tetanus Prophylaxis**

| Patient Category | Non-tetanus prone | Tetanus prone |
|---|---|---|
| Immunized and booster within 5 years | Nil | Nil |
| Immunized and 5 to 10 years since booster | Nil | TT |
| Immunized and >10 years | TT | TT |
| Incomplete immunization or unknown | TT and TIG | TT and TIG |

*TT = Tetanus toxoid; TIG = Tetanus Immunoglobulin*

## 18.3.2 Sprains and Strains

It is a type of soft tissue injury where the muscle and tendons are affected. Exclude fracture by performing x-ray

**Diagnostic Criteria**

- History of trauma
- Pain, especially on movement
- unable to use the limb
- Tenderness on touch
- Limited movement

These may be caused by:

- Sport injuries
- Slips and twists
- Overuse of muscles
- Abnormal posture

**Note:** In children always bear non-accidental injuries (assault) in mind.

**Emergency Treatment**

- Immobilize with firm bandage and/or temporary splinting e.g. triangular sling, back slab etc
- Children over 12 years and adults:

  **A:** Ibuprofen200–400 mg PO 8 hourly

  **AND**

  **A:** Paracetamol 15 mg/kg PO 6 hourly per 24 hours.
- Perform X-ray to rule out dislocations or sublaxations

**Referral**

- If Severe progressive pain. Do X-ray to exclude bone fractures or joint dislocation.
- Progressive swelling
- Extensive bruising
- Deformity
- Joint tenderness on bone
- No response to treatment
- Severe limitation of movement

### 18.3.3 Extremity Fractures

Fractures of long bones of upper and lower limbs are quite common. If not properly treated they often lead to long-term deformities. Osteomyelitis is always the complication of open fractures. Hemorrhagic shock may occur in situations involving multiple fractures or pelvic ring fractures.

**Diagnostic Criteria**

- Pain, swelling
- Loss of limb function
- Deformity and abnormal movement

**Investigation**

- X-ray

**Non–Pharmacological Treatment**
**Community / dispensary level**

- Immobilize injured limb by POP cast or splint.
- Monitor vital signs.
- Monitor the arterial pulse and capillary refill below an injury on the limb with swelling
- Refer the patient

**Health Centre**

- Immobilize injured limb by POP cast or splint
- Monitor vital signs
- Monitor the arterial pulse and capillary refill below an injury on the limb with swelling
- Consider anti tetanus prophylaxis according to the anti-tetanus protocol
- Refer the patient if open fracture or if specialist service not available

**Hospital level**

- Immobilize injured limb by POP cast or splint
- Monitor vital signs
- Monitor the arterial pulse and capillary refill below an injury on the limb with swelling
- Treat open fractures by proper surgical debridement and ORIF as per specialist guideline.

### 18.3.4 Spine fractures

Motor traffic injuries and falls constitute the burden of most spine injuries. Paralysis may be associated, often been brought by improper transfer of the patient to the hospital. C-spine injury is always accompanied by traumatic brain injury.

**Diagnostic Criteria**

- History of trauma
- Pain
- Neurological deficit

**Investigation**

- X-ray,
- CT scan and MRI are mandatory.

**Non–Pharmacological Treatment**

- Immobilize the neck by collar or pillows/sand bags
- Patient should lie flat in bed, preferably the flat bed or air mattress
- Treat shock as per the guideline
- Catheterize if urine retention
- Immediate transfer to the hospital that handles specialized spine surgeries
- Surgery of the spine often involves utilization of surgical implants such as plate, screws, rods, cage and transpedicular screws

**Note:** Examine cervical spine in all traumatic brain injury patients

# CHAPTER NINETEEN
# METABOLIC AND ENDOCRINE DISEASE CONDITIONS

## 19.1 DIABETES MELLITUS

Diabetes mellitus is a clinical syndrome characterized by persistent hyperglycemia (blood glucose values higher than the normal range) due to deficiency or diminished effectiveness of insulin.

**Classification**
Diabetes mellitus can be classified as follows:

- Type 1 Diabetes Mellitus (T1DM) – due to autoimmune β-cell destruction, usually leading to absolute insulin deficiency
- Type 2 Diabetes Mellitus (T2DM) – due to a progressive loss of β-cell insulin secretion frequently with underlying insulin resistance
- Gestational Diabetes Mellitus (GDM) – diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt diabetes prior to gestation
- Specific types of diabetes – due to other causes, e.g., monogenic diabetes syndromes (such as neonatal diabetes and maturity-onset diabetes of the young (MODY), diseases of the exocrine pancreas (such as cysticfibrosis), and drug- or chemical-induced diabetes (such as with glucocorticoid use, in the treatment of HIV/AIDS, or after organ transplantation)

**Note**: MODY includes patients between the ages of 25–45 who present with very high blood glucose with or without ketones. They may require insulin initially followed by oral hypoglycaemic agents or may require insulin for the rest of their lives.

**Diagnostic Criteria**

- Main clinical features of diabetes are thirst, polydipsia, polyuria, tiredness, loss of weight, blurring of vision.
- Many people have no classical symptoms and may only present late with the symptoms related to complications e.g pruritus vulvae and balanitis due to infections, paraesthesia or pain in the limbs, non-healing ulcers, and recurrent bacterial infection.

**WHO diagnostic Criteria 2006**

- Fasting plasma glucose level ≥ 7.0 mmol/L (126 mg/dL)
- Plasma glucose ≥ 11.1 mmol/L (200 mg/dL) two hours after a 75 g oral glucose load as in a glucose tolerance test
- Symptoms of hyperglycemia and casual plasma glucose ≥ 11.1 mmol/L (200 mg/dL)
- Glycated hemoglobin (HbA1c) ≥ 6.5%.

**Diagnosis of gestational diabetes** (WHO criteria 2013)

- Fasting plasma glucose 5.1–6.9 mmol/l
- 2–hour plasma glucose 8.5–11.0 mmol/l following a 75g oral glucose load.

**Note**: Fasting plasma glucose higher than 6.9 mmol/l or 2–hour plasma glucose higher than 11.0 mmol/l are considered overt diabetes rather than GDM.

**At risk screening**

Early diagnosis and good control reduces the risk of costly complications and reduces the deterioration of islet function in T2DM. The following people should therefore be screened with fasting blood glucose or HbA1c at least yearly when they visit health facilities:

- Individuals with impaired glucose tolerance or impaired fasting glucose or a history of a cardiovascular event
- Those aged ≥40 years with body mass index (BMI) ≥30 kg/m2 or hypertension
- Children and adolescents who are overweight or obese and who have two or more additional risk factors for diabetes.
- Women with a history of gestational diabetes mellitus or polycystic ovary syndrome
- People on long-term steroids or immunosuppressants.
- All pregnant women at the first antenatal visit if overweight, have had big babies (birth weight >4 kg), gestational diabetes, previous stillbirths or neonatal deaths. Screening should be repeated in the second trimester if negative.
- All women during the 2$^{nd}$ or 3$^{rd}$ trimester (for gestational diabetes)

**Management and non-pharmacological treatment**

For people with glucose intolerance the risk of T2DM and its associated mortality may be reduced by:

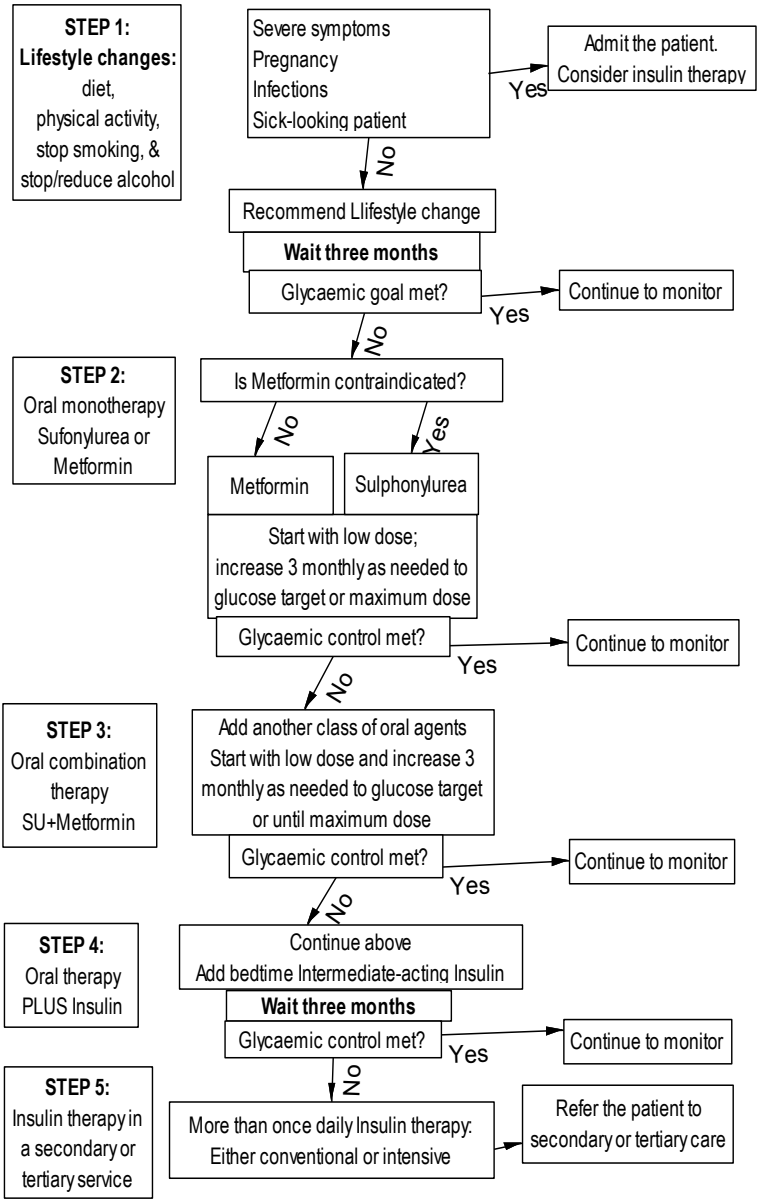
- dietary modification
- physical activity
- weight reduction
- medication with metformin.

**Table 19.1: Goals for optimum management of diabetes**

| | |
|---|---|
| Diet | Advise same as for people without diabetes |
| Body mass index | Therapeutic goal is 5–10% weight loss for people who are overweight or obese, but aim for BMI<25 kg/m$^2$ |
| Waist circumference | <102 cm for men, <88 cm for women |
| Physical activity | At least 30 minutes of moderate physical activity on most days of the week (total ≥150 minutes/week) |
| Cigarette consumption | 0 per day |
| Alcohol consumption | Not more than 2 standard drinks (20 g) per day for men and women |
| Blood glucose level | Non-pregnant: 4–6 mmol/L fasting; 6–8 mmol/L postprandial<br>Pregnant: ≤5.0 mmol/l fasting, ≤6.7 mmol/l postprandial<br>Self-monitoring of blood glucose is recommended to improve outcomes |
| HbA1c | Target ≤7% (6.5–7.5%) |
| Lipids | Total cholesterol: <5.2 mmol/L<br>HDL-C: ≥1.0 mmol/L<br>LDL-C: <2.6 mmol/L<br>Triglycerides: <1.7 mmol/L |
| Blood pressure | Target ≤140/90 mmHg<br>For those with albuminuria/proteinuria <130/80 mmHg |
| Urine albumin | Spot collection: <20 mg/L |
| | Urine albumin-to-creatinine ratio (UACR): women: <3.5 mg/mmol; men: <2.5 mg/mmol |

The algorithm below is a stepwise guide towards achieving the above goals. Lifestlye measures are the first step but they are lifelong.

**Algorithm for the Glycaemic Management of T2DM**




Refer to Downes et al. for evidence for combination therapy.

**Healthy lifestyles**

- Dietary control aims to maintain the blood sugar level within an acceptable range as follows:
    - Each meal should consist of a wide variety of nutritious foods from the core food groups (vegetables, fruits, grains, meat and proteins, dairy products)
    - 45-50% of energy intake should be in the form of carbohydrates
    - Complex carbohydrates are preferable to simple sugars
    - Carbohydrates and calories should be evenly distributed throughout the day with small/light meals in between the three main meals
    - Meals must not be missed
    - Sugar and sugar-containing food/drinks should be avoided. They are only recommended when a patient feels faint, or ill and cannot eat normally.
    - Sweetners, diabetes foods and drinks are not essential.
    - It is also recommended that a light/small meal should be taken before and after playing sport.
- Encourage weight loss if the patient is obese or has body mass index (BMI) of more than 25 kg/$m^2$. Loss of body weight often results in improved glycaemic control, BP and lipid profiles.
- Increase physical activity levels (e.g. brisk walking): at least 30 minutes of moderate activity at least five times a week.
    - Low-level aerobic exercise (eg brisk walking for half an hour per day) and physical resistance training improves glucose tolerance, energy expenditure, feeling of wellbeing and mood, work capacity, improved BP, lipid profiles and increased functional mobility in older people.
    - Medicine dosages and or food intake may need adjustment to avoid hypoglycaemia.
- Encourage patients to stop taking alcohol or limit to 1 drink per day for women and 2 drinks per day for men. For women who are pregnant, planning a pregnancy or breastfeeding, not drinking alcohol is the safest option.

**Note:**

- Consistency in carbohydrate intake, and spacing and regularity of meals may help some patients manage blood glucose and weight.
- Inclusion of snacks in meal plans should be balanced against the potential risk of weight gain and/or hypoglycaemia.
- A small amount of sugar as part of a mixed meal or food (eg one teaspoon of sugar/honey added to breakfast cereal) may not adversely affect the blood glucose level.
- Foods naturally high in sugars such as fruit and dairy are recommended

**Pharmacological Treatment**

**Treatment with oral hypoglycemics**

- Review the blood glucose at follow-up clinic and adjust medicines as needed until blood glucose is controlled.
- If dietary control on its own fails or blood glucose levels are persistently high (fasting >11 mmol/l or random >15 mmol/l) initiate:

**A:** Metformin 500 mg twice daily with or after meals. Increase, as required, until a maximum of 2000mg in 2–3 divided doses. If Metformin is contraindicated then use

**A:** Glibenclamide 2.5–15mg once daily

**OR**

**A:** Glimepiride 1–2mg twice daily

**OR**

**A:** Gliclazide 40–320mg twice daily

- If the maximum dose of metfotmin does not result in adequate glycaemic control, either one of the above sulphonylureas may be added, starting with the lower dose and increasing until control is achieved or the maximum dose is reached.
- If a combination of both medicines is still inadequate, then insulin should be added as detailed below in the section on insulin.

**Note**

- Metformin is contraindicated in those with **severe** renal, liver and cardiac failure. The lower dosage are appropriate when initiating treatment in elderly patients with uncertain meal schedules, or in patients with mild hyperglycemia
  - Activity of sulphonylurea is prolonged in both hepatic and renal failure; sulphonylureas are best taken 15 to 30 minutes before meals
  - Several recent guidelines provide succinct summaries on current evidence for use of oral drugs in the management of diabetes.

**Treatment with Insulin Injection**

T1DM is treated with insulin injections. Oral agents are not to be used in T1DM

Insulin injections are indicated in T2DM in the following conditions:

- Initial presentation with fasting blood glucose more than 15 mmol/l
- Presentation in hyperglycaemic emergency
- Peri-operative period especially major or emergency surgery
- Other medical conditions requiring tight glycaemic control
- Organ failure: Renal, liver, heart etc
- Diabetes in pregnancy not well controlled with diet or oral drugs
- Latent autoimmune diabetes of adults (LADA)
- Contraindications to oral drugs
- Failure to meet glycaemic targets with oral drugs.

**Note**: The maximum glucose lowering efficacy of oral drugs is usually evident by six months and therefore the efficacy of any added therapy must be assessed within six months and an alternative drug instituted in case of failure.

Insulin injections should be initiated by a doctor able to fully instruct the patient in its use but insulin will be available at lower health facilities for management of stable patients who require prescription refills.

**Table 19.2: Types of insulin as per WHO Essential Medicine List**

| Type of Insulin | Name | Basal or short acting |
|---|---|---|
| Short acting | A: Insulin–short acting (human) soluble | Short acting |
| Intermediate acting | A: Insulin–intermediate acting (human) | Basal |
| Pre-mixed insulin | A: Intermediate and short acting insulin (70/30) | Basal + Short acting |

**Insulin as substitution therapy**

- Oral medicines are discontinued (unless the patient is obese where metformin will be continued)
- A Pre-mixed insulin is introduced at a dosage of 0.2 IU/kg body weight and this is split into: ⅔in the morning and ⅓in the evening
- Inject 30 minutes before the morning and the evening meals.

**Insulin as supplemental therapy**

- Neutral Protamine Hagedorn (NPH) insulin administered at night before 22:00h at a total daily dose of 0.1–0.2 IU/kg body weight.
- The oral medicines are continued (half maximum dose of sulphonylureas and metformin dose of 2 g/day)
- Blood glucose levels are monitored.

**Insulin for T1DM**

- Use insulin such as short acting, intermediate and mixed insulin.
- Most people with T1DM should be treated using a combination of prandial (rapid or short-acting insulin) and basal (intermediate or long acting insulin) insulins subcutaneously
- Give prandial insulin 3 or more times a day approximately 30 minutes prior to start of a meal
- Give basal insulin before the evening meal.
- Total daily insulin requirements are generally between 0.5 to 1 unit/kg/day
    - Give 1/3 of the total dose as basal
    - Give the remaining 2/3 of the total dose as prandial before meals.
    - The amount for each meal should depend on the carbohydrate content of the meal, pre-meal blood glucose, and anticipated activity.
- At initiation of insulin therapy, give appropriate advice on hypoglycaemia, sick days, physical activity, SMBG and diet.

**Self-monitoring in patients with T2DM**

Self Monitoring Blood Glucose (SMBG) is usually recommended in the following patients:

- patients on insulin and glucose lowering agents that can cause hypoglycaemia (sulphonylureas)

- when monitoring hyperglycaemia arising from illness
- with pregnancy and pre-pregnancy planning
- when changes in treatment, lifestyle or other conditions requires data on glycaemic patterns
- when HbA1c estimations are unreliable (eg haemoglobinopathies)

**Table 19.3:** Clinical monitoring of people with diabetes

| Initial visit | 3 Month visit | Annual visit |
|---|---|---|
| History and diagnosis<br>Physical examination<br>• Height and weight<br>• Waist/Hip circumference<br>• Blood pressure<br>• Detailed foot examination<br>• Tooth inspection<br>• Eye examination<br>  ○ Visual acuity+ Fundoscopy<br>• ECG<br>• Biochemistry<br>  ○ Blood sugar<br>  ○ Glycosylated Haemoglobin (HbA1c)<br>  ○ Lipid profile (TC,HDC,LDLC,TG)<br>  ○ Serum creatinine<br>  ○ Urine: glucose, ketones, protein<br>• Education<br>• Nutritional advice<br>• Medication if needed | • Relevant history<br>• Weight<br>• Blood pressure<br>• Foot inspection<br>• Biochemistry<br>  ○ Blood Glucose<br>• Urine protein<br>• Education advice<br>• Nutrition advice<br>• Review therapy<br>• HbA1c every six months | History and examination – as at initial visit<br><br>Biochemistry as at initial visit |
| TC=Total cholesterol, HDLC=high density lipoprotein, LDLC= low density lipoprotein, TG=Tryglycerides | | |

**Surgery in diabetes**

**General measures**

Correct pre-operative management depends on type of surgery (major or minor), type of diabetes and recent diabetes control.

- Surgery should be delayed if possible if HBA1C >9% or blood glucose fasting >10 mmol/l or random glucose > 13 mmol/l.
- Screen for nephropathy, cardiac disease, retinopathy and neuropathy and inform surgical team.

**If on diet or oral agent therapy and well controlled and surgery is minor:**

Omit therapy on morning of surgery

Resume therapy when eating normally

**If on insulin therapy or poor glycaemic control or major surgery:**

- Use continuous IV insulin infusion
- Start at 8 am and stop when eating normally.
- Monitor blood glucose before, during and after surgery
- Aim for blood glucose levels of 6–10 mmol/l.

**For major surgery (glucose-insulin potassium regimen)**

- Once snack is missed, start an IV regimen irrespective of the size of the procedure
- Maintain insulin administration (hourly) to avoid lipolysis and ketoacidosis in patients with restricted oral intake and thus prevent DKA
- Administer 5% dextrose in maintenance IV fluids

  **AND**
- Short-acting insulin (16 Units) + KCl 10mmol/L added to 500mls of 10% dextrose.
  - Infuse at 80ml/hr IV.
  - If obese or initial blood glucose is high (>14mmo/l) consider higher dose of insulin (20 Units)
  - If very thin or usual insulin dose is very low consider lower dose (12 Units)
- Monitor blood glucose levels hourly (aim for 6–10 mmo/l)
  - If blood glucose is low or falling reduce dose by 4 Units
  - If blood glucose is high or raising increase dose by 4 Units
- Patients receiving Multiple Daily Insulin Therapy (MDIT) should receive preoperative basal insulin dose without interruption in the perioperative period. When oral intake is restricted, regular insulin may be given every 4–6 hrs to control hyperglycemia. When a diet is tolerated, the MDIT regimen should be resumed
- Post operatively: give 5–10% dextrose IV 1 litre + KCl 20ml + 2/3 of total daily dose of insulin over 8hrs and repeat until able to take orally
- Continue the infusion until 60 minutes after the first meal.
- Resume usual therapy after first meal
- Check electrolytes daily

**Note**:

- Diabetic patients should be first on the operation list
- Minor surgery: does not involve general anesthesia or starvation
- Major Surgery: involves a general anesthesia and therefore a period of fasting

## 19.2 MANAGEMENT OF DIABETES DURING RELIGIOUS FASTING

There are several types of fasting:

- An absolute fast imposes total abstinence from both food (solid or liquid) and water. This should not go beyond a maximum of three days and is not recommended for those people taking insulin secretagogues or insulin.

- In partial fast, the subjects abstain from selected foods and drinks. Choosing to fast or to omit a certain meal each of the fasting days is also taken as partial fast.
- In normal fast (the common fast) the fasting person abstains from all foods (solid or liquid) but can take water for a limited time.
- A pleasure fast involves setting aside one's favorite form of entertainment such as watching TV, listening to the radio, newspapers, etc. for the fasting period.
- A person with diabetes should be advised to select the fast that best suits his/her type of diabetes

**Those with very poor glucose control should be discouraged from fasting**

- A total fast is not recommended for anyone with diabetes. Adequate hydration is important even during the period of fasting.
- For those on insulin, a partial fast is preferred to absolute or normal forms of fasting.
- Self-blood glucose monitoring (SBGM) is mandatory for people with diabetes who elect to fast.
- Once-a-day monitoring is adequate for patients on diet only or diet with metformim.
- In patients on insulin secretagogues, SBGM should be done at least three times a day.
- Doctor and patients should agree on how to handle abnormal results of SBGM and as to when to terminate the fast, e.g. frequent hypoglycaemia, intercurrent infection.
- If hyperglycaemia is marked, retesting should be more frequent and the urine tested for ketones. Clear guidelines should be set as to when to terminate the fast, e.g. frequent hypoglycaemia, intercurrent infection.
- Vigorous activity should be avoided during period of fast.
- People who fast should have ready access to their health-care providers during the period of fast.

**Management of normal fasting for people treated with oral hypoglycaemic agents**

- Fasting is possible in this situation.
- Usual dietary advice should be followed at this time.
- Patients on metformin, alpha-glucosidase inhibitors and thiazolidinediones (glitazones) can continue taking the usual doses at the usual times.
- If on chlorpropamide, this should be stopped and substituted with a shorter-acting agent.
- If on a second or third generation sulphonylurea (glibenclamide, gliclazide, glipizide, glimepiride), this should be taken at the time of breaking the fast and not before dawn.

**Management of normal fasting for T2DM patients on insulin**

- If on once daily insulin before bed, this can be given as usual
- If on twice daily short- and intermediate-acting insulin:
    - Before the dawn meal, give the usual evening dose of short-acting insulin without any intermediate-acting insulin.
    - Before the evening meal give the usual morning dose of short-acting and intermediate-acting insulin.

- If on basal bolus regimen: Usual doses of the short-acting insulin can be given before the dawn and evening meals, and usual doses of the intermediate-acting insulin can still be given at 10pm.
- Regular SBGM is essential to ensure prevention of hypoglycaemia, and titration of doses should occur according to SBGM results.
- Neither the insulin injection nor the breaking of the skin for SBGM will break the fast.

**Management of other fasting types**

**Table 19.4: Types of fasting and recommended diabetic treatment**

| Treatment regimen | Fasting regimen | When to take antidiabetic agents |
|---|---|---|
| Diet only | Total normal of partial fast | Not applicable |
| Metfomim/ thiazolidinediones | Normal or partial fast | With meals |
| Insulin secretagogues Sulphonylureas | Partial fast | Before meals |
| Daily intermediate or long-acting insulin | Partial fast | Before first meal |
| Multiple insulin doses using intermediate and short acting | Avoid fasting or pleasure fasting | Not applicable |
| Long-acting plus bolus fast acting | Avoid fast or partial fast | Lantus am and analogue with meals |
| Complex medications | Pleasure fasting | No change indicated |

## 19. 3 HYPERGLYCAEMIA IN PREGNANCY

Gestational Diabetes Mellitus (GDM) is any degree of glucose intolerance first recognized in pregnancy. Diabetes in pregnancy refers to those with pre-existing diabetes, whether dignosed or not.

**Screening at first antenatal visit**

- Perform screening in all women at the first antenatal clinic attendance if they have:
    - BMI > 25 kg/m$^2$
    - previous history of GDM
    - glycosuria
    - previous big baby
    - poor obstetric history
    - family history of DM
    - known impaired glucose tolerance/impaired fasting glucose or grand multipara.
- Women in early pregnancy with levels of HbA1c≥6.5% or blood glucose levels fasting ≥7.0 mmol/l or two hour ≥11.1 mmol/l which are diagnostic of diabetes should be treated as having pre-existing diabetes.

- Women with intermediate levels of HbA1c 6.0–6.4%, fasting glucose 5.1–6.9 mmol/l or two hour glucose 8.6–11.0 mmol/l should be assessed to determine the need for immediate home glucose monitoring and, if the diagnosis remains unclear, assessed for gestational diabetes by 75 g oral glucose tolerance test (OGTT) at 24–28 weeks.

**Screening later in Pregnancy**

- All women with risk factors (see above) should have a 75 g OGTT at 24–28 weeks
- A fasting plasma glucose at 24–28 weeks is recommended in low-risk women

**Non-Pharmacological Treatments**

- All women with pre-gestational diabetes should:
    - Be encouraged to achieve excellent glycaemic control using glucose monitoring of both fasting and postprandial values
    - Be prescribed high-dose (5mg) pre-pregnancy folate supplementation, continuing up to 12 weeks' gestation
    - Have an eye exam and be informed of the risk of developing and/or progression of diabetic retinopathy
    - Have a kidney assessment (random urine albumin/creatinine ratio and serum creatinine) and refered if urine protein ≥ 1g.
- A combined health-care team (obstetrician, diabetologist or internist, diabetes educator, pediatrician/neonatologist) is required. Review SMBG, blood pressure and urine protein and ketones by dipstick at each visit and eye examination in each trimester.
- Target glycaemia:
    - Preprandial blood glucose 3.5–5.5mmol/L
    - Postprandial blood glucose 5–7.5mmol/L
- Lifestyle management is the preferred means of managing gestational diabetes.
- Diet is based around the principles of optimal nutrition and controlled weight gain.
- Exercise can be helpful in lowering BG levels: the most acceptable form of exercise for most women is walking in their normal daily routine.
- Glucose-lowering therapy should be considered in addition to diet where fasting or two hour glucose levels are above target, for example, where two or more values per fortnight are:
    - fasting or preprandial ≥5.5 mmol/L, or two hours postprandial ≥7 mmol/L at ≤35 weeks
    - fasting or preprandial ≥5.5 mmol/L, or two hours postrandial ≥8 mmol/L at >35 weeks, or
    - any postprandial values are >9 mmol/L.
- When pharmacologic treatment of gestational diabetes is indicated, insulin and oral medications are equivalent in efficacy, and either can be an appropriate first-line therapy.

**Pharmacological Treatment**

**A:** Metformin 500 mg twice daily, maximum 2000mg in 2–3 doses

**OR**

**A:** Glibenclamine 2.5mg once daily to a maximum of 10mg daily

> **Note:** Oral hypoglycamics (except for metiformin and glibenclamide) are contraindicated in pregnancy

**Insulin**

The rapid-acting insulin analogs (lispro and aspart) lower postprandial blood glucose and decrease the risk of nocturnal hypoglycemia. Patients on lispro and aspart prior to conception may continue them during pregnancy. Patients on regular insulin may be switched to lispro or aspart if 1–hour postprandial blood glucose levels are above target and/or the patient is also experiencing pre-meal or nocturnal hypoglycemia.

**Postnatal Follow Up**

- Women with gestational diabetes should be screened at 6–12 weeks postnatal to ensure return to normal glucose tolerance. Thereafter, a 1–2 yearly follow up is recommended.
- Metformin and glibenclamide may be used even if a woman is breastfeeding.
- Encourage women to breastfeed.
- If retinopathy, check eyes 1 year postpartum

## 19.4 DIABETES AND HIV

- ARVs are associated with increased metabolic dysfunction, including insulin resistance, dyslipidemia and lipodystrophy
- Protease inhibitors (PIs) increase insulin resistance and reduce insulin secretion by interfering with GLUT–4 mediated glucose transport
- Standards of treatment and management of diabetes for patients with HIV are generally the same as those for diabetic patients without HIV and patients who acquire HIV may continue to be managed with the same drug therapy as before
- Sulfonylureas may not be effective in the face of severe insulin resistance. In case glycemic control deteriorates, insulin should be initiated, rather than increasing dosage or number of oral medications
- People who are on ARTs need to be screened for diabetes at least once a year and especially if they have other CVD risk factors

## 19.5 DIABETES AND TUBERCULOSIS

- People attending TB clinics should be screened for diabetes and those attending diabetes clinics should be screened for TB if presenting with symptoms.
- Diabetes may be associated with delayed sputum conversion (>60 days), higher probability of tuberculosis treatment failure, higher recurrence and relapse rates, higher overall mortality, higher rates of multi-drug resistance TB and more atypical presentation in hyperosmolar hyperglycemic nonketotic coma or ketoacidosis

- For both conditions, controlling blood sugar, being more physically active, avoiding chronic stress, getting enough sleep and maintaining ideal weight are recommended.

**Review Drug Requirements**

- Rifampicin is a potent hepatic enzyme-inducing agent, accelerates the metabolism of oral hypoglycemic agents and shortens the plasma half-life of sulphonylureas
- Isoniazid antagonizes sulphonylureas, impairs insulin release and action and leads to increased requirement of insulin and oral antidiabetic medication
- Therefore people with diabetes may require an increase in dosage of anti-diabetic medication if they develop tuberculosis

**Use Oral Antidiabetic Medicines Carefully in Tuberculosis**

People with diabetes mellitus and tuberculosis should be treated with insulin injection, or in case a diabetic with tuberculosis is on oral hypoglycemic agents, it may be necessary to switch to insulin.

- Tuberculosis affects both the liver and pancreas: oral antidiabetic drugs are contraindicated in hepatic disease, which is a common adverse effect of antituberculous therapy.
- Metformin produces weight loss, particularly in high doses, and it is also an anorectic.
- Marked weight loss and higher insulin and caloric needs in tuberculosis are other important indications for reviewing oral antidiabetic therapy in diabetes mellitus.

## 19.6 HYPOGLYCAEMIA

Hypoglycaemia is defined as blood glucose <4 mmol/L.

**Diagnostic Criteria**

- Hunger
- Sweating
- Trembling or shaking
- Anxiety
- Dizziness
- Lightheadedness
- Palpitation
- Numbness around the lips and fingers
- Headache
- Confusion
- Lack of concentration
- Weakness
- Changes in behaviour (eg irritability, tearfulness, crying), paraesthesiae.

Patients may also present with convulsions, seizures or coma due to delayed corrective action or impaired hypoglycaemia awareness where the patient loses the ability to detect the early symptoms of hypoglycaemia due to repeated episodes of mild hypoglycaemia or

long duration of diabetes leading to loss of adrenergic and glucagon response, with eventual loss of adrenergic and neuroglycopaenic symptoms.

**Non-Pharmacological Treatment**
**For conscious Patients:**

Quickly take a glass of a sugar-rich drink

**OR**

Eat one table spoon of sugar or honey

**AND**

Have a meal.

If symptoms persist after 5 minutes repeat the above.

**For unconscious Patients give:**

**C:** IV 50% dextrose (40–50ml)

**OR**

**C:** 10% dextrose (200–300ml). Repeat if patient is not responsive or if after 15 minutes, the blood glucose is still below 4mmol/l. Follow by 8–10 % glucose infusion. Use 5% dextrose if the higher concentrations are not available.

**OR**

**C:** Glucagon injection 1mg IM or SC

**Note**: If IV access is impossible, consider nasogastric tube or rectal glucose

**On Recovery**:

- Give long-acting carbohydrate snack eg a piece of bread
- Identify the cause of hypoglycaemia and correct it
- If hypoglyceamia is a result of long acting suphonylureas, long- or intermediate-acting insulin or alcohol frequently monitor blood glucose (2hourly) and give IV dextrose infusion (5–10%) for 12–24 hours

If patient is not responding look for another cause or refer.

## 19.7 ACUTE METABOLIC COMPLICATIONS

### 19.7.1 Diabetic Ketoacidosis

It is an acute metabolic complication of diabetes mellitus that may present with a decreased level of consciousness

**Symptoms**

- Nausea/vomiting
- Thirst/polyuria
- Abdominal pain
- Dehydartion
- Shortness of breath
- Fruity smelling breath
- Fever
- Lethargy
- Obtundation/drowsiness
- Confusion
- Altered mental fuction
- Coma

**Note:**
- When you suspect DKA, confirm diagnosis immediately.
- All patients minimum should be admitted in hospital for intensive management.

**Diagnostic Criteria**
- Blood glucose > 11.0mmol/L or known diabetes mellitus
- Ketonuria ++ or more on Ketostix
- Glasgow Coma Scale less than 12, systolic BP below 90mmHg and pulse over 100 or below 60bpm each indicate severe status.

**Investigations**
- Check blood glucose
- Urine for ketones
- Arterial blood gases
- Urea, creatinine and electrolyte

**Non-Pharmacological Treatment**
- Admit for intensive care
- Insert nasogastric tube for gastric decompression
- Use DKA chart to guide treatment and monitor the patient

**Pharmacological Treatment**

Fluid and electrolytes replacement

If systolic BP < 90mmHg give:

**A:** 0.9% sodium chloride solution (500ml) over 10–15 minutes. If SBP remains below 90mmHg this may be repeated once. Most patients require between 500 to 1000ml given rapidly.
- If systolic BP remains <90mmHg consider other causes (septic shock, heart failure)
- Do NOT use plasma expanders

If the systolic BP is > 90mmHg

**A:** Normal Saline(NS) 1 litre + Potassium chloride (KCl) 2g when available 2 hourly for 1st 4hours, then 4 hourly

**OR**

A**:** Ringer's Solution 1 litre 2hourly for 1st 4hours, then 4 hourly
- When blood glucose falls to 14 mmol/L or below, start 5% Dextrose 500mls 4hourly
- Isotonic dextrose saline may be used in place of dextrose 5%
- If a patient is still dehydrated continue Normal saline or Ringer's solution as well.
- More cautious fluid replacement should be considered in young people aged 18–25 years, elderly, pregnant, heart or renal failure, mild DKA, other serious co-morbidities

**Insulin Therapy**

**B:** Soluble insulin 8 IU (0.1 IU/kg) IM and 8 IU IV at begining. Then give 8 IU (0.1 IU/kg) IM soluble insulin bolus hourly
- Check blood glucose 2hourly if using IM route or 4 hourly if sc route

- Expect a fall in capillary blood glucose of 3.0mmol/L/hour: increase the insulin rate by 1.0 IU/hour increments hourly until glucose falls at this rate.
- If blood glucose is fluctuating widely, then use the guide in Table 2:
- When blood glucose falls to 14 mmol/L or bellow give soluble insulin 4 IU SC 4 hourly OR IM 2 hourly and continue until the patient is able to eat again then change to twice or thrice daily insulin as follows:
    - Give insulin 0.5–0.75 IU/kg/day (the higher doses for the more insulin resistant i.e. teens, obese)
    - Give 50% of total dose with the evening meal in the form of long-acting insulin and divide remaining dose equally between pre-breakfast, pre-lunch and pre-evening meal.

      **OR**
    - Use pre-mixed insulin: give two thirds of the total daily dose at breakfast, with the remaining third given with the evening meal.

**Table 19.5:** Treatment of diabetic ketoacidosis in case of blood glucose fluctuations

| **Blood glucose mmol/L** | **Insulin 4 hourly sc OR 2hourly IM** | **5% dextrose 4hourly** |
|---|---|---|
| >14.0 | 12 | 500ml |
| 7.2–14.0 | 8 | 500ml |
| 2.5–7.2 | 4 | 500ml |
| <25 | 4 | 100ml |

**Other important notes and measures**

- Assess Cardial Vascular System (CVS) for volume overload (Input output chart, oedema (lungs, peripheral)
- Maintain an accurate fluid balance chart, the minimum urine output should be no less than 0.5ml/kg/hour
- Consider urinary catheter if no urine passed after 2 hours or if incontinent
- Consider nasogastric tube and aspiration if the patient does not respond to commands
- Screen for infection and give antibiotics if clinical evidence of infection.
- Only with severe acidosis Sodium bicarbonate (NaHCO3) 50mmol may be given under doctor's instruction.

**Table 19.6: Diabetes ketoacidosis initial management chart**

| Name of Patient: | | | | | | | | Reg. No.: Ward: | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hour | Time | Soluble Insulin | IV Fluids | | Blood Glucose | Urine | | Electrolytes | | Remarks |
| | | | When KCL Available | When No KCL | | Glucose | Ketones | Na+ | K+ | |
| 1st | | 8IU IV 8IU IM | 2 Litres N/S | 2 Litres N/S | | | | | | |
| 2nd | | 8IU IM | 1 Litre N/S +2g KCL | Darrow's 1 Litre | | | | | | |
| 3rd | | 8IU IM | ↓ | ↓ | | | | | | |
| 4th | | 8IU IM | 1 Litre N/S + 2g KCL | Darrow's 1 Litre | | | | | | |
| 5th | | 8IU IM | ↓ | ↓ | | | | | | |
| 6th | | | | | | | | | | |
| 7th | | | | | | | | | | |
| 8th | | | | | | | | | | |
| 9th | | | | | | | | | | |
| 10th | | | | | | | | | | |
| 11th | | | | | | | | | | |
| 12th | | | | | | | | | | |
| 13th | | | | | | | | | | |
| 14th | | | | | | | | | | |
| 15th | | | | | | | | | | |
| 16th | | | | | | | | | | |
| 17th | | | | | | | | | | |
| 18th | | | | | | | | | | |
| 19th | | | | | | | | | | |
| 20th | | | | | | | | | | |
| 21st | | | | | | | | | | |
| 22nd | | | | | | | | | | |
| 23rd | | | | | | | | | | |
| 24th | | | | | | | | | | |
| Notes: | | | | | | | | | | |
| 1. When Blood glucose falls to 14mmol/l (250mg/dl) or below<br>Give soluble insulin 8IU (0.1IU/kg) SC 4 hourly OR im 2hourly<br>Start 5% dextrose 500ml 4hourly | | | | | | | | | | |

If patient still dehydrated continue N/S OR Darrow's solution as well
Check blood glucose 2hourly if using IM route OR 4 hourly if using SC route

| Blood Glucose | | Insulin 4 hourly SC OR 2 hourly IM | 4 hourly 5% Dextrose |
|---|---|---|---|
| mmol/l | mg/dl | | |
| >14.0 | >250 | 12 | 500 ml |
| 7.2–14.0 | 130–250 | 8 | 500 ml |
| 2.5–7.2 | 45–130 | 4 | 500 ml |
| <2.5 | <45 | 4 | 1000 ml |

2. Potassium chloride should be mixed in N/S. If not available use Darrow's Solution as shown
3. With severe acidosis, NaHCO3 50mmol should be given under doctor's instruction
4. Isotonic dextrose/saline can be used in place of 5% dextrose
5. Patient should remain under close observation

## 19.7.2 Non-ketotic hyperosmolar state (NKHS)

It is a serious condition most frequently seen in older persons with T2DM. In NKHS, blood sugar level rise and the body tries to get rid of the excess sugar by passing into urine.

**Diagnostic Criteria**

- Polyuria
- Ortostatic hypotension
- Altered mental state lethargy, obtundation, confusion
- Seizures, possible coma
- Diminished oral intake of fluids
- Profound dehydration
- Hypotension
- Tachycardia
- Weight loss

Differentiated from DKA by no nausea and vomiting, no abdominal pain, and no Kussmaul breathing

**Note:** Try to identify precipitating factors:

- Poor oral fluid intake
- MI, stroke, sepsis, pneumonia and other serious infections
- Medicines: thiazides diuretic, glucocorticoids, phenytoin

**Laboratory investigation**

- Blood glucose
- Serum electrolytes (K+, Na+, Cl–)
- Initial serum K+ may be falsely high due to extracellular shifts.
- Renal function (Urea and Creatinine)
- Serum osmolarity (usually >330 mosmol/L)
  - Serum osmolarity = $2(Na^{+} + K^{+})$ + glucose + Urea (Glucose and Urea in mmol/L)
  - Normal is < 310 mosmol/L as calculated

**Note:**

- A patient may be acidotic due to lactic acidosis or shock/sepsis: in this case principle management as in case of DKA
- IV fluids should be replaced as half-normal saline (0.45%) if hypernatremia, normal saline if serum sodium is normal
- There is frequently intercurrent illness usually sepsis, CVA, or cardiac and these must be diagnosed and treated.

### 19.7.3 Diabetes and other cardiovascular diseases

Diabetic patients are 2–4 times likely to develop cardiovascular diseases mainly due to atherosclerosis and hypertension.

The clinical spectrum of cardiovascular diseases includes:

- Coronary heart disease
- Angina (which may be silent)
- Acute coronary artery syndrome
- Congestive cardiac failure
- Sudden death
- Cerebral vascular accident (stroke, transient ischaemic attacks and dementia)
- Peripheral vascular disease (intermittent claudication, foot ulcer and gangrene).

**Assessment (annual)**

- ECG, Chest X-Ray, if with symptoms/signs of heart failure.
- Peripheral vascular disease evaluation includes doppler and angiography of lower limbs.

**Pharmacological Treatment**

**Acute coronary syndrome**

- All adults with T2DM and recent acute coronary syndrome and/or coronary stent should receive dual anti-platelet therapy, for 12 months after the event or procedure:

  **A:** Low-dose aspirin (75–100 mg daily)

  **AND**

  **D:** Clopidogrel (75mg daily)
- Aspirin is also indicated for primary prevention for people with T2DM over the age of 40 years with family history of ischaemic heart disease (IHD), cigarette smooking, obesity, proteinuria or dyslipidemia.
- It is contraindicated in peptic/duodenal ulcer, dyspepsia, hurtburn, malignant hypertension, haemorrhagic stroke.

Hyperlipidaemia

- Statin therapy results in a significant decrease in CVD morbidity and mortality in T2DM for those at high CVD risk.

  **B:** Simvastatin 20mg daily. Dose may be increased to 40mg daily if required

  **OR**

  **B:** Atorvastatin 10mg daily. Dose may be increased to 80mg daily if required

- Fenofibrate reduces incidence of retinopathy and need for laser surgery, peripheral neuropathy and improvement in proteinuria, sugesting a more generalsed effect on microvascular disease independent of dyslipidaemia Fibrates
- Shouldbe used in mixed hyperlipidemias which have not responded adequately to diet or other therapy.
- Are more effective in lowering triglycerides and increasing HDL, but less effective in lowering cholesterol.
- Should be used with caution in combination with statins.
- Can enhance the effects of warfarin and antidiabetic agents
- Are contraindicated in patients taking Orlistat.

**D:** Fenofibrate 67–267mg/day

**OR**

**D:** Gemfibrozil 0.9–1.2g/day

**19.7.3.1 Hypertension**

In people with T2DM, antihypertensive therapy with an angiotensin receptor blockers (ARB) or angiotensin-converting enzyme inhibitors (ACEI) decreases the rate of progression of albuminuria, promotes regression to normal albuminuria and may reduce the risk of decline in renal function. Therefore:

- BP-lowering therapy in people with diabetes should preferentially include an angiotensin converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB) e.g:

  **C:** Enalapril: 10 mg–40 mg orally daily, taken either as a single dose or two divided doses (enalapril 5 mg–10 mg twice a day)

  **C:** Losartan: Initial dose: 50 mg orally once a day. Maintenance dose: 25–100 mg orally per day in 1 or 2 divided doses

- The target level for optimum BP is controversial. It is reasonable to target BP levels of <140/90 mmHg for people with diabetes, with lower targets for younger people and those at high risk of stroke. The target BP for people with diabetes and microalbuminuria or proteinuria remains <130/80 mmHg.
- Combining an ARB and an ACEI is not recommended.
- If monotherapy does not sufficiently reduce blood pressure (BP) add one of the following:
  - Calcium channel blocker:

  **C**: Amlodipine 5–10mg once daily
  - Low-dose thiazide or thiazide-like diuretic:

  **A**: Bendrofluazide 5mg once daily
- ACE-inhibitors and ARBs should be stopped pre-conception. Diltiazem in extended release forms may be a useful substitute.

**19.7.3.2 Diabetic Peripheral Neuropathy**

All patients should be screened for distal symmetric polyneuropathy starting at diagnosis of T2DM and at least annually thereafter.

**Diagnostic Criteria**

- Unsteady gait
- Burning, aching pain or tenderness in legs or feet (occurring at rest or at night, not related to exercise)
- Prickling sensations in legs and feet (occurring at rest or at night, distal>proximal, stocking glove distribution)
- Numbness in legs or feet (distal>proximal, stocking glove distribution)
- History of previous foot ulceration and/or amputation.

**Investigations**

Test for:

- Sensation (10g monofilament or cotton wool)
- Vibration (128 Hz tuning fork)
- Postural hypotension and pulse (tibial and dorsalis)
- Inspect foot for structural abnormalities and ulceration.

**Pharmacological Treatment**

Burning pain: Antidepressants:

**C:** Imipramine – 50–150mg/day

**OR**

**A:** Amitriptyline – 75–150mg/day

Lancinating pain: Anticonvulsants:

**A:** Carbamezapine – 400–800mg/day

**OR**

**C:** Sodium valproate – 10–15 mg/kg/day)

Give foot care education and advice on appropriate footwear.

**19.7.3.3 Diabetic Nephropathy**

It is a progressive kidney disease that damages the capillaries in the kidney' glomemeruli because of the long-lasting diabetes mellitus. People with diabetes and microalbuminuria have high cardiovascular disease risk, and should be treated with multifactorial interventions (refer to the section on CVD cardiovascular risk).

**Diagnostic Criteria**

- There are no symptoms in early stage
- In later stage, there is body swelling, most often feet and legs

**Investigations**

- Perform regular urine tests to check the albumin

**Non-Pharmacological Treatment**

Reduce salt intake (< 2g/day) and restrict proteins (<1g/kg/day)–explore options from patient's dietary history.

**Pharmacological treatment**

**C:** Losartan: Initial dose: 50 mg orally once a day. Maintenance dose: 25–100 mg orally per day in 1 or 2 divided doses

## 19.8 THYROID DISORDERS

Thyroid disorders are conditions that affect the thyroid gland. There are specific kinds of thyroid disorders that includes hypothyroidism, hyperthyroidism, goiter, thyroid nodules and thyroid cancer.

### 19.8.1 Hypothyroidism

Hypothyroidism is a condition in which a person's thyroid hormone production is below normal. Common causes of the disease is chronic autoimmune thyroiditis, post surgery and post radio active iodine.

**Diagnostic criteria**

The symptoms depend on the deficiency of thyroid hormone, but can include:

- Increased cholesterol levels,
- Depression
- Fatigue
- Hair loss
- Memory loss
- Dry, rough skin
- Constipation
- Hoarse voice

**Investigation**

A blood test is used to confirm hypothyroidism

**Indications for Treatment**

- TSH level persistently > 10 mU/L; treat all patients due to, increased likelihood of progression to overt disease and a higher risk of congestive heart failure, cardiovascular disease and mortality.
- TSH levels (4.5–10 mU/L); consider, treatment in patients younger than 65 with increased cardiovascular risk (e.g., previous cardiovascular disease, hypertension, documented diastolic dysfunction, atherosclerotic risk factors (dyslipidaemia, diabetes mellitus, smoker), goitre, positive antithyroid peroxidase antibodies, evidence of autoimmune thyroiditis by ultrasound, pregnancy, or infertility), particularly when TSH level is persistently > 7 mU/L.
- Levothyroxine therapy could be considered also for symptomatic middle-aged patients for a short period of time. If a clear beneficial effect is observed, levothyroxine therapy could be maintained.
- Persistently mildly increased TSH levels (>4.5–10 mU/L) with positive Thyroid Antibody and thyroid sonographic findings typical of autoimmune thyroiditis.

**Pharmacological Treatment**

Initial dose:

Clinical hypothyroidism–Levothyroxine 1.6–1.8 µg/kg ideal body weight

Subclinical hypothyroidism–Levothyroxine 1.1–1.2 µg/kg is recommended

- Take at least after 2 hours fast, 30 minutes before food intake. Alternatively at bedtime (3 or more hours after the evening meal).

- When initiating therapy in young healthy adults with overt hypothyroidism, consider beginning treatment with full replacement doses
- Routine use of combined therapy with levothyroxine and triiodothyronine for hypothyroid patients is not recommended
- Assess TSH and adjust dosage when there are large changes in body weight, with aging, and with pregnancy.
- There is no convincing evidence to support routine use of thyroid extracts, L-T3 monotherapy, compounded thyroid hormones, iodine containing preparations, dietary supplementation, and over the counter preparations in the management of hypothyroidism.

**Monitoring**

- TSH monitoring 6–8 weeks after any levothyroxine dose change, and yearly life– long monitoring once euthyroidism is achieved (target TSH 0.2–4.0 um/l). FT4 can be measured in early stages of treatment.
- In patients with central hypothyroidism, assessments of serum free T4 should guide therapy and targeted to exceed the mid normal range value for the assay being used.
- Wait for TSH equilibration–TSH equilibration requires eight to 12 weeks after any thyroxine dosage change. Once a stable dose is achieved–yearly TSH is sufficient.

**In Pregnancy**

When the elevation of the TSH level is confirmed, free T4 should be measured in order to classify the hypothyroidism as clinical or overt (OH) and subclinical (SH).

- TSH > 2.5–10.0 mU/L with normal free T4: SH.
- TSH > 2.5 –10.0 mU/L with low levels of free T4: OH.
- TSH =10.0 mU/L, despite the level of free T4: OH

Women in reproductive period should be euthyroid before conceiving, as the hypothyroidism is associated with neural development. Dose may be doubled during pregnancy and returned to normal dose after delivery

## 19.8.2 Hyperthyroidism

Hyperthyroidism is a condition in which an overactive thyroid gland is producing an excessive amount of thyroid hormones that circulate in the blood. Graves' disease, multinodular goiter (TMNG), inflammation of the thyroid gland (thyroiditis) and excessive iodine intake are the most common cause of hyperthyroidism.

**Diagnostic criteria**

Hyperthyroidism can be suspected in patients with

- Tremors
- Excessive sweating
- Smooth velvety skin
- Fine hair
- A rapid heart rate
- An enlarged thyroid glandfrequent bowel movements

**Investigations**

- Baseline complete blood count, including white count with differential, and a liver profile (bilirubin and transaminases)
- Differential white blood cell count should be obtained during febrile illness and at the onset of pharyngitis in all patients taking antithyroid medication. Routine monitoring of white blood counts is not recommended
- Test for THS and T4
- When thyrotoxicosis is confirmed, if cause is not known request thyroid uptake scan

**Note:** Management of hyperthyroidism depends on the cause

**19.8.2.1 Toxic multinodular goitre or Thyroid antibody positive**

Patients with overtly Toxic multinodular goitre or Thyroid antibody are treated with either:

- Radio iodine (131-I) therapy

**OR**

- Hyroidectomy
-

**Note:** Long term, low-dose carbimazole should not be used for either conditions except in some elderly

**Surgery**

- Patients with overt hyperthyroidism should be rendered euthyroid prior to the procedure with carbimazole pre-treatment (15–40 mg daily, divided into 2–3 doses a day for 4–8 weeks then a maintenance dose of 5–15 mg, taken once daily) with or without beta–adrenergic blockade (e.g. propranolol 1—40mg 6hourly). Preoperative iodine should not be used in this setting.
- Following thyroidectomy for Toxic multinodular goitre, it is suggested that serum calcium or intact parathyroid hormone levels be measured, and that calcitriol and oral calcium supplementation (maximum 1,200mg of calcium per day in two divided doses) be administered based on these results.
- Following surgery for Toxic multinodular goitre, thyroid hormone replacement should be started at a dose appropriate for the patient's weight (0.8 µg/lb or 1.7 µg/kg) and age, with elderly patients needing somewhat less. TSH should be measured every 1–2 months until stable, and then annually.

**Radioiodine**

- Radioactive iodine therapy should be used for retreatment of persistent or recurrent hyperthyroidism following inadequate surgery for Toxic multinodular goitre or Thyroid antibody.

**19.8.2.2 Graves hyperthyroidism**

Patients with overt Graves' hyperthyroidism should be treated with:

| Medicine | Initial therapy for 4–6 weeks | Maintenance therapy (gradual reduction over 3–6 months from initial dose) |
|---|---|---|
| **C:** Carbimazole | 20 – 30 mg/day | 5–10 mg/day<br>Continue for approximately 12–18 months, then taper or discontinue if TSH is normal. |

Beta Blockers are used for excessive sympathetic symptoms.

**B:** Atenolol (PO) 50–100mg daily

**Factors which favour use of antithyroid medicines**

- High likelihood of remission (patients, especially females, with mild disease, small goitres, and negative or low-titre TSH-receptor antibody)
- Elderly or others with comorbidities increasing surgical risk or with limited life expectancy or unable to follow radiation safety regulations
- Previously operated or irradiated necks
- Moderate to severe active Graves' ophthalmopathy

**Radioactive iodine**

Potassium iodide (**B**) should be given in the immediate preoperative period as 5–7 drops (0.25–0.35 mL) Lugol's solution (8 mg iodide/drop) or 1–2 drops (0.05–0.1 mL) saturated solution of potassium iodide (50 mg iodide/drop) three times daily mixed in water or juice for 10 days before surgery

**Factors which favour use of radioiodine**

- Individuals with comorbidities increasing surgical risk
- Patients with previously operated or externally irradiated necks
- Lack of access to a high-volume thyroid surgeon
- Contraindications to antithyroid medicnes use
- Females who are not pregnant and are not planning a pregnancy in the future (4–6 months) following radioiodine therapy

**Surgery**

Consider the following factors

- Symptomatic compression or large goitres
- Low uptake of radioactive iodine
- Thyroid malignancy is documented or suspected or large non-functioning nodule
- Coexisting hyperparathyroidism requiring surgery
- Females planning a pregnancy in <4–6 months
- Patients with moderate to severe active Graves' ophthalmopathy
- If a patient with Grave's disease becomes hyperthyroid after completing a course of carbimazole, consideration should be given to treatment with radioactive iodine or thyroidectomy. Low-dose carbimazole treatment for longer than 12–18 months may be considered in patients not in remission who

prefer this approach but evidence is that remission rate in adults is not improved by a course of medicines longer than 18 months
- Whenever possible, patients with Grave's disease undergoing thyroidectomy should be rendered euthyroid with carbimazole.

**19.8.2.3 Thyroid storm (crisis)**

Thyroid storm is one of the most life-threatening endocrine emergencies, resulting from exacerbation of manifestations of thyrotoxicosis.

**Triggers of thyroid storm include**:

- Acute infections
- Thyroidal or nonthyroidal surgeries
- Iodinated contrast dyes
- External beam radiation therapy.

It should be considered in very sick patients if they present with recent history of thyrotoxicosis and a recent history of precipitating factor.

Patients with thyroid storm (tachycardia, arrhythmias, congestive heart failure, hypotension, hyperpyrexia, agitation, delirium, psychosis, stupor and coma, as well as nausea, vomiting, diarrhoea, and hepatic failure) should receive a multimodal treatment including:

- Beta-adrenergic blockade
- Antithyroid medicine therapy
- Inorganic iodide
- Corticosteroid therapy
- Aggressive cooling with acetaminophen and cooling blankets
- Volume resuscitation
- Respiratory support
- Monitoring in an intensive care unit.

Thyroid storm is not a matter of thyroid levels increased beyond those of uncomplicated thyrotoxicosis, but the systemic decompensation that occurs.

**Table 19.7: Pharmacological Treatment**

| Medicine | Dosing | Comment |
|---|---|---|
| **D:** Propylthiouracil* | 500–1000 mg load, then 250 mg every 4 hours | Blocks new hormone synthesis<br>Blocks T4–to–T3 conversion |
| **C:** Carbimazole | 40 – 60 mg/day | Blocks new hormone synthesis |
| **A:** Propranolol | 60–80 mg every 4 hours | Consider invasive monitoring in congestive heart failure patients<br>Blocks T4–to–T3 conversion in high doses;<br>Alternate medicine: esmolol infusion |
| **B:** Iodine (saturated solution of potassium iodide) | 5 drops (0.25 mL or 250 mg) orally every 6 hours | Do not start until 1 hour after antithyroid medicines<br>Blocks new hormone synthesis<br>Blocks thyroid hormone release |
| **A:** Hydrocortisone | 300 mg intravenous load, then 100 mg every 8 hours | May block T4–to–T3 conversion<br>Prophylaxis against relative adrenal insufficiency<br>Alternative medicine: dexamethasone |

**Note**: In thyroid storm, propylthiouracil is preferred to carbimazole

# CHAPTER TWENTY
# CARDIOVASCULAR DISEASE CONDITIONS

## 20.1 PREVENTION OF ATHEROSCLEROTIC ISCHAEMIC HEART DISEASE AND STROKE

Cardiovascular disease (CVD) prevention is a coordinated set of actions, at the population level or targeted at an individual at risk of developing cardiovascular disease, that are aimed at eliminating or minimizing the impact of CVDs and their related disabilities.

**Diagnostic/screening Criteria**

Major risk factors for ischaemic cardiovascular and cerebrovascular disease are:

- Diabetes mellitus
- Hypertension
- Central obesity: waist circumference ≥ 94 cm (men) and ≥ 80 cm (women)
- Dyslipidaemia (fasting levels): Total cholesterol > 5 mmol/L, or LDL> 3 mmol/L, or HDL< 1 mmol/L in men and < 1.2 mmol/L in women
- Smoking
- Age: Men > 50 years, Women > 60 years
- Family history of early onset cardiovascular disease; Male relatives < 55 years and Female relatives < 65 year

Estimation of total cardiovascular risk is important for prevention of CVD in an individual, should be adapted to his or her total CV risk: the higher the risk, the more intense the management should be. See Table 20.1 Cardiovascular Disease Risk Classification and WHO risk estimate

**Table 20.1: Cardiovascular Disease Risk Classification**

| | |
|---|---|
| Very High Risk | Subjects with any of the following:<br>• Documented CVD, clinical or unequivocal on imaging: Documented clinical CVD includes previous AMI, ACS, coronary revascularization and other arterial revascularization procedures, stroke and TIA, aortic aneurysm and PAD. Unequivocally documented CVD on imaging includes plaque on coronary angiography or carotid ultrasound. It does NOT include some increase in continuous imaging parameters such as intima–media thickness of the carotid artery.<br>• DM with target organ damage such as proteinuria or with a major risk factor such as smoking or marked hypercholesterolaemia or marked hypertension.<br>• Severe CKD (GFR <30 mL/min/1.73 $m^2$).<br>• A calculated CVD Risk Score ≥10%. |
| High Risk | Subjects with:<br>• Markedly elevated single risk factors, in cholesterol >8 mmol/L (>310 mg/dL) (e.g. in familial hypercholesterolaemia) or BP ≥180/110 mmHg.<br>• Most other people with DM (except for young people with type 1 DM and |

| | |
|---|---|
| | without major risk factors that may be at low or moderate risk).<br>• Moderate CKD (GFR 30–59 mL/min/1.73 $m^2$).<br>• A calculated CVD Risk Score ≥5% and <10%. |
| Moderate Risk | CVD Risk Score is ≥1% and <5% at 10 years. Many middle–aged subjects belong to this category |
| Low Risk | CVD Risk Score < 1% |

**Non-Pharmacological Treatment**

General measures (also refer to Table 6.1 below):

- Lifestyle modification for all persons with risk factors for ischaemic heart disease should be encouraged (lifestyle changes as appropriate and summarized below on table 1.0)
- Maintain ideal weight, i.e. BMI < 25 kg/$m^2$, Weight reduction in the overweight patient, i.e. BMI > 25 kg/$m^2$,
- Reduce alcohol intake to ≤ 2 standard drinks/day for men and ≤ 1 for women on no more than 5 out of 7 days per week (1 standard drink is equivalent to 25 mL of spirits, 125 mL of wine, 340 mL of beer or sorghum beer, or 60 mL of sherry),
- Ideal healthy diet i.e. low fat, high fibre and unrefined carbohydrates, with adequate fresh fruit and vegetables.
- Exercise; regular moderate aerobic exercise, e.g. 30 minutes brisk walking 3–5 times/week (150 minutes/week) and
- Stop smoking.

**Pharmacological Treatment**

Individualized treatment targets are elaborated on Table 20.2 below, however for specific pharmacological treatment for hypertension, diabetes, dyslipidemia refer specific sections, respectively

**Table 20.2: The summarized preventive measures to be individualized on targeted goals**

| Risk factor goals and target levels for important cardiovascular disease risk factor reduction | | |
|---|---|---|
| 1 | Smoking | No exposure to tobacco in any form. |
| 2 | Diet. | Low in saturated fat with a focus on wholegrain products, vegetables, fruit and fish. |
| 3 | Physical activity | At least 150 minutes a week of moderate aerobic exercise (30 minutes for 5 days/week) or 75 minutes a week of vigorous aerobic exercise (15 minutes for 5 days/week) or a combination thereof |
| 4 | Body weight | Body weight BMI 20–25 kg/$m^2$. Waist circumference <94 cm (men) or <80 cm (women) |
| 5 | Blood Pressure | <140/90 mmHg |
| 6 | Lipids<br>LDL–C is the primary target | **Very high–risk**: <1.8 mmol/L (<70 mg/dL), or a reduction of at least 50% if the baseline is between 1.8 and 3.5 mmol/L (70 and 135 mg/dL)<br>**High–risk:**<2.6mmol/L (<100 mg/dL), o r a reduction of at least 50% if the baseline is between 2.6 and 5.1 mmol/L (100 |

| | | |
|---|---|---|
| | | and 200 mg/dL)<br>**Low to moderate risk:**<3.0 mmol/L (<115 mg/dL) |
| | HDL–C | No target but >1.0 mmol/L (>40mg/dL) in men and >1.2 mmol/L (>45 mg/dL) in women indicate lower risk |
| | Triglycerides | No target but <1.7 mmol/L (<150 mg/dL) indicates lower risk and higher levels indicate a need to look for other risk factors. |
| 7 | Diabetes | HbA1c <7%. (<5.3 mmol/l) |

Recommended to repeat CV risk assessment every 5 years, and more often for individuals with risks close to thresholds mandating treatment[3].

## 20.2 MANAGEMENT OF DYSLIPIDEMIAS

Lowering blood cholesterol levels using statins is recommended to reduce the impact of cardiovascular morbidity and mortality

**Clinical indication for lipid lowering medicine therapy**

- Established atherosclerotic disease
- Ischaemic heart disease
- Peripheral vascular disease
- Atherothrombotic stroke

**Note:** Lipid lowering medicines should be administered in this setting even if the level of cholesterol is normal

- Type 2 diabetics > 40 years of age, or diabetes for > 10 years,
- Existing cardiovascular disease, or
- Chronic kidney disease (eGFR < 60 mL/min).
- CV risks of more than > 20% in 10 years Such high-risk patients will benefit from lipid lowering (statin) therapy irrespective of their baseline LDL levels.

**Pharmacological Treatment**

**C:** Simvastatin 10mg/20mg oral once daily

**OR**

**D**: Atorvastatin 20mg daily

**OR**

**D**:Rosuvastatin 10mg-40mg daily

**Note:**

- Lipid lowering medicine therapy for patients taking protease inhibitors
- Certain antiretroviral medication, particularly protease inhibitors, can cause dyslipidaemia. Fasting lipid levels should be done 3 months after starting lopinavir/ritonavir. Lopinavir/ritonavir is associated with a higher risk of dyslipidaemia than atazanavir/ritonavir.
- Patients at high risk (> 20% risk of developing a CVS event in 10 years) should switch to atazanavir/ritonavir and repeat the fasting lipid profile in 3 months.
- Patients with persistent dyslipidaemia despite switching, qualify for lipid lowering therapy

Criteria for initiating lipid lowering therapy are the same as for HIV uninfected patients.

**Key Point.**

- Statins can be initiated at Health Centre/District Hospital by a doctor after assessing
  cardiovascular risks as stipulated above.

## 20.3 STABLE CORONARY ARTERY DISEASE (SCAD)/ISCHAEMIC HEART DISEASE (IHD)

Mostly from clinical history characterized by chest pain due to myocardial ischaemia usually inducible by exercise, emotion or other stress and reproducible, relieved by rest but may occur spontaneously and stable in nature. Especially when occurs in high risk patient[9, 10].

**Non-Pharmacological Treatment**
**General Measures**

- Life style modification. See section 20.1 above Prevention of ischaemic heart disease and atherosclerosis.
- Annual control of lipids, glucose metabolism and creatinine is recommended in all patients with known SCAD.
- A resting ECG is recommended in all patients at presentation and during or immediately after an episode of chest pain suspected to indicate clinical instability of CAD. Consider immediate referral [9,10].
- A resting transthoracic echocardiogram is recommended in some patients for: a) exclusion of alternative causes of angina; b) regional wall motion abnormalities suggestive of CAD; c) measurement of LVEF for risk stratification purpose d) evaluation of diastolic function. Consider referral if no echocardiogram available or unavailability of skilled personnel to perform transthoracic [9,10].

**Pharmacological Treatment**

**A:** Aspirin soluble 75 – 100mg daily oral. (long-term prophylaxis for arterial thrombosis)

**AND**

**C:** Isosorbide mononitrate 10mg/20mg twice daily oral, or Isosorbide dinitrate 20mg/40mg twice daily oral preferably at 8:00 and 14:00 hours for both medicines to provide a nitrate free period to prevent tolerance.

If nitrates cannot be tolerated especially due to nitrate induced severe headache consider stepwise adding other anti-angina medicines below;

Add stepwise other anti-angina medicines

**Step 1:** add ß-blocker if not contraindicated eg
**B:** Atenolol12.5/25mg daily oral

**OR**

**D:** Metoprolol 25/50mg daily oral.

If a ß-blocker cannot be tolerated or is contraindicated, consider long acting calcium channel blocker.

**Step 2** adds long acting calcium channel blocker.

**D:** Verapamil 30mg 2–3 times daily oral

**OR**

**D:** Diltiazem 30mg 2–3 times daily oral, if suspects Prinzmetal Angina.

**Key Note:**

- All patients with stable chronic angina are high-risk for cardiovascular events, should initiate lipid lowering medicines (HMGCoA reductase inhibitors); See Section 20.2 management of dyslipidemias
- Therapy requires good initial evaluation, ongoing support for patients and continuous evaluation to ensure compliance. Therapy should be initiated together with appropriate lifestyle modification and adherence monitoring.
- Consider immediate referral to high level of care where there are adequate resources eg equipment/medicines to manage the case

**Indications for Referral**

- Angina or chest pain suspected to indicate clinical instability of CAD ie Unstable Angina See section **6.4**
- When diagnosis is in doubt/ failed medical therapy especially if no echocardiogram available or unavailability of skilled personnel to perform transthoracic echocardiogram.

Before referral especially when high likelihood of clinical instability of stable CAD consider giving

**A:** Aspirin 300mg (PO) stat.

**AND**

**C:** Clopidogrel 300mg (PO) stat

**AND**

**C:** Simvastatin 80mg (PO) stat

**OR**

**C:** Atorvastatin 80mg (PO) stat

## 20.4 ACUTE CORONARY SYNDROME(UNSTABLE CORONARY ARTERY DISEASE)

**Unstable Angina (UA)**

Unstable angina is a **medical emergency** and if untreated can progress to Non-ST Elevation Myocardial Infarction (NSTEMI) [11, 12, 13].

**Diagnostic Criteria**

Presents as chest pain or discomfort like stable angina but with the following additional characteristics:

- Angina at rest or minimal effort, occurring for the first time, particularly at rest and prolonged > 10 minutes, not relieved by sublingual nitrates.
- The pattern of angina accelerates and gets worse
- The chest pain may be associated with ST segment depression or T wave inversion or normal ECG without rise in cardiac enzymes (biomarkers ie Total Creatine, Creatine -MB and Troponin).

### 20.4.1 Non-ST Elevation Myocardial Infarction (NSTEMI)

Non-ST Elevation Myocardial Infarction is **medical emergency** characterized with chest pain that is increasing in frequency and/or severity or occurring at rest. The chest pain is associated with elevated cardiac enzymes and ST segment depression or T wave inversion or normal ECG [14, 16]

**Diagnostic Criteria**

Presents with typical chest pain with the following additional characteristics.

- Electrocardiogram (ECG) may show ST segment depression or transient ST segment elevation, or normal ECG which does not exclude the diagnosis.
- Raised Cardiac Biomakers – Total Creatine Kinase (Total-CK), Creatine Kinase - MB (CK-MB) and Standard/High Sensitive Troponin I or T.

**Non-Pharmacological Treatment**

Both UA and NSTEMI are medical emergencies with the same pathophysiological progressive instability of CAD, which share similar management approach non-pharmacological and pharmacological treatment.

**Supportive Therapy**

- Admit patient into high dependent ward/ICU/CCU for haemodynamic monitoring, bed rest in Fowler's position and reassurance.
- Oxygen via nasal blog cannula or face mask if saturation < 92%
- Establish Peripheral Intravenous - IV line for intravenous fluid or drug administration
- Haemodynamics blood pressure, heart rate and electrocardiogram rhythm monitor

**Pharmacological treatment**

**Adjunctive therapy**

**Control cardiac pain**

**C:** Glyceryl trinitrate (Nitroglycerine) sub–lingual/ spray 0.5mg (make sure patient hasn't taken phosphodiesterase–5 inhibitor).

For persistent pain and if oral therapy is insufficient

**C:** Glyceryl Trinitrate (Nitroglycerine) IV, 1–2 μg/kg/min titrated with chest pain over 8–24 hours.

**OR**

**C:** Morphine, IV, 1–2 mg/minute dilute 10 mg up to 10 mL with sodium chloride solution 0.9%. Total maximum dose10 mg, repeat after 4 hours if necessary[15].

**Note:** But pain not responsive to this dose may suggest ongoing unresolved ischaemia. This requires immediate referral to high level of care where resources available to manage cute Coronary Syndrome or to exclude differential diagnosis

**Antiplatelet Therapy**

**A**: Aspirin 300mg start (PO) then followed by 75mg/100mg daily

**AND**

**D**: Clopidogrel 300mg /600mg start then followed by 75mg daily

**Statin high dose**

**C:** Simvastatin 80mg start then 40mg daily

**OR**

**D**: Atorvastatin 80mg start then 40mg daily

**D**: Rosuvastatin 10mg-40mg daily

**Anticoagulant**

**D:** Heparin UFH 70–100U/Kg body weight IV a day

**OR**

**D:** Enoxaparin 1mg/kg body weight SC 12 hourly

**Beta blocker (ß –blockers)**

In case of LV dysfunction

**C:** Carvedilol initial dose 6.25mg (PO) 12 hourly preferred, titrate the dose upward. Max. dose 25mg (PO) 12 hourly

**OR**

**Others ß –blockers** in the settings of normal LV systolic function

**B:** Atenolol 25–50mg once daily,

**OR**

**C:** Metoprolol 25–50mg once daily

**Angiotensin Converting Enzyme Inhibitors (ACEIs)**

**C:** Enalapril 10mg (PO) 12 hourly

**OR**

**B:** Captopril 6.25mg–25mg (PO) 8 hourly

**OR**

**S:** Perindopril 4mg–8mg (PO) daily

**Referral**

High suspicion index of acute coronary syndrome immediate consider referral to high level of care where resources are available to manage. In acute settings before referral from low to high level of care if available consider giving the following urgently:

- Glyceryl trinitrate (Nitroglycerine) sub-lingual 0.5mg/ spray prn for intolerable chest pain
- Aspirin 300mg stat. oral
- Clopidogrel 300mg/600mg stat oral
- High dose statin simvastatin 80mg stat OR atorvastatin 80mg stat oral

### 20.4.2 ST Elevation Myocardial Infarction (STEMI) /Acute Myocardial Infarction (AMI)

STEMI/AMI is a medical emergency caused by the complete or partial occlusion of a coronary artery and requires prompt hospitalization and intensive care intervention management.

**Diagnostic Criteria**

Initial diagnosis: Management including both diagnosis and treatment of STEMI/AMI starts at the point of first medical contact (FMC), defined as the point at which the patient is either initially assessed by a paramedic or physician or other medical personnel in the pre-hospital setting, or the patient arrives at the hospital emergency department.

**Simple recognition triage**: Two out of three points most likely point to STEMI/AMI diagnosis

- Symptoms - typical/atypical chest pain
- ECG – ST elevation in in two contiguous leads≥0.1mV
- Raised cardiac biomakers– Total Creatine Kinase (Total-CK), Creatine Kinase - MB (CK-MB) and Standard/High Sensitive Troponin I or T

**Symptoms**: Severe chest pain with the following characteristics, site: retrosternal or epigastric, quality: crushing, constricting or burning pain or discomfort, radiation: to the neck and/or down the inner part of the left arm, duration: at least 20 minutes and often not responding to sublingual nitrates, occurrence: at rest. May be associated with: pulmonary oedema sweating, hypotension or hypertension, arrhythmias

**Non-Pharmacological Treatment**:

**Supportive therapy**

- Consider cardio-pulmonary resuscitation if necessary before transfer (cardiac arrest– cardiopulmonary resuscitation).
- Oxygen 40% via facemask, if saturation < 92% or if in distress
- See section 20.4.1 above on supportive therapy for NSTEMI

**Adjunctive therapy**

**Control cardiac pain**

**C:** Glyceryl trinitrate sub-lingual/ spray 0.5mg (make sure patient hasn't taken phosphodiesterase-5 inhibitor).

For persistent pain and if oral therapy is insufficient

**C:** Glyceryl Trinitrate IV, 1–2 μg/kg/min titrated with chest pain over 8–24 hours.

**OR**

**C**: Morphine, IV, 1–2 mg/minute dilute 10 mg up to 10 mL with sodium chloride solution 0.9%. Total maximum dose: 10 mg, repeat after 4 hours if necessary.

Anti-platelets therapy

**A:** Aspirin 300mg stat (O) then followed by 75mg/100mg daily

**Plus**

**D:** Clopidogrel 300mg/600mg stat then followed by 75mg daily next day

Statin high dose

**C:** Simvastatin 80mg stat then 40mg daily

**OR**

**D:** Atorvastatin 80mg stat then 40mg daily

**OR**

**D:** Rosiivastatin 10mg-40mg daily

Anticoagulant

**D**: Heparin UFH 70–100U/Kg body weight IV a day

**OR**

**D:** Enoxaparin 1mg/kg body weight sc bid, Reduce dose in renal failure patient to 0.5mg/kg

Beta blocker (ß –blockers)
In case of LV dysfunction

**C:** Carvedilol initial dose 6.25mg twice daily preferred, titrate dose upward to maximum dose 25mg twice daily

In the settings of normal systolic function

**B:** Atenolol 12.5mg or 25mg or 50mg once a day,

**OR**

**C:** Metoprolol 25m/ or 50mg once a day

Angiotensin-Converting Enzyme Inhibitors (ACEIs)

**B:** Captopril 6.25mg or 12.5mg (PO) 8 hourly

**OR**

**C:** Enalapril 10mg twice a day

**OR**

**S**: Perindopril 4mg/8mg (PO) daily

**Definitive management of STEMI – Reperfusion therapy (Myocardial reperfusion)**
Myocardial reperfusion with rapid recanalization of infarct related artery is the key to success in the management of ST Elevation Myocardial Infarction (STEMI). Timely reperfusion is crucial for minimization of infarct size and thereby for preservation of left ventricular function and reduction in mortality in STEMI patients[17,18,19]

The two main reperfusion strategies for STEMI patients are;

- Thrombolytic/Fibrinolytic therapy) and
- Primary percutaneous coronary intervention (PPCI)

Thrombolytic agents

**C:** Streptokinase IV, 1.5 million units diluted in 100 mL sodium chloride 0.9%, infused over 30–60 min

**OR**

**D:** Alteplase (TPA**)** 15mg as bolus, 0.75mg/kg over 30min, then 0.5mg/kg over 60min

**O**R

**D:** Tenecteplase 40mg IV bolus (70–79kg body weight) 30 –35mg < 70kg body

Absolute contraindication for Thrombolytics

- Previous allergy to streptokinase or used within the last year for streptokinase only
- Stroke CVA within the last 3 months
- History of recent major trauma
- Bleeding within the last month
- Aneurysms
- Brain or spinal surgery or head injury within the preceding month
- Active bleeding or known bleeding disorder

Relative contraindication for Thrombolytics

- Refractory hypertension
- TIA in the preceding 6 months,
- Subclavian central venous catheter
- Warfarin therapy
- Pregnancy
- Traumatic resuscitation
- Recent retinal laser treatment

Referral is urgent for all suspected or diagnosed cases to high level care equipped with cardiac catheterization laboratory.

## 20.5 HYPERTENSION

Hypertension is elevation of Blood Pressure(BP) measured on at least three separate occasions. There is strong association between hypertension and CAD. Hypertension is a major independent risk factor for the development of CAD, stroke, and renal failure [20, 21, 22]

**Diagnostic Criteria**

If blood pressure measurements performed on three separate occasions when either

- The initial Systolic Blood Pressure (SBP) is ≥ 140mmHg or
- The Diastolic Blood Pressure (DBP) is ≥ 90mmHg

Measured on three separate occasions, a minimum of 2 days apart and/or taken over period of two months

Minimum of 3 blood pressure readings must be taken at the first visit to confirm hypertension

- If SBP is ≥ 160mmHg or DBP ≥100mmHg Stage II of JNC –VII – especially when SBP >180 mmHg and/or DBP >110 mmHg immediate drug treatment is needed – See a section on hypertensive crisis – Urgency/Emergencies section

Consider secondary hypertension with identifiable cause in young patients < 40 years or elderly patient > 60 years presenting for first time with hypertension.

**Key points**

- Hypertension control has shown to have significant benefit for patients. Existence of risk factors should be detected and treated. Assess cardiovascular risk. Lifestyle modification and patient education are essential in all patients. Antihypertensive treatment is required for life in truly hypertensive patients.
- Hypertension often has no symptoms: the aim of treatment is to lower the risk of end organ damage, especially stroke
- Compliance is the most important determinant of blood pressure control.

- Explanation, education and minimizing side-effects of drugs are important
- Extra care should be taken with antihypertensive drugs administered to those over 60 years of age, because of increased side-effects. Lower doses are needed
- Recommend an alternative contraceptive method for women using oestrogen containing oral contraceptive.
- Evidence of end organ damage, i.e. cardiomegaly, proteinuria or uraemia, retinopathy or evidence of stroke, dictates immediate treatment.
- Patients should be reviewed every 1–3 months, till blood pressure controlled then every 6 months and more often if necessary. The aim of treatment is to bring the systolic BP below 140mmHg and diastolic BP below 90 mm Hg, without unacceptable side effects.

**Treatment goal of Hypertension**

- Achieve and maintain the target BP: In most cases the target BP should be: systolic below 140 mmHg and diastolic below 90 mmHg.
- Achieve target BP in special cases as: in diabetic patients and patients with cardiac or renal impairment, target BP should be below 130/80mmHg;

Prevent and treat associated cardiovascular risks such as dyslipidemia

**Non–Pharmacological Treatment**

Lifestyle modification:

- Weight reduction: Maintain ideal body weight BMI 18.5–24.9kg/$m^2$
- Adopt DASH* eating plan: Consume a diet rich in fibre-fruits, vegetable, unrefined carbohydrate and low fat dairy products with reduced content of saturated and total fat
- Dietary Sodium: Reduce dietary sodium intake no more than 1000 mmmol/L (2.4gm sodium or 6gm sodium chloride per day)
- Physical Activity: Engage in regular activity such as a brisk walking at least 30 min/day most days a week
- Stop using all tobacco products
- Moderation of alcohol consumption: Limit consumption to no more than 2 drinks per day in men and no more than one drink per day in women and light person

*DASH–Dietary Approaches to Stop Hypertension

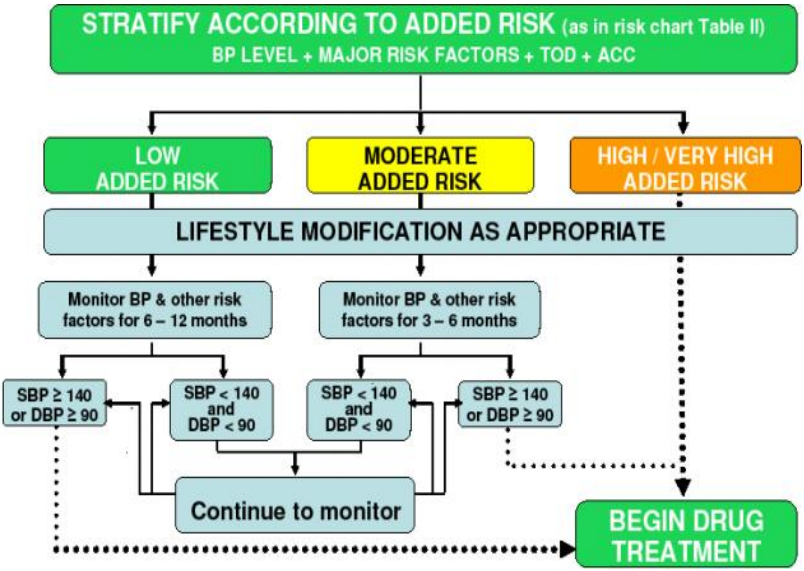
Assess or stratify according to risk factors and target organ damage see table 20.1 below

**Table 20.3: Major risk factors, target organ damage and associated clinical condition**

| Major risk factors | Target organ damage | Associated clinical condition |
|---|---|---|
| Level of SBP & DBP | 1. Left Ventricular based on the ECG | 1. Coronary artery disease |
| Smoking | | 2. Heart failure |
| Dyslipidemia<br>Total Cholesterol < 5mmol/l<br>or | 2. Micro-albuminuria:<br>Albumin/Creatinine<br>30mg/mmol | 3. Chronic kidney disease<br>Albumin creatinine ratio |

| | | |
|---|---|---|
| LDL >3.0mmol/l or<br>HDL < 1mmol/l men,<br><1.2mmol/l women | Slightly elevated Creatinine: Men 115–133µmol/l; Women 107-124µmol/l | >30mg/mmol |
| 1. Diabetes mellitus | | 4.Stroke or Transient ischaemic attack |
| 5. Family history of premature Ischaemic Heart Disease/Coronary Artery Disease Men <55 years, Women <60years | | 5. Peripheral vascular disease |
| 6. Waist circumference – Abdominal obesity:<br>Men ≥ 102cm; Women ≥ 88cm | | 6. Advanced retinopathy haemorrhage, or Exudates papilloedema |

**Figure 20.1: Non-Pharmacological Management flow diagram of hypertension**




**Pharmacological Therapy**

First-line treatment without compelling indications: Low dose Thiazide diuretics e.g.

**A:** Hydrochlothiazide 12.5mg/d

**OR**

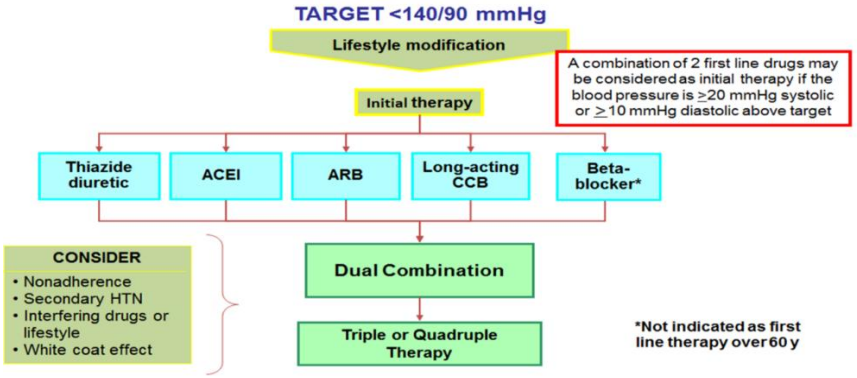
**A:** Bendroflumethiazide 5mg/d

Second-line treatment with compelling indications:
Combination therapy may be considered if SBP>20mmHg or DBP> 10mmHg above target.
Refer table 20.2 and figure 20.2 below show appropriate choice of combination therapy.

**Table 20.4: Compelling indications and anti-hypertensive drug combination**

| Compelling indications | Drug class |
|---|---|
| Angina<br>Prior or Post–myocardial infarct | • ß–blocker or Long acting calcium channel blocker<br>• ß–blocker and ACEI or ARB if patient sensitive to ACEIs<br>•If ß–blocker contraindicated: Long acting calcium channel blocker eg verapamil |
| Heart failure<br><br>For volume overload: Congestion | • ACE inhibitor and ß–blocker eg carvedilol<br><br>• Diuretics–Loop diuretics eg furosemide and/or spironolactone ****(exclude Renal Failure before adding spironolactone)*** |
| Left ventricular hypertrophy (confirmed by ECG) | ACE inhibitor or ARB if patient sensitive to ACEIs |
| Stroke: secondary prevention | Hydrochlorothiazide or Indapimide and ACE inhibitor |
| Diabetic mellitus | ACE inhibitor or ARB, usually in combination with diuretic |
| Chronic kidney disease | ACE inhibitor, usually in combination with diuretic |
| Isolated systolic hypertension | Hydrochlorothiazide or Long acting calcium channel blocker |
| Pregnancy | Methyldopa or Hydralazine (Avoid ACEI/ARB tetratogenic) |
| Prostatism | alpha–blockers |
| Elderly | Calcium channel blocker CCB |

**Figure 20.2: Approach of Pharmacological Treatment of hypertension**



**Recommended initial medication doses for hypertension treatment.**

Thiazide diuretics

**A:** Hydrochlothiazide 12.5mg/daily

**OR**

**A**: Bendroflumethiazide 5mg/daily

**OR**

**C:** Indapamide 5mg/daily preferred for patient with previous stroke/TIA

Loop diuretics

**B:** Furosemide initial dose 40mg twice a day

**OR**

**S:** Torsemide 5mg/daily

*Dose can be up scaled depending on congestive status to maximum dose*

Mineralocorticoid (Aldosterone) Receptor antagonist

**C:** Spironolactone 25mg/daily

**OR**

**S:** Eplerenone 25mg/daily

Angiotensin-Converting Enzyme Inhibitor (ACEI)

**B**: Captopril 6.125mg, 12.5mg or 25mg three times daily

**OR**

**C:** Enalapril 10mg twice a day

**OR**

**S:** Perindopril 8mg/daily orally

Angiotensin Receptor Blocker–ARB (*Don't combine with ACEI contraindications, indicated in patient sensitive to ACEIs)

**C:** Losartan 50mg/daily*

Beta–blocker

**B:** Atenolol 50mg/daily

**OR**

**C:** Metoprolol 50mg/daily

Calcium Channel Blocker

- Dihydropyridines:

  **C:** Nifedipine (Slow Release/Long Acting) 20mg/30mg/ 60mg/90mg/daily

  **OR**

  **C:** Amlodipine 5mg or 10mg/daily
- Non–dihydropyridine

  **D:** Verapamil 30mg twice–three times a daily

  **OR**

  **D:** Diltiazem 30mg twice–three times a day

**Referral indicated when:**

- Resistant (Refractory) hypertension suspected,
- Secondary hypertension is suspected
- Complicated hypertensive urgency/emergencies,
- Hypertension with Heart failure.

- When patients are young (<30 years).
- Blood pressure is severe or refractory to treatment.

## 20.6 RESISTANT (REFRACTORY) HYPERTENSION

Hypertension that remains >140/90mmHg despite the use of 3 antihypertensive drugs in a rational combination at full doses and including a diuretic i.e. thiazide. Consider all correctable causes of refractory hypertension before you refer.

**Hypertensive urgency.** Symptomatic severe hypertension SBP 180mmHg and/or DBP >110 mmHg with evidence of Target Organ Damage or grade III/IV Retinopathy with no immediate life–threatening neurological or cardiac complication such seen in emergencies

**Note:** All patients with hypertensive urgency should be treated in hospital

**Pharmacological treatment**

The goal is to lower DBP to 100mmHg slowly over 48–72 hours. This can be achieved with two or more oral agents preferably

- Long acting calcium channel blocker

**AND**

- ACE inhibitor (use in low dosage initially)

**OR**

- Beta-blocker if not contraindicated with compelling indication

**AND/OR**

- Diuretic – Thiazide or Loop diuretics (i.e. furosemide)- beneficial in renal insufficient pulmonary oedema and potentiate above other classes

## 20.7 HYPERTENSIVE EMERGENCY

A marked elevated systolic blood pressure SBP ≥ 180mmHg and/or a diastolic DBP ≥130mmHg associated with life threatening situations one or more of the following:

- Unstable angina/myocardial infarction
- Hypertensive encephalopathy e.g. severe headache, visual disturbances, confusion,
  coma or seizures which may result in cerebral haemorrhage
- Acute left ventricular failure with severe pulmonary oedema (extreme breathlessness at rest)
- Excessive circulating catecholamine: e.g. pheochromocytoma – rare cause of
  emergency; food or drug interaction with monoamine oxidase inhibitors
- Rapidly progressive renal failure
- Acute aortic dissection
- Eclampsia and severe pre-eclampsia

**Pharmacological Treatment**

Goal: immediate lowering of BP usually with parental therapy preferably, intravenous agents as infusion with strictly monitoring of haemodynamics in high care depended unit or intensive care unit in the hospital.

Preferred intravenous drugs are:

**S:** Labetolol a mixed alpha/beta blocker, excellent for most hypertensive emergencies. **Dose** is 20–80mg IV bolus every 10 minutes or 0.5–2mg/min infusion IV **Start** 20 mg IV, then 20–80 mg every10 min prn, or start with 0.5 mg/min infusion, then 1–2 mg/min (may be up to 4 mg/min) IV infusion up to 300 mg/d max. **Onset:** 5–10 min; duration: 3–6 h

**S:** Nitroglycerin (glyceryl trinitrate; Highly effective in setting of coronary ischemia, acute coronary syndromes. **Dose** is 5–100μg/min as IV infusion Nitroglycerin IV infusion start 5–10 ug/min then may be up to >200 ug/min prn. **Onset**: immediate; Duration: 1–5 min

**D:** Hydralazine. **Dose** is 5mg IV slow push over 1–2 minutes, repeat 5–10mg prn

## 20.8 HEART FAILURE

Heart Failure is a clinical syndrome characterized by typical symptoms (e.g. breathlessness, ankle swelling and fatigue) that may be accompanied by signs (e.g. elevated jugular venous pressure, pulmonary crackles and peripheral oedema) caused by a structural and/or functional cardiac abnormality, resulting in a reduced cardiac output and/or elevated intracardiac pressures at rest or during stress[23].

**Acute Heart Failure (AHF) or Decompensated Acute Heart Failure (ADHF)**
AHF is defined as rapid or gradual onset of signs and symptoms of heart failure that results in urgent unplanned hospitalization or Emergency Medicine Department visits. The clinical signs and symptoms are significantly life threatening if the above features occur in patients with established diagnosis with structurally heart disease categorized as Acute Decompensated Heart Failure (ADHF)[2]. The cause and immediate precipitating factor(s) of the AHF must be identified and treated to prevent further damage to the heart.

**Treatment Goals**
To improve clinical symptoms and outcome, management strategy should be based on clinical, laboratory and haemodynamic findings. All patient with AHF should be cared and admitted to a high care dependent unit or Intensive Care Unit.

**Non-Pharmacological Treatment:**
Oxygen therapy and/or ventilatory support.
Ventilatory support:

- Non-invasive positive pressure ventilation includes both CPAP and bi–level positive pressure ventilation (PPV)
- Mechanical ventilation

**Note:** In AHF, oxygen should not be used routinely in non–hypoxaemic patients, as it causes vasoconstriction and a reduction in cardiac output

**Pharmacological treatment**
Recommendations for the management of patients with acute heart failure:

**Diuretics**

Diuretics are a cornerstone in the treatment of patients with AHF and signs of fluid overload and congestion. Improve congestive symptoms. It is recommended to regularly monitor symptoms, urine output, renal function and electrolytes during use of intravenous diuretics

In patients with new-onset AHF or those with chronic, decompensated HF not receiving oral diuretics the initial recommended dose should be 20–40 mg intravenous furosemide (or equivalent); for those on chronic diuretic therapy, initial intravenous dose should be at least equivalent to oral dose

It is recommended to give diuretics either as intermittent boluses or as a continuous infusion, and the dose and duration should be adjusted according to patients' symptoms and clinical status. Combination of loop diuretic with either thiazide-type diuretic or spironolactone may be considered

Loop diuretic

**B:** Furosemide 20–120mg I.V

**OR**

**S:** Torsemide 5–20mg orally

**Plus**

Mineralocorticoid (Aldosterone) Receptor Antagonists:

**C:** Spironolactone 25–50mg

**OR**

**S:** Eplerenone 25–50mg orally

**Vasodilators:** these are the cornerstone of treatment of AHF and have dual benefit by decreasing venous tone (to optimize preload) and arterial tone (decrease afterload). Consequently, they increase stroke volume

Intravenous vasodilators should be considered for symptomatic relief in AHF with SBP >90 mmHg (and without symptomatic hypotension). Symptoms and blood pressure should be monitored frequently during administration of intravenous vasodilators. In patients with hypertensive AHF, intravenous vasodilators should be considered as initial therapy to improve symptoms and reduce congestion. Intravenous vasodilators for treating AHF are described in table 20.3.

**Table 20.5: Intravenous Vasodilators, dose and side effects.**

**Note**: Vasodilators should be used with caution in patients with significant mitral or aortic stenosis

| Vasodilator | Dosing | Mainside effects | Other |
|---|---|---|---|
| Nitroglycerine | Start with 10–20µg/min, increase up to 200 µg/min | Hypotension, headache | Tolerance on continuous use |
| Isosorbide dinitrate | Start with 1mg/h, increase up to 10mg/h | Hypotension, headache | Tolerance on continuous use |
| Nitroprusside | Start with 0.3 µg/kg/min and increase up to5µg/kg/min | Hypotension, isocyanate toxicity | Light sensitive |

Consider oral vasodilators in case intravenous vasodilator not available or unavailability of intensive care or high dependent unit care

**C:** Isosorbide mononitrate 10–20mg (PO) 12 hourly

**OR**

**C:** Hydralazine 25 mg (PO) 6–8 hourly. Maximum dose: 200 mg/day

**Inotropes (Inotropic agents)**
Indicated in patients with hypotension (SBP <90 mmHg or mean arterial BP < 60mmHg) and peripheral hypoperfusion. Dosage see below table 20.4

**Vasopressor (norepinephrine preferably)** Indicated in patients with cardiogenic shock, despite treatment with another inotrope, to increase blood pressure and vital organ perfusion. Dosage: see table 20.4

**Indication:** Patients with cardiogenic shock, despite treatment with another inotrope, to increase
blood pressure and vital organ perfusion.

**Table 20.6: Positive inotropes and/or vasopressors for treat acute heart failure**

| Inotropes/Vasopressors | Bolus | Infusion rate |
|---|---|---|
| Dobutamine | No | 2–20µg/kg/min(beta+) |
| Dopamine | No | 3–5 µg/kg/min; inotropic(beta+)<br>>5 µg/kg/min:(beta+), vasopressor(alpha+) |
| Norepinephrine | No | 0.2–1.0µg/kg/min |
| Epinephrine | Bolus:1mg can be given iv during | 0.05–0.5µg/kg/min |

**Special pharmacological treatment consideration:**
**Add ACEI**

**B:** Captopril 6.25–25mg (PO) three times a day

**OR**

**C:** Enalapril 5–20mg (PO) twice a day. When patient is out of congestive state and renal failure

**Add Beta-blocker**

**C:** Carvedilolol 6.25–25mg twice a day especially in heart failure with reduced systolic function

When patient is out of congestive state and SBP above 90mmHg and In case patient admitted with beta blocker continue with carvedilol unless is contraindicated

**Thrombo–embolism prophylaxis**
Thrombo–embolism prophylaxis (LMWH) is recommended in patients not already anticoagulated and with no contra indication to anticoagulation, to reduce the risk of deep venous thrombosis and pulmonary embolism.

**D**: Unfractionated heparin 5,000u subcutaneous twice a day

**OR**

**D**: Low molecular weight heparin–Enoxaparin 40mg–80mg subcutaneous twice a day

**Referral**

All patients with AHF should be treated at centre/hospital where at least can perform Echocardiographic assessment and Intensive Care Units (ICU) or High care dependent Units (HDUs) are available

## 20.9 CHRONIC HEART FAILURE

Patients who have had HF as defined above for some time are often said to have 'Chronic Heart Failure'. A treated patient with symptoms and signs that have remained generally unchanged for at least 1 month is said to be 'Stable chronic heart failure'

**Diagnostic Criteria**

The diagnosis of Chronic heart failure requires the following features:

- Symptoms of heart failure, typically breathlessness or fatigue, at rest or during exertion
- Objective evidence of cardiac dysfunction preferably by Echocardiography (Systolic and/or Diastolic)
- A clinical response to treatment is supportive but not sufficient for diagnosis

Hence diagnosis and management of CHF should be sought at referral centres where at least echocardiography assessment can be performed.

**Treatment of Systolic Heart Failure (LVEF< 45–50%)**

**Goals of treatment**

- Prevention of disease leading to cardiac dysfunction and heart failure eg hypertension, coronary artery disease, valve disease etc.
- To achieve maintenance or improvement in quality of life and improve survival

**Non-pharmacological Treatment**:

- Patient and family education
- Explain what Heart Failure (HF) is and why symptoms occur, cause of HF, how to recognize symptoms and what to do when they occur, daily self-weighing and what to do in case of weight gain
- Rationale of treatment, importance of adhering to drug & non-drug prescription
- Refrain from smoking
- Prognosis–explain morbidity and mortality
- Drug counseling–Effects, doses and times of administration, side effects and adverse effects
- Dietary and social habit
- Control sodium intake when necessary, avoid excessive fluid intake in severe HF Limit fluid intake to 1–1.5 L/day if fluid overloaded despite diuretic therapy
- Avoid excessive alcohol intake
- Regular exercise within limits of symptoms.

- Sexuality counselling regarding the risk of pregnancy and the use of oral contraceptives and phosphodiesterase-5 inhibitors are not recommended in advanced HF, if used nitrates should be avoided < 24–48hours of nitrate intakes

Medicines to avoid or to be used with caution

- NSAIDs & Coxibs
- Class I anti–arrhythmic
- Calcium antagonists
- Lithium
- Tricyclic antidepressants
- Corticosteroids

**Pharmacological Treatment**

Approach combination therapy

**Diuretics**

Loop diuretic

**B:** Furosemide 40–80mg (PO) twice a day orally

**OR**

**S:** Torsemide 5–20mg (PO) orally

**AND**

Mineralocorticoid (Aldosterone) Receptor Antagonists:

**C:** Spironolactone 25–50mg ounce a day orally

**OR**

**S:** Eplerenone 25–50mg ounce a day orally

Thiazide

A: Hydrochlorthiazide 12.5–25mg (PO) once a day

**OR**

**S:** Metolazone 0.1–10mg day

Angiotensin Receptor Inhibitors ACEI or Angiotensin Receptor Blockers (ARB)

**B:** Captopril 6.25–25mg three times a day orally

**OR**

**C:** Enalapril 5–20mg twice a day orally.

**OR**

**S:** Perindopril 8mg/daily orally

Angiotensin Receptor Blocker–ARB (*Don't combine with ACEI contraindicated, Indicated in patient sensitive to ACEIs)

**C:** Losartan 50mg/daily

**OR**

**C:** Candesartan 4–16mg ounce a day orally.

Beta blocker (Carvedilol–improve Morbidity & Mortality in CHF).

**C:** Carvedilolol 6.25–25mg twice a day especially in heart failure with reduced systolic function

**Note**: Beta Blockers is contraindication to patients with Bronchial Asthma or Severe Pulmonary Disease Symptomatic bradycardia or hypotension

**Add on therapy in patient in NYHA class III/IV.**
Vasodilator agents: The combination of hydralazine/nitrate

**C:** Isosorbide mononitrate 10–20mg orally 12 hourly

**OR**

**C:** Hydralazine 25 mg 6–8 hourly. Maximum dose: 200 mg/day

Cardiac Glycosides–Digoxin, give with caution! has narrow therapeutic index see below under section of Cardiac Glycosides

**C:** Digoxin 0.125mg–0.25mg once a day orally

**Note:** Patients at high risk of digoxin toxicity are: Elderly, patients with poor renal function, hypokalaemia and low body weight

Consider Anti–thrombotic agents–Heparin &/or warfarin under special indications see below: Congestive Heart Failure with atrial fibrillation, previous thromboembolic events or a mobile LV thrombus Heparin for DVT prophylaxis for patients admitted to hospital, unless contraindicated

Anti–thrombotic agents.
Heparin &/or warfarin – firmly indicated on congestive heart hailure with atrial fibrillation, previous thromboembolic events or a mobile LV thrombus Heparin for DVT prophylaxis for patients admitted to hospital, unless contraindicated:

D: Heparin 5000 units (SC) 8 hourly

**OR**

D: Warfarin oral 5 mg daily.

Monitor INR to therapeutic range, i.e. between 2.0–2.5

Thiamine Supplement: Consider in all unexplained heart failure

**Referral**
Ideally all patients with CHF should be managed in dedicated HF clinics/units with devoted HF expert staffs (nurses & doctors).

The following category of patients should be referred for specialized care

- Severe HF class III/IV
- HF of unknown origin
- Relative contraindication: asymptomatic bradycardia and/or low blood pressure
  - Intolerance to low doses
  - Previous use of ß –blockers and discontinuation because of symptoms
  - Bronchial asthma or severe pulmonary disease

## 20.10 PULMONARY OEDEMA

**Diagnostic Citeria**
Common cause of pulmonary oedema are cardiac/fluid overload, and th common causes are;
Systolic heart failure complicating fluid overload

- Renal failure complicating fluid overload
- Iatrogenic fluid overload

Other Cause of pulmonary oedema

- Increased capillary permeability Acute Respiratory Distress Syndrome (ARDS); many causes include; Systemic sepsis–gram negative infection, pancreatitis, head injury, aspiration of gastric contents, amniotic embolus

**Non-Pharmacological Treatment**
Initial management

- Maintain airway, bed rest in Fowler`s position except if hypotensive or comatose
- Administer oxygen to keep $PO_2$ > 60 mmHg ($O_2$ saturation > 90%)
- Correct base–acid & electrolyte disorders, determine and correct arrhythmias,

**Pharmacological Treatment**
Cardiac failure

**B**: Furosemide 20mg–80mg IV, may be repeated in 10–15 minutes

- If symptoms persist, morphine 1–3mg IV diluted form,
- Inotropic support if hypotensive SBP < 90mmHg–dobutamine 2–20 μg/kg/min
- Intravenous vasodilator nitroglyceride if SBP > 100mmHg.

Non–cardiac (ARDS)

- Treat the underlying conditions
- Ventilate with PEEP – if RF
- Inotropic support if SBP<90mmHg
- Dialysis if renal fail

**Referral**
All patients suspected pulmonary oedema should be referred to high level of care where hospital resourced with high care dependent unit or intensive care unit hospital. Patient should be stabilized first at low level of care before referral to the high level of care

## 20.11 INFECTIVE ENDOCARDITIS (IE)

The infective process of endocardial layer of the heart can involve native or prosthetic valve and congenital defects/shunts. Alpha–haemolytic streptococci are the most common causes of native valve endocarditis but Staphylococcus aureus is more likely if the disease is rapidly progressive with high fever, or is related to a prosthetic valve (Staphylococcus epidermidis) 24.

**Diagnostic Criteria**
Use Modified Dukes Criteria below and consult microbiologist where possible. Three sets of blood cultures should be taken before starting treatment.

**Modified Dukes Criteria**
**Major Criteria**

- Positive blood cultures of typical organism for IE from at least two separate blood cultures
- Evidence of endocardial involvement by echocardiogram (Trans–thoracic Echo/Trans– oesophageal Echo)

**Minor Criteria**

- Fever > 38ºC
- Presence of Rheumatic heart disease, congenital heart disease
- Vascular phenomena; Major arterial emboli, septic pulmonary infarcts, mycotic aneurysm, intracranial haemorrhage, conjuctival hemorrhage, Janeway lesions
- Immunological phenomena; glomerulonephritis, Osler`s nodes, Roth`s spots,
- Rheumatoid factor.
- Serologic evidence of active infective endocarditis or blood culture not meeting major criterion.

**Definitive diagnosis of IE**

- Two major criteria or
- One major and three minor criteria or
- Five minor criteria

**Possible Diagnosis of IE**

- One major and one minor or three minor criteria

**Key Note**: Positive blood cultures remain the cornerstone of diagnosis and provide live bacteria for both identification and susceptibility testing.
To improve yield of culturing bacteria at least three blood sample sets are taken at 30 minutes apart each containing 10mLof blood and should be incubated in both aerobic and anaerobic atmospheres. Sampling should be obtained from a peripheral vein using a meticulous sterile technique.

**Pharmacological Treatment**
**Empirical Treatment**
Consider for negative blood culture or if risk delaying treatment for blood culture outweigh the befit of starting treatment early

**Table 20.7: Treatment for native valves**

| Antibiotics | Dosage & Route* | Duration |
|---|---|---|
| Benzyl Penicillin G or | 18–24milllion Units/24hoursIVI,4 hourly in | 4–6weeks |
| Ceftriaxone | 2g IV daily | 4–6 weeks |
| Plus cloxacillin | 2g IV 6 hourly | 4–6weeks |
| plus, gentamicin ** | 1–1.5mg/kg IV every 8 hours | at least |

| | | |
|---|---|---|
| Methicillin–Resistant Staphylococci Anaerobes (MRSA) add vancomycin | 30mg/kg/24hours IV in two equally divided dose, not to exceed 2gm/24 hours unless serum levels are monitored | 4–6 weeks |

*****Dosage patient with normal renal function **It is important to assay serum gentamicin levels every 3–4 days. One–hour peak concentration should not exceed 10mg/l and trough concentration (2–hour pre– dose) should be less than 2mg/l.

**Table 20.8: Prosthetic valve empirical treatment**

| Antibiotics | Dosage & Route* | Duration |
|---|---|---|
| Benzyl Penicillin G (X–Pen) or | 18 –24 milllion Units/24 hours IVI, 4 hourly in equally divided dose | 6 – 8 weeks |
| Ceftriaxone | 2mg once daily IVI | >6 weeks |
| plus cloxacillin | 2g IVI 6 hourly | >6 weeks |
| plus, rifampicin | 300 –600mg every 8 hourly | >6 weeks |
| and gentamicin** | 1mg/kg IVI every 8 hours | 2 weeks |

*Dosage patient with normal renal function
**It is important to assay serum gentamicin levels every 3–4 days. One–hour peak concentration should not exceed 10mg/l and trough concentration (2–hour pre– dose) should be less than 2mg/*L*

At any stage, treatment may have to be modified according to:

- Detailed antibiotic sensitivity tests
- Adverse reactions allergy
- Failure of response

Endocarditis leading to significant cardiac failure or failure to respond to antibiotics may well require early cardiac surgery within few days

**Referral**
Patients with complicated IE should be evaluated and managed in high level of care or centre, with immediate surgical facilities and the presence of a multidisciplinary including an Infectious Disease specialist, a microbiologist, cardiologist, imaging specialists, and cardiac surgeons

**Infective Endocarditis Prophylaxis**
Antibiotic prophylaxis should be considered for patients at highest risk for IE:
Patients with any prosthetic valve, including a trans catheter valve, or those in whom any prosthetic material was used for cardiac valve repair.
Patients with a previous episode of IE.
Patients with Congenital Heart Disease (CHD):
(a) Any type of cyanotic CHD.

(b) Any type of CHD repaired with a prosthetic material, whether place surgically or by percutaneous techniques, up to 6 months after the procedure or lifelong if residual shunt or valvular regurgitation remains.

**Antibiotic prophylaxis is not recommended in other forms of valvular or CHD**.

**Prophylaxis of Endocarditis Infective**

To reduce the risk of bacterial endocarditis, antibiotic prophylaxis should be given to patients undergoing dental procedures requiring manipulation of the gingival or periapical region of the teeth or perforation of the oral mucosa.

Antibiotic prophylaxis is not recommended for,

- Respiratory tract procedures including bronchoscopy or laryngoscopy, or trans nasal or endotracheal intubation
- Gastrointestinal or urogenital procedures or Trans–oesophageal Echocardiogram, gastroscopy, colonoscopy, cystoscopy, vaginal or caesarean delivery.
- Skin and soft tissue procedures

**Table 20.9: Recommended prophylaxis for high–risk dental procedures in high–risk patient**

| Situation | Antibiotic | Single–dose 30–60 minutes before procedure | |
|---|---|---|---|
| | | Adults | Children |
| No allergy to penicillin or ampicillin | Amoxicillin or ampicillin* | 2 g orally or i.v | 50 mg/kg orally or i.v. |
| Allergy to penicillin or ampicillin | Clindamycin | 600 mg orally or i.v | 20 mg/kg orally or i.v. |

*Alternatively, **C**: cephalexin 2g iv for adults or 50 mg/kg iv.for children, cefazolin or ceftriaxone 1 g iv. for adults or 50 mg/kg i.v. for children. Cephalosporins should not be used in patients with anaphylaxis, angio–oedema, or urticaria after intake of penicillin or ampicillin due to cross–sensitivity.

## 20.12 ACUTE RHEUMATIC FEVER

It is a non–suppurative sequela of a group A ß haemolytic streptococcal (GABHS) pharyngeal infection.

**Diagnostic Criteria Jones** Criteria updated 1992 See table 20.9 below

**Definitive Diagnosis**

- Two major criteria or
- One major criterion with two minor criteria, with evidence of antecedent streptococcal infection

**Table 20.10: Criteria for Acute Rheumatic Fever Diagnosis**

| Major Criteria | Minor Criteria |
|---|---|
| Carditis<br>Migratory polyarthritis<br>Sydenham's chorea<br>Erythema Marginatum | Clinical<br>Fever<br>Arthralgia<br>Laboratory<br>Elevated Acute Phase Reactants eg CRP<br>Prolonged PR interval |
| Plus<br>Supporting evidence of recent group A streptococcal infection e.g. positive throat culture or antigen detection and/or elevated streptococcal antibody tests*<br>*Anti –Streptolysin O, Anti –Deoxyribonuclease B | |

**Non–Pharmacological Treatment**
**Acute stage:**

- Bed rest and supportive care until all evidence of active carditis has resolved
- Patient education.
- Intensive health education for prevention of sore throats.

**Pharmacological Treatment**
Treatment of acute attack for eradication of streptococci in throat: Regardless of the presence or absence of pharyngitis at the time of diagnosis.

**A:** Benzathine Penicillin 1.2MU single dose im
Paediatric> 5 years 0.3MU, 5–10 years 0.6 MU > 10 years 1.2.mu single dose IM.
**OR**
**A**: Penicillin V 500mg two to three times daily for 10 days orally.
Children > 10years 500mg, 5–10 years 250mg, < 5years 125mg two to three times
daily for 10 days orally

Patients allergic to penicillin
**A:** Erythromycin 500mg or 40mg/kg 4 times per day for 10 days orally.

**Treatment of Acute Arthritis and Carditis:**
**A:** Aspirin orally 25mg/kg* 4 times a day as required.
Aspirin should be continued until fever, all signs of joint inflammation and the ESR have returned to normal and then tapered gradually over 2 weeks. If symptoms recur, full doses should be restarted. *dose should be reduced if tinnitus or other toxic symptoms develop

**In severe carditis** with development of increasing heart failure or failure of response to aspirin, **Add** **A:** Prednisolone 1–2mg/kg once a day for 3–4 weeks.

Then review and gradual reduction and discontinuation of prednisolone may be started after 3–4 weeks when there has been a substantial reduction in clinical disease.

**Heart failure** should be managed in the usual way (see Heart Failure Section 20.7).

**Treatment of Sydenham's Chorea:**

**B:** Haloperidol 1.5–3mg (O) 8hourly a day as required (Adult).
Paediatrics 50µg/kg in 2 divided doses.

**Referral:** Ideally all patients should be referred to high level of care a specialized hospital care;
where surgery is contemplated

**Antibiotic prophylaxis after rheumatic fever**:
Prophylaxis should be given to all patients with a history of acute rheumatic fever and to those with rheumatic heart valve lesions. The optimum duration of prophylaxis is controversial, but should be continued up to at least 21 years of age.

**Note**: Specific situations requiring prophylaxis for longer periods (up to 30 years as a guide):

- definitive carditis in previous attacks
- high risk of exposure to streptococcal infection at home or work (crowded conditions, high exposure to children)

**Medicine of choice**

**A:** Benzathine Penicillin IM Adult 2.4MU monthly or every three weeks*
Paediatrics <12yrs 1.2MU every 4 weeks or 3 weeks* up to 21–30yrs

**OR**

**A:** Penicillin V (PO) 250mg 12 hourly Adult
Paediatric<12yr 125–250mg 12 hourly a day up to 21–30yrs

**OR**

**A:** Erythromycin 250mg 12hourly a day Adult
Paediatric <12yr 125–250mg 2 times a day up to 21–30yrs***Every 3week regimen is more effective***

## Valvular Heart Disease and Congenital Structural Heart Disease

**Description:** Valvular Heart Disease
These are chronic acquired sequelae of Acute Rheumatic Fever or Acute Sequelae of Infective Endorcaditis or Ischaemic Heart Disease, consisting of valvular damage, usually left heart valves, with varied progression of severity and complications.

**Description:** Congenital Heart Disease
It is a congenital chamber defects or vessel wall anomalies
Valvular Heart Disease and Congenital Structural Heart Disease may be complicated by:

- Heart failure
- Infective endocarditis
- Atrial fibrillation
- Systemic embolism eg Stroke

**Non–Pharmacological Treatment**
**General measures**

- Advise all patients with a heart murmur regarding the need for prophylaxis treatment prior to undergoing certain medical and dental procedures
- Advise patients to inform health care providers of the presence of the heart murmur when reporting for medical or dental treatment

**Referral**:
Should be considered from low level of care to high level of care where specialized (physician`s care) or super–specialized care (Cardiologist`s care) can be offered, those includes;

- All patients with heart murmurs for further assessment such as ECG, Echocardiogram
- All patients with heart murmurs not on a chronic management plan
- Development (New) of cardiac signs and symptoms
- Worsening of clinical signs and symptoms of heart disease
- Any newly developing medical condition, e.g. fever
- All patients with valvular heart disease for advice on prophylactic antibiotic treatment
- prior to any invasive diagnostic or therapeutic process

## 20.13 PULMONARY EMBOLISM

### 20.13.1 Acute Pulmonary Embolism

Clinical Spectrum less than two weeks

- Sudden onset of dyspnoea often with unexplained anxiety (most common)
- Pleuritic chest pain and haemoptysis
- Massive embolism: pleuritic chest pain, cyanosis, right heart failure and shock. Minor emboli or pulmonary infarction may herald massive embolism and must be treated vigorously
- About 90% of emboli are from proximal leg deep vein thromboses (DVTs) or pelvic vein thromboses. DVTs are at risk for dislodging and migrating to the lung circulation. Thus, termed as venous thromboembolism (VTE).

**Diagnostic Criteria**
**Determination pre-est probability of PE**
Use validated scoring system: **Wells Score** [25]

- Score > 6.0–High clinical probability proceeds with imaging test to confirm PE and treat,
- Score 2.0 to 6.0–Moderate clinical probability; negative D–dimer, PE is excluded. and D– dimer positive, obtain imaging tests to confirm based on result treat.
- Score < 2.0–Low clinical probability negative D–dimer, PE is excluded. Positive D–dimer obtain imaging tests to confirm or rule out and based on result treat

**Alternatively**

- Score > 4–PE likely, d–dimer positive proceeds with diagnostic imaging to confirm and treat PE.
- Score 4 or less–PE unlikely, consider d–dimer to rule out PE.

**Table 20.11: Wells Score**

| Variable | Score |
|---|---|
| Clinically suspected DVT | 3.0 points |
| alternative diagnosis is less likely than PE | 3.0 points |
| Tachycardia (heart rate > 100) | 1.5 points |
| Immobilization (≥ 3d)/surgery in previous four weeks | 1.5 points |
| History of DVT or PE | 1.5 points |
| Hemoptysis | 1.0 points |
| Malignancy (with treatment within six months) or palliative | 1.0 points |

- ECG – Not reliable test for diagnosis may be normal. However,
- Sinus tachycardia most common feature, acute right ventricular strain – i.e. right axis shift, S1Q3T3 occurs in small percentage of cases, may develop acute bundle branch block – right or left, may simulate right ventricular infarction, may develop arrhythmias – eg atrial fibrillation
- Arterial blood gases; not diagnostic, the $pO_2$ decreased <60mmHg due ventilation/perfusion mismatch. $pCO_2$ decreased due to hyperventilation, pH increased but may decrease in shocked patient
- D–dimer test – very sensitive blood test, but not specific. A negative test d–dimer test excludes an embolus in majority of cases (best exclusive test to rule out PE when is negative)
- Chest X–ray – Not very reliable usually normal, diaphragm may be raised on affected area, atelectasis may occur, peripheral wedge–shaped shadow & plural effusion
- Cardiac Echocardiography; Useful in diagnosis, features suggestive or support
- evidence of massive embolus acute right ventricular strain
- Computer Tomography Pulmonary Angiogram Scan (CTPA); Useful can demonstrate the presence and extent of proximal pulmonary emboli
- Ventilation/Perfusion Scan; Useful in stable patient to confirm the diagnosis. The presence of a perfusion defect with normal ventilation not corresponding to an x–ray abnormality is characteristic
- Pulmonary Angiography: Still gold standard investigation, may be necessary to establish
- diagnosis and catheter based embolectomy in the catheterization lab.

**Non-Pharmacological Treatment**

- Administer $O_2$ – maintain $pO_2$ > 60mmHg,
- Treat shock
- Correct electrolyte & acid base abnormalities and arrhythmias
- Ventilate if patient in respiratory failure

**Pharmacological Treatment**
**Anticoagulation**

**D:** Heparin (UFH) 10,000units IV bolus, then maintenance infusion starts with 6,000U over 6 hours to keep PTT or clotting time 2–3 times above baseline. PTT should be performed 12 hourly per lab instruction.

**OR**

**D:** Enoxaparin 1mg/kg twice daily

Start warfarin after 24 hours of heparin and continue post discharge for long–term. If the aetiology unknown may be for life, if aetiology is established at least for six months. Maintain INR 2.0–3.0

**Thrombolytic (Fibrinolysis)**

Indicated in proximal massive pulmonary emboli and haemodynamically unstable if no contra–indication exists

**C**: Streptokinase 250,000 IU infusion over 30 minutes, then 100,000 IU per hour for 24 hours

**OR**

**D:** Alteplase (rtPA) 100mg IV infusion over 2hours

**Referral**

All cases suspected of pulmonary embolus should be referred to a high level of care – specialized hospital care with HCDU/ICU

### 20.13.2 Chronic Pulmonary Embolism

Chronic pulmonary emboli are mainly a consequence of incomplete resolution of acute pulmonary thromboembolism. Clinically symptoms and signs may be preceded by Acute PE for more than two weeks.

**Diagnostic Criteria**

Refer or Section 6.11.2 majority of patients present with features of pulmonary hypertension

**Pharmacological Treatment**

Long-term oral anticoagulation

**S:** Warfarin 2–10mg once a day orally

**Maintain** INR 2.0–3.0

**Referral:** All cases suspected of pulmonary embolus should be referred to a high level of care

## 20.14 CARDIAC ARRHYTHMIAS/ DYSRHYTHMIAS

Always exclude underlying structural cardiac disease in all patients with cardiac dysrhythmias [25, 26]

## 20.14.1 Tachyarrythmias:

### 20.14.1.1 Narrow QRS Complex Tachyarrythmias (SVTs)

Definition Sustained (> 30 seconds) or non–sustained narrow QRS (≤ 0.1 seconds) tachycardias.

**Atrial fibrillation**

Acute onset (< 48 hours)

- Assess clinically, e.g. heart failure, mitral stenosis, thyrotoxicosis, hypertension, age and other medical conditions.
- Consider anticoagulation with heparin or warfarin
- Synchronized DC cardioversion is occasionally necessary in emergency especially
- haemodynamic instability or consider if is the first episode.

**Non-acute/chronic (> 48 hours)**

- As above, but not immediate DC cardioversion is indicated, unless in hypotensive emergency cases. Anticoagulation with oral warfarin 2mg – 5mg orally once a day for at least a month, then perform elective cardioversion at specialized hospital.

**Atrial flutter**

- P waves visible before QRS, commonly occurs, usually 2:1. (150 per minute). P waves, usually negative in Lead II precede QRS, blocked P in ST segment or hidden by QRS.
- Vagal stimulation with ECG may reveal blocked P waves.

**AV Junctional Re-Entry Tachycardias**

- Usually paroxysmal, often young with normal heart.
- AV nodal re-entry or WPW syndrome. P waves usually not visible (hidden by QRS).

**Non-pharmacological Treatment**

**Electrical Cardioversion.**

Synchronized DC cardioversion, 200 J, after sedation with:

**A:** Diazepam 10–20 mg IV

If flutter has been present longer than 48 hours, defer cardioversion for 4 weeks after anticoagulation with warfarin, unless severe symptoms or heart failure requires urgent cardioversion

**Pharmacological Treatment**

None is nearly as effective as DC cardioversion.

Consider anticoagulants if Atrial flutter sustained.

**Long term treatment:** Recurrent atrial flutter is an indication for referral. Many can be cured by radiofrequency catheter ablation.

**Atrial tachycardias**

- Rare, often incessant P before QRS (often long PR) or hidden in T
- May cause heart failure (tachycardia cardiomyopathy).

**Atrial fibrillation**

**Pharmacological Treatment**
**Initial**

- Anticoagulation with warfarin.
- Control the ventricular rate with one of the following:
  **C:** Digoxin oral, 0.25mg daily; use only in heart failure.
  **B:** Atenolol, oral, 50–100 mg daily (contraindicated in asthmatics).

DC cardioversion in selected cases, after 4 weeks warfarin anticoagulation

**Long – term**

- Continue warfarin anticoagulation long-term, unless contraindicated:
  **S:** Warfarin 5mg daily.
  Monitor INR
- Maintain therapeutic Range INR 2–3: Stable patients check 3 monthly monitoring If INR < 1.5 or > 3.5: do monthly monitoring

Note: INR monitoring is mandatory for all patients on warfarin.

**Rate control:**

- Digoxin only controls rate at rest and is insufficient on its own. If used for long-term, combine with s–blocker.
- In the elderly and patients with renal impairment:
  **C:** Digoxin (O) 0.125 mg initial dose
  Adjust dosages according to trough levels within the therapeutic range. Do levels only if the patient has been on the drug for at least 10 days.
  **B:** Atenolol (O) 50–100 mg daily

## 20.14.2 AV Junctional Re-Entry Tachycardias

**Non-Pharmacological Treatment**

Vagal manoeuvres: Valsalva or carotid sinus massage. The patient should be supine and as relaxed as possible, to avoid competing sympathetic reflex

**Pharmacological Treatment**

If vagal manoeuvres fail:

**D:** Adenosine, rapid IV bolus, 6 mg through a good IV line, followed by a bolus of 10mL Sodium chloride 0.9% to ensure that it reaches the heart before it is broken down. Run the ECG for 1 minute after the injection. If 6 mg fails, repeat with 12 mg.

If the medicine reaches the central circulation before it is broken down the patient will experience flushing, sometimes chest pain and anxiety. If the tachycardia fails to terminate without these symptoms, the drug did not reach the heart.

If none of the above is effective, or if the patient is hypotensive, consider DC shock

**Prevention of recurrent paroxysmal atrial fibrillation**
Only in patients with severe symptoms despite the above measures:

- **D:** Amiodarone 200 mg (O) 8 hourly for 1 week, followed by 200 mg twice daily for one week and thereafter 200 mg daily. Specialist initiated.

**Precautions**:

- Halve dosage of warfarin and monitor INR closely if patient on warfarin, until stable
- Avoid concomitant digoxin use.

Note: Verapamil and digoxin are contraindicated in WPW syndrome

**Long-term treatment:** Teach the patient to perform vagal manoeuvres, Valsalva is the most effective. For infrequent, non–incapacitating symptoms:
ß –Blockers

**B:** Atenolol 50–100 mg (O) daily (If asthmatic)

**OR**

**D:** Verapamil (O) 80–120 mg three times daily (Normal heart)

## 20.14.3 Wide QRS (Ventricular) Tachyarrhythmias (VTs)

**Definition:** Sustained (> 30 seconds) or non-sustained wide QRS (> 0.12 seconds) tachycardias

**Regular Wide QRS Tachycardias**
These are ventricular tachycardias until proved otherwise. Regular wide QRS supraventricular tachycardias are uncommon**.**
**Non-pharmacological treatment**
Refer all cases after resuscitation and stabilization. Emergency DC cardioversion is mandatory with a full protocol of Cardiopulmonary Resuscitation (CPR)

- Cardio-pulmonary resuscitation (CPR).
  If no cardiac arrest:
- DC cardioversion, 200 J, after sedation with: Diazepam, I.V, 10–20 mg If 200 J fails, use 360 J.
  If cardiac arrest: Defibrillate (not synchronized).

**Pharmacological Treatment**
DC cardioversion is first line therapy for regular wide QRS tachycardias.
Medicines are needed if VT recurs after cardioversion or if spontaneous termination/recurrence.

**D:** Amiodarone, IV, 5 mg/kg (150mg – 300mg) infused over 30 minutes then continue
with maintenance dose to total dose of 1200mg/24 hours

**OR**

**D:** Amiodarone 800 mg orally once daily for 7 days, 600 mg/day for 3 days followed
by a maintenance dose of 200–400 mg/day

Note: Amiodarone may cause serious long-term side effects due to long half-life.
Therefore, patients require regular monitoring by specialist

**B:** Lidocaine 50–100 mg (1–2 mg/kg) IV initially and at 5–minute intervals if required to a total of 200–300 mg,
Thereafter, for recurrent ventricular tachycardia only
**B:** Lidocaine, IV infusion, 1–3 mg/minute for 24–30 hours. Lidocaine will only terminate ± 30% of sustained ventricular tachycardias, and may cause hypotension, heart block or convulsions.

**Note:**
- Never give verapamil IV to patients with a wide QRS tachycardia.
- For emergency treatment of ventricular tachycardia, DC cardioversion is first–line therapy, even if stable.

**Sustained (> 30 Sec) Irregular Wide QRS Tachycardias**
They are usually due to atrial fibrillation with bundle branch block, or pre-excitation (WPW syndrome).

**Non-Pharmacological/pharmacological Treatment**
- If the QRS complexes have a pattern of typical right or left bundle branch block, with a rate < less than 170/minute, treat as for atrial fibrillation. See the section on atrial fibrillation.
- If the rate is > 170 per minute, and/or the complexes are atypical or variable, the likely diagnosis is WPW syndrome with atrial fibrillation, conducting via the bypass tract, DC conversion.

**Referral:**Refer patient to high care centre for further management

**Non–Sustained (< 30 Sec) Irregular Wide QRS Tachycardias**
They are usually ventricular. They are common in acute myocardial infarction.
In acute myocardial infarction, only treat non–sustained ventricular tachycardia if it causes significant haemodynamic compromise. Ensure the serum potassium level is above 4 mmol/L

**Pharmacological Treatment**
Medicines are needed if VT recurs after cardioversion or if spontaneous termination/recurrence.
**D:** Amiodarone, IV, 5 mg/kg (150mg – 300mg) infused over 30 minutes then continue with maintenance dose to total dose of 1200mg/24 hours
**OR**
**D:** Amiodarone 800 mg orally once daily for 7 days, 600 mg/day for 3 days followed
by a maintenance dose of 200–400 mg/day
Only in a haemodynamically stable patient:
**B:** Lidocaine, IV, 50–100 mg (1–2 mg/kg) initially and at 5–minute intervals if required
to a total of 200–300 mg
Thereafter, for recurrent ventricular tachycardia only:
**B:** Lidocaine, IV infusion, 1–3 mg/minute for 24–30 hours
In the absence of acute ischaemia or infarction, consider torsade's de pointes, due to QT prolonging drugs.

**Torsade's De Pointes Ventricular Tachycardia (VT)**

Has a twisting pattern to the QRS complexes and a prolonged QT interval in sinus rhythm

It is usually due to a QT–prolonging drug, ± hypokalaemia.

**Non-pharmacological Treatment**

- Cardioversion/defibrillation, as necessary.
- Torsade's complicating bradycardia: temporary pacing.

**Pharmacological Treatment**

Stop all QT-prolonging drugs. Correct serum potassium.

**A:** Magnesium sulphate 2 g I.V over 5–10 minutes

If recurrent episodes after initial dose of magnesium sulphate:

**A:** Magnesium sulphate 2 g I.V over 24 hours

Torsade's complicating bradycardia: temporary pacing.

**A:** Adrenaline infusion to raise heart rate to > 100 per minute (if temporary pacing unavailable).

**Referral:** All cases of wide QRS tachycardia, after resuscitation and stabilization

## 20.15 HEART BLOCK (SECOND & THIRD DEGREE)

Most cases occur in patients over 60 years and is idiopathic, with an excellent long-term prognosis, provided a permanent pacemaker is implanted. Acute, reversible AV block commonly complicates inferior myocardial infarction. The condition may also be induced by metabolic and electrolyte disturbances, as well as by certain medicines.

**Non-Pharmacological Treatment**

- Emergency cardio-pulmonary resuscitation.
- External pacemaker should be available in all secondary hospitals and must be preceded by appropriate analgesia.

**Pharmacological Treatment**

Analgesia if external pacemaker:

**C:** Morphine 10–15 mg IM 3–6 hourly

AV nodal block with narrow QRS complex escape rhythm only:

**A:** Atropine, I.V bolus, 0.6–1.2 mg, may be repeated until a temporary or permanent pacemaker is inserted. Use in a patient with inferior myocardial infarct and hypotension and second-degree AV block.

It is temporary treatment of complete AV block before referral (urgently) for pacemaker.

**OR**

For resuscitation of asystole:

**A:** Adrenaline 1:10 000, slow IV, 5 mL (0.5 mg)

Used as temporary treatment of complete heart block when other drugs are not effective

**Referral**

All cases with a heart rate below 40 beats/minute after resuscitation and stabilization to high level of care where permanent pacemaker implantation can be performed

- All cases of second or third-degree AV block, whether myocardial infarct or other reversible cause is suspected, and whether the patient is thought to be symptomatic
- Permanent pacemaker is the definitive form of treatment.

Note: Complete Heart Block Is a Medical Emergency Refer Urgently

## 20.16 SINUS BRADYCARDIA & SINUS ARREST

This rhythm does not require treatment, unless they are causing symptoms, i.e. syncope, dizziness, tiredness and poor effort tolerance.

Sinus bradycardia < 50/minute or sinus arrest with slow escape rhythm, accompanied by hypotension, strongly suggests a treatable underlying cause:

- Acute inferior myocardial infarct
- Hyperkalaemia, especially if wide QRS and/or peaked T waves
- Drugs, especially combination of verapamil and ß –blocker or digoxin
- Hypothermia
- Hypoxia

  Treat the cause. Consider atropine if inferior infarct.

**Sinus arrest**

- Refer all to a cardiologist specialist.

# CHAPTER TWENTY ONE
# KIDNEY AND UROLOGICAL DISORDERS

These are disorders resulting from structural malformation or function of the genito-urinary system which may lead to renal impairment.

## 21.1 CHRONIC KIDNEY DISEASES (CKD)

It is structural or functional kidney damage present for > 3 months, with or without a decreased glomerular filtration rate (GFR).
**Note**: A history of diabetes, hypertension or cardiovascular disease confers the highest risk for developing CKD and individuals who have such a history should be screened

**Diagnostic Criteria**
Clinical features depend on the stage of renal disease. In advance stage includes:

- Anorexia
- Malaise
- Vomiting
- Oliguria/Anuria

**Investigations**

- Renal function tests (serum creatinine and urea)
- FBC (HB)
- Urinalysis (Protein, red blood cells and cast cells)
- Renal ultrasound

Common causes of chronic kidney disease include:

- Hypertension
- Diabetes mellitus
- Glomerular diseases

**Note:**

- Chronic kidney disease can be entirely asymptomatic **BUT** early detection and management can improve the outcome of this condition
- Adults with early CKD i.e. stages 0–3 can all be managed at primary care level **once** the cause and plan for care has been established. All children should be referred for investigation and initial management

The general management of the patient with chronic kidney disease involves the following issues

- Treatment of reversible causes of renal dysfunction
- Preventing or slowing the progression of renal disease
- Treatment of the complications of renal dysfunction
- Identification and adequate preparation of the patient in whom renal replacement therapy will be required

**Table 21.1: Staging of kidney disease for adequate management of CKD stage/glomerular filtration rate (ml/minute/1.73)**

| | Description | Action Includes actions from preceding stages |
|---|---|---|
| Stage 0 or GFR > 90 | Increased risks for CKD e.g<br>Diabetes mellitus<br>Hypertension<br>Glomerular disease<br>and HIV | Screening for advanced CKD and CVD disease<br>CKD risk reduction i. e treat hypertension, diabetes and HIV |
| Stage 1 or GFR >90 | Kidney damage with normal GFR | Diagnose and treat comorbid conditions See for Stage 0 |
| Stage 2 or GFR 60-89 | Kidney damage with mild GFR | Refer to determine cause and develop care plan<br>While on the care plan, monitor the GFR in these patients and make sure kidney function is not worsening rapidly and watch for stage 3 |
| Stage 3 or GFR 30-59 | Moderate GFR | Refer |
| Stage 4 or GFR 15-9 | Severe GFR | Refer |
| Stage 5 or GFR < 15 | Kidney failure requiring renal replacement therapy End stage renal disease | Refer |

**Non-Pharmacological Treatment**

- Reduce salt intake.
- Low protein diet (not exceed 1g/kg per day) is indicated in the presence of CKD stage 4 and 5. (Evidence)
- Reduce cardiovascular disease risk factors – See section: Prevention of ischaemic heart disease and atherosclerosis.
- Treat underlying conditions.
- Decrease significant proteinuria, if present.

Significant proteinuria = spot urine protein creatinine ratio of > 0.1 g/mmol or ACR (albumin-creatinine ratio) > 100 g/mol, confirm as positive if raised on at least 2 of 3 occasions, in the absence of infection, cardiac failure and menstruation.

**Proteinuria**

- In established chronic kidney disease, decrease proteinuria, irrespective of presence or absence of systemic hypertension.
- Monitor renal function and potassium especially with impaired renal function.
- If volume depleted, first rehydrate before commencing ACE-inhibitor.
- ACE-inhibitor are contraindicated in:
  - ✓ Hyperkalaemia
  - ✓ known allergy to ACE-inhibitor

Begin with low dosage of ACE-inhibitor and titrate up ensuring blood pressure remains in normal range and no side effects are present, up to the maximum dose or until the proteinuria disappears – whichever comes first.

**Pharmacological Treatment**
**Adults**

**C:** Enalapril 10–20 mg (PO) 12 hourly.

**Hyperlipidaemia**
If hyperlipidaemia is a co-existent risk factor manage according to section

**Diabetes mellitus**

- In diabetics, optimise control according to section 9.6: Diabetes mellitus type 2, in adults
- Avoid oral hypoglycaemics if GFR is < 60 because of the risk of lactic acidosis with metformin and prolonged hypoglycaemia with long acting sulphonylureas.

**Hypertension**
Treat if present. **See Section 20.7: Hypertension**
Current evidence does not support stricter blood pressure control targets for the majority of patients with CKD *[IA].* CKD patients with albuminuria may benefit from tighter control with a target of < 130/80 *[IIA].*

**Fluid overload**
Treat fluid overload if present and refer.

**Adults**

**B:** Furosemide 40–80mg slow I.V or oral, 12 hourly.
If poor response, repeat after 1 hour.
Do not give I.V fluids – use heparin lock or similar I.V access.

**Note:** Exclude heart failure in patients with persistent pedal oedema.

**Referral to nephrologist**

- All cases of suspected chronic kidney disease stages 3–5 for assessment and planning
- All children
- All cases of CKD with:
  - haematuria,
  - proteinuria
  - raised blood urea or creatinine initially for assessment and planning
- Uncontrolled hypertension/fluid overload
- CKD associated with hyperlipidaemia
- No resolution of proteinuria with ACE-I therapy

**Note:** Patients who might qualify for dialysis and transplantation or who have complications should be referred early to ensure improved outcome and survival on dialysis, i.e. as soon as GFR drops below 30 mL/min/1.73 $m^2$, or as soon as diagnosis is made/suspected

## 21.2 ACUTE RENAL FAILURE (ARF)

Is an abrupt or rapid decline in renal filtration function
This is (usually) reversible kidney failure, most commonly as a result of:

- dehydration and fluid loss
- drugs/toxins,
- urinary tract obstruction, and
- acute glomerulonephritis in older children

**Diagnostic Criteria**

- Oedema
- Oluguria/anuria
- Convulsions in children

**Investigations**

- Serum electrolytes, Urea and Creatinine tests
- Ultrasound
- Urinalysis

**Non-Pharmacological Treatment**

- Give oxygen, and nurse in semi-Fowlers' position if patient has respiratory distress.
- Stop intake of all salt and potassium containing foods and fluids
- Restrict fluid intake to 10 mL/kg/day daily plus visible fluid losses

**Pharmacological Treatment**
**Adults**
If diastolic blood pressure is greater than **100 mmHg** or systolic blood pressure is above **150 mmHg**:

**C:** Amlodipine (PO) 5 mg as a single dose.

If there is respiratory distress (rapid respiration, orthopnoea):

**B:** Furosemide, as an IV bolus, 80 mg.

**Note**: Do not put up a drip **and do not** give a fluid infusion.

**Referral**
All cases where adequate laboratory and clinical resources exists, management according to the hospital level guidelines may be instituted

## 21.3 GLOMERULAR DISEASES (GN)

Are those which cause glomerular to leak blood or protein into urine. Glomerular disease may be a result of a primary condition of the kidney, or may be secondary to a systemic disorder.

**Diagnostic Criteria**

- Proteinuria
- Reduced GFR (and its effects)
- Haematuria
- Hypertension
- Oedema.

### 21.3.1 Glomerular disease - Nephritic syndrome

A non infectious inflammatory process that involve the nephron.

**Diagnostic Criteria:**

- Painless macroscopic turbid, bloody or brownish urine
- Peripheral and facial oedema
- Difficulty in breathing
- Hypertension encephalopathy with impaired level of consciousness or convulsions
- Little or no urine excretion

**Investigations**

- Renal function test
- Urinalysis
- Urine culture
- Complete blood count
- Others on tertiary hospital e.g. lupus serology, complements

**Non Pharmacological Treatment**

- Give oxygen, and nurse in semi-Fowlers position if patient has respiratory distress.
- Restrict intake of all salt
- Restrict potassium containing foods and fluids
- Restrict fluid intake to 10 mL/kg/day daily plus visible fluid losses

**Pharmacological treatment**

**Adults**

Fluid overload

**B:** Furosemide I.V bolus, 80 mg.

If hypertension

If diastolic blood pressure is greater than **100 mmHg** or systolic blood pressure is above

**150 mmHg**:

**C:** Amlodipine 5 mg (PO) as a single dose

**Note:** The definitive treatment of nephritis depends on the cause – an assumption of acute post streptococcal nephritis or any other disease cannot be made without specific investigation which may include renal biopsy.

### 21.3.2 Nephrotic syndrome

It is a renal disorder characterized by urinary protein loss leading to generalized body swelling.

It is severe proteinuria defined as: Adults: 2.5 g/day,

**Diagnostic Criteria**

- Oedema
- Hypoalbuminaemia
- Hyperlipidaemia

**Note:** Accurate diagnosis requires a renal biopsy

**Non-Pharmacological Treatment**
Adequate calories and adequate protein 1g/kg/d
No added salt to limit fluid overload

**Pharmacological Ttreatment**
The management of glomerular disease depends on the type/cause of the disease and is individualized guided by a specialist according to the biopsy result.

**Note**: Referral to nephrologist may include treatment using immunosuppressant such as prednsolone, mycophenolate mofetil, cyclophosphamide, angiotensin blockade etc

## 21.4 URINARY TRACT INFECTION (UTI)

Urinary tract infections may involve the upper or lower urinary tract. Infections may be complicated or uncomplicated. Uncomplicated cystitis is a lower UTI in a non-pregnant woman of reproductive age and who has a normal urinary tract. All other UTIs should be regarded as complicated.

**Note:**
- Differentiation of upper from lower urinary tract infection in young children is not possible on clinical grounds
- Upper UTI is a more serious condition and requires longer and sometimes intravenous treatment. To be summarized and refined; see also Obstetric/Gynecology

**Diagnostic criteria of upper UTI (pyelonephritis)**
- Flank pain/tenderness
- Temperature $38^0$C or higher
- Tachypnoea, tachycardia, confusion, and, hypotension
- Vomiting

**Investigations**
- urine microscopy, culture and sensitivity
- Ultrasound (kidney and pelvis)to exclude stones and structural abnormalities

**Non-Pharmacological Treatment**
- Ensure adequate hydration

**Pharmacological Treatment**
Acute pyelonephritis
**A:** Ciprofloxacin 500 mg (PO) 12 hourly for 7 days
Uncomplicated cystitis

Adults:

**A:** Ciprofloxacin 500 mg (PO) as single dose

Complicated cystitis

Adults:

**A:** Ciprofloxacin 500 mg (PO) 12 hourly for 7 days

For pregnant women and adolescents:

**C:** Amoxicillin/clavulanic acid 500/125 mg (PO) 12 hourly for 7 days

**Acute Pyelonephritis**

Outpatient therapy is only indicated for women of reproductive age, who do not have any of the danger signs – see referral criteria. All other patients should be referred.

**A:** Ciprofloxacin 500 mg (PO) 12 hourly for 10 days

**Referral**

Refer the patient **urgently** to the next facility with adequate expertise and facilities if:-

Acute pyelonephritis with:

- Vomiting
- Sepsis
- Diabetes mellitus

Acute pyelonephritis in:

- Pregnant women
- Women beyond reproductive age
- Men

**While patients Awaiting Transfer**

Ensure adequate hydration with intravenous fluids

**A:** Ceftriaxone IM, 50–80 mg/kg/dose immediately as a single dose

**Non-urgent**

- All children for urinary tract investigations after completion of treatment
- No response to treatment.
- UTI more than 3 times within a one-year period in women, and more than 1 time for men

## 21.5 UROLOGY DISORDERS

Are diseases that affect urinary system including urinary incontinence, urolithiasis, benign prostatic hyperplasia, prostate cancer**.**

### 21.5.1 Prostatitis

It is an infection of the prostate caused by urinary or STI pathogens.

**Diagnostic Criteria**

- perineal, sacral or suprapubic pain
- dysuria and frequency
- varying degrees of obstructive symptoms which may lead to urinary retention
- sometimes fever

**Investigations**

- Urine analysis
- Urine culture

**Pharmacological Treatment**

**Acute bacterial prostatitis**

In men < 35 years or if there are features of associated urethritis (STI regimen):

**D:** Cefixime 400mg (PO) as a single dose

Followed by:

**A:** Doxycycline 100 mg (PO) 12 hourly for 7 days

In men > 35 years or if there is associated cystitis:

**A:** Ciprofloxacin 500 mg (PO) 12 hourly for 14 days

**Referral to Urologist if**

- No response to treatment
- Urinary retention
- High fever
- Chronic/relapsing prostatitis

## 21.5.2 Benign prostatic hyperplasia (BPH)

Benign prostatic hyperplasia is a noncancerous (benign) growth of the prostate gland. Management of BPH depends on severity of symptoms according to International Prostate Symptom Score (IPSS)

**Diagnostic Criteria**

- weak, intermittent stream and urinary hesitancy
- Irritative (frequency, nocturia and urgency) voiding symptoms.
- Digital Rectal Examination reveals a uniform enlargement of the prostate.
- Urinary retention with a distended bladder may be present in the absence of severe symptoms, therefore it is important to palpate for an enlarged bladder during examination.
- Pelvic or transrectal USS confirms the prostate enlargement
- Prostatic specific antigen levels are within normal range

**Non-Pharmacological Treatment**

- Patients with mild symptoms should be put under watchful waiting (change of life style and regular follow up)
- Patients with severe symptoms should undergo surgery, transurethral resection of the prostate for prostate weighing up to 75 gms and those weighing more than 75gms should undergo open prostatectomy
- For patients presenting with urinary retention, insert a urethral catheter as a temporary measure while patient is transferred to hospital
- Remove drugs that prevent urinary outflow e.g. tricyclics and neuroleptics.

**Pharmacological Treatment**

Patients with moderate symptoms according to IPSS should be put under medical therapy unless opt for surgery.

Medical treatment of BPH includes alpha adrenergic blocker or 5 alpha reductase inhibitor or a combination of both

**Adrenergic Alpha Blockers:**

**D:** Tamsulosin (PO) 0.4 mg once daily

**OR**

**S:** Alfuzosin (PO) 10mg once daily

**5-alpha Reductase Inhibitors**

**S:** Finasteride (PO) 5mg once daily

**OR**

**S:** Dutasteride (PO) 0.5mg once daily.

**Referral**

All patients with BPH and associated commplications like recurrent UTI, Haematuria, renal insufficiency, hernia and urinary stones need surgery and should be referred to centres where specialized care can be offered.

## 21.5.3 Prostate cancer

Usually occurs in men over 50 years and is most often asymptomatic. Systemic symptoms, i.e. weight loss, bone pain, etc. occurs in 20% of patients. Obstructive voiding symptoms and urinary retention are uncommon.

**Diagnostic Criteria**

- The prostate gland is hard and may be nodular on digital rectal examination and/or PSA elevation
- Verification of prostate cancer is by prostate core biopsy
- As the axial skeleton is the most common site of metastases, patients may present with back pain or pathological fractures.
- Lymph node metastases can lead to lower limb lymphoedema.
- Serum prostate specific antigen (PSA) is generally elevated and may be markedly so in metastatic disease.
- Non-pharmacological treatment
- Wathful waiting- low risk patients with short life expectancy
- Active surveillance-lowest risk of cancer progression and more than 10 years life expectancy
- Radical prostatectomy- patients with localized cancer and life expectancy more than 10 years
- Surgical Androgen deprivation therapy (bilateral orchidectomy) for advanced prostate cancer

**Pharmacological Treatment**

Medical androgen Deprivation Therapy is offered in patients with advanced disease, PSA levels more than 50 ng/ml, poorly differentiated tumour and in those who cannot receive any form of local treatment.

Luitenising hormone releasing hormone (LHRH) Agonists

**S:** inj Goserelin 3.6 mg subcutaneous every weeks or 10.8mg every 12 weeks

**OR**

**S:** Bicalutamide (PO) 50–150mg once daily

**Castrate resistant prostate cancer**

**S:** Docetaxel 75mg/m2 every 3 weeks

**Referral**

All patients with suspected cancer (For more detail refer to the Malignant diseases section)

## 21.6 NOCTURNAL ENURESIS

Enuresis is bedwetting after the age of 5 years. It is a benign condition which mostly resolves spontaneously. It is important, however, to differentiate between nocturnal enuresis and enuresis during daytime with associated bladder dysfunction. Secondary causes of enuresis include:

- diabetes mellitus
- urinary tract infection
- physical or emotional trauma

**Note:** Clinical evaluation should attempt to exclude the above conditions. Urine examination should be done on all patients.

**Non-pharmacological treatment**

- Motivate, counsel and reassure
- Spread fluid intake throughout the day
- Psychotherapy

**Pharmacological Treatment**

**A:** Imipramine 25 mg nocte for on month

**OR**

**S:** Oxybutynin (PO) 5mg 8 hourly for one month

**Referral**

- Suspected underlying systemic illness or chronic kidney disease
- Diurnal enuresis

## 21.7 SEXUAL DYSFUNCTION

**In Women**

May involve decrease or increase sexual responsiveness (persistent genital arousal disorder)

Decrease responsiveness include absence of sexual desire, sexual arousal disorder, orgasmic disorder, vaginismus and dyspareunia

**Non pharmacological Treatment**

Correction of contributing factor (genital lesion, systemic or hormonal factors and drugs e.g. SSRIs)

Psychological therapies

Use of antidepressants

**In men**
It is inability to attain and maintain an erect penis with sufficient rigidity for vaginal penetration. Organic causes include neurogenic, vasculogenic, endocrinological as well as many systemic diseases and medications.

**Non-Pharmacological Treatment**
- Education counseling
- Consider the removal of drugs that may be associated with the problem.
- A change in lifestyle or medications may resolve the problem, e.g. advise cessation of smoking and alcohol abuse.

**Pharmacological Treatment**
- Treat the underlying condition.
- If persist refer the patient

Note: The use of medication like sildenafil may result to serious problem.

## 21.8 UROLITHIASIS

This is a calculus which has formed in the urinary tract i.e. calyx, renal pelvis, ureters or urinary bladder as a result of urine which is supersaturated with respect to a stone-forming salt.

**Diagnostic Criteria**
- Sudden onset of acute colic, localized to the flank, causing the patient to move constantly.
- nausea and vomiting
- blood in urine
- referred pain to the scrotum or labium on the same side as the stone moves down the ureter
- Urinalysis with features of infection or microscopic haematuria
- Ultrasound with an acoustic shadow with features of obstructive uropathy eg. Hudroureter or hydronephrosis
- Plain x-ray can pick up to 90% of calculi as they are radio-opaque
- Conventional intravenous urogram or CT urography confirms upper urinary tract lithiasis.

**Non- Pharmacological Treatment**
- Ensure adequate hydration. (Drink water 2.5 to 3 litres per day, diuresis more than 2.5 litres of urine)
- Nutritional advice for a balanced diet-rich in vegetables and fibre, normal calcium content1-1.2 g/day limited NaCl content (4-5 g/day), limited animal protein content0.8-1.0g/kg/day
- Surgical intervention is indicated
- For patient with obstructive uropathy and infection, emergency decompression is indicated by percutenous nephrostomy placement or ureteric DJ Stenting

**Pharmacological Treatment**

Analgesia for pain, if needed:

**A:** Ibuprofen (PO) 400mg 8hourly for 3 days

**OR**

**C:** Tramadol inj 100mg stat then continue with PO 50mg 8 hourly

For distal ureteric calculi less than 7mm

**D:** Tamsulosin 0.4 mg (PO) once daily for a month may be prescribed for spontaneous stone expulsion.

**Note:** Refer patients for surgical interventions in centres where there is expertize and equipment

# CHAPTER TWENTY TWO
# MALIGNANT DISEASE CONDITIONS

Cancer is a term covering a wide range of malignant diseases, which contribute significantly to the overall morbidity and mortality of people worldwide. An estimated 50,000 new cancer cases occur each year in Tanzania, however, only about 6,000 were recorded in 2016 at Ocean Road Cancer Institute (ORCI) based registry. This implies that many patients die from cancers without proper diagnosis. Of those who present to hospital for diagnosis and treatment, majority present with advanced stages (stage 3 and 4) where cure is rarely possible. More effort is required to create public awareness on risk factors, symptom and screening for prevention, early diagnosis and treatment.

## 22.1 GYNECOLOGICAL MALIGNANCIES

### 22.1.1 Cancer of the Uterine Cervix

This is the commonest female malignancy in developing countries, with ~ 33% of all cancer patients attending at ORCI. It is caused by persistent infection with human papilloma Virus (HPV). Risk factors include early coitus and childbirth, multiple sexual partners, smoking and HIV infection. It is preventable through avoiding risk factors, screening and vaccination. When detected early, it is curable by surgery or radiotherapy hence regular screening is required for all women at risk.

**Diagnostic Criteria**

- Asymptomatic in early stages of the disease.
- Majority present with abnormal vaginal bleeding (post coital, inter-menstrual or postmenopausal vaginal bleeding).
- Foul smelling discharge, pain and incontinence (VVF or RVF) are symptoms of late disease

**Investigations**

- Full Blood Count (FBC), Liver Function Test (LFTs), Creatinine, Urea and HIV test.
- CXR.
- Abdominal and pelvic Ultrasonography.
- Pelvic MRI, CT Scan of the abdomen and pelvis.
- Biopsy of cervix for histology or abnormal Papanicolaou smear for cytology.
- Bimanual Examination under Anesthesia (EUA).

**Table 22.1:.Management by disease stage.**

| Stage | Management |
|---|---|
| Stage IA1: | Simple hysterectomy or if patient desires fertility consider conization |
| Stage IA2–IB1 | Consider Wertheim Hysterectomy plus bilateral pelvic lymph node dissection. RT may be given post operation or alone. No benefit of adjuvant chemotherapy |
| Stage IB2; IIA and IIB | 2.0Gy/# to 50Gy external beam + 8.0 Gy x 3 # HDR +/– Chemotherapy depending on renal function |
| Stage IIIA and IIIB | if stage by CT or MRI and no distant metastasis and good renal function: 2.0Gy to 50 Gy external beam + 8.0 Gy x 3 HDR |
| Stage lll A and lll B | 2.5 Gy to 50 Gy external beam only no HDR nor chemotherapy if poor renal function |
| Stage lV A + good general condition, no VVf or RVF: | can be given curative dose of 50 Gy external beam + Brachytherapy or palliative dose of 20Gy/5# or 30 Gy/10# |
| Stage lll B advanced/stage lV B with bad general condition | Individual approach, palliative basis |

**Pharmacological Treatment**

Chemotherapy is given as a radiotherapy sensitizer or on palliative intent.

**S:** Cisplatin 40 mg/$m^2$ IV to max of 70 mg is given weekly during radiation therapy.

- If patient is HIV positive or has mild renal impairment consider 30 mg/$m^2$ to max of 60 mg weekly.
- Available and preferred palliative chemotherapy drugs for metastatic, recurrent or persistent cancer after RT, given in single or combination regimen include: Cisplatin, paclitaxel, bevacizumab, carboplatin, docetaxel and gemcitabine.

- Do FBC, urea and creatinine before each cycle of chemotherapy

**Follow up:**

First visit at 4–6 weeks post treatment then 3–6 months in the first 2 years, there after yearly.

***This follow-up schedule applies to all malignancies with few exceptions***

**NOTE:**

● All patients suspected or confirmed to have cervical cancer should be referred to cancer specialized centers for definitive management

● All women aged 25 years and above are advised to have regular cervical screening with VIA and VILI or Pap smear

## 22.1.2 Endometrial Cancer

This is predominantly a disease of old women. Adenocarcinoma is the commonest histological type. Risk factors for endometrial carcinoma include obesity, diabetes, high fat diet, early age at menarche, nulliparity and late age at menopause, old age and use of tamoxifen.

**Diagnostic Criteria**

- Abnormal vaginal bleeding in a postmenopausal female.

**Investigations**

- FBC, LFTs, urea, creatinine and Cancer
- Cancer Antigen 125 (CA 125)
- CXR, Abdominal and pelvic USS
- Abdominal–pelvic CT scan and/or pelvic MRI
- Endometrial biopsy to confirm the diagnosis

**Staging:** By FIGO or TNM
**Management**: Surgery is the main stay of treatment in early stages of the disease

| Stage | Management |
|---|---|
| Stage IA | Total abdominal hysterectomy and bilateral salpingoopherectomy (TAH + BSO) |
| Stage IB, IIA | TAH + BSO with pelvic lymphnode dissection followed by Radiotherapy (45Gy or 30Gy of External beam radiotherapy) |

**Note:** For inoperable disease stage llb – lVA, radiotherapy and or chemotherapy can be offered as neo-adjuvant prior to surgery

**Pharmacological Treatment**

Cytotoxic therapy for inoperable, metastatic or recurrent disease is given with palliative intent and responses are generally of short duration.
The most active drugs are the platinum agents, taxanes and anthraccyclines. Combined regimens recommended for high–risk disease, inoperable, recurrent or metastatic disease include:

**S:** Doxorubicin 60 mg/m$^2$ IV plus cisplatin 50 mg/m$^2$ IV on day 1; repeat every 21days

**OR**

**S:** Doxorubicin 45 mg/m$^2$ IV plus cisplatin 50 mg/m$^2$ IV on day 1 plus paclitaxel 160 mg/m$^2$ over 3h on day 1; repeat every 3weeks.

**OR**

**S:** Cisplatin 50 mg/m$^2$ IV plus doxorubicin 50 mg/m$^2$ IV on day 1; repeat every 3weeks

**OR**

**S:** Doxorubicin 45 mg/m$^2$ IV on day 2 plus cisplatin 50 mg/m$^2$ IV on day 1 plus paclitaxel 160 mg/m2 IV over 3h on day 2 plus filgrastim 5 µg/kg SC on days 3–12; regimen repeated every 21days

**OR**

**S:** Carboplatin AUC 5–6 IV plus paclitaxel 175 mg/m$^2$ IV over 3hours on day 1 every 3weeks

**Note**:
• All patients should be referred to a gynecologist for evaluation and surgical treatment
• All surgical specimens should be sent to lab for further histopathology diagnosis and staging. • After surgery and histopathology report, all patients should be referred to cancer specialized center for further management and follow up.

### 22.1.3 Cancer of the Vulva

Vulva cancer is predominantly a disease of older women. Squamous cell carcinoma is the commonest histological type, usually arising from premalignant lesions–vulva intraepithelial neoplasia (VIN). Risk factors contributing to development of VIN and later vulva cancer include HPV infection, infection with HIV, and cigarette smoking.

**Diagnostic Criteria**

- A lump or vulva mass
- Presence of leukoplakia and other dystrophic changes on the vulva
- Itching is a common manifestation and may become ulcerative ("non-healing ulcers")

**Investigations**

- FBC, LFTs, Urea, creatinine, HIV test
- CXR, Ultrasonography or CT scan of abdomen and pelvis
- Colposcopy to determine presence of other lesions in the vagina and cervix
- Biopsy from the vulvar lesion to confirm the diagnosis

**Staging:** FIGO and TNM.
**Management:**
Treatment is individualized, taking into considerations of histological type, disease stage and patient factors

**Primary treatment is surgery**. Adequate surgery involves wide local excision of primary tumor together with groin lymphnode dissection.

**Radiotherapy** is indicated in the following conditions:

- As primary therapy for patient with small primary tumors particularly young patients in whom surgical resection would have significant psychological consequences.
- For patients with locally advanced disease where resection is not possible.
- After surgery to treat the pelvic and groin nodes.
- After surgery in patients with positive surgical margins.

**Pharmacological treatment:** As for cervical cancer

## 22.1.4. Gestational trophoblastic disease

### 22.1.4.1. Hydatidiform mole

Two types; complete and partial hydatidiform mole. Treatment is suction curettage or hysterectomy. Careful risk assessment is needed to determine patients who require chemotherapy after surgery. Patient with high risk hydatidiform mole will have to reserve single agent chemotherapy; methotrexate or Actinomycin D
**Note**: Patient should be followed up with weekly serum β–hCG after surgery until it is undetectable.

### 22.1.4.2. Choriocarcinoma

Choriocarcinoma is extremely chemo sensitive; cure is possible even in metastatic disease. All patients with choriocarcinoma should undergo a careful pre-treatment evaluation for proper staging and risk stratification.

**Investigations:**

- Serum β-hCG level
- LFT, RFT, TSH, T3, T3
- CXR and or CT Scan
- Abdominal and Pelvic USS or CT Scan
- Brain MRI
- Tissue sample for histology
- CSF hCG level

**Management:**
Treatment is based on disease stage and risk score. Patient with stage l disease usually have a low risk score, and those with stage IV disease have a high risk score. Staging and scoring as shown below.

**Table 15.7 Scoring System Based on Prognostic Factors**

| | Scores | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 4 |
| Age (yr) | <40 | ≥40 | — | |
| Antecedent pregnancy | Mole | Abortion | Term | |
| Interval months from index pregnancy | <4 | 4–<7 | 7–<13 | ≥13 |
| Pretreatment serum hCG (International Unit/L) | $<10^3$ | $10^3$–$<10^4$ | $10^4$–$<10^5$ | $>10^5$ |
| Largest tumor size (including uterus) | 3–<5 cm | ≥5 cm | | |
| Site of metastases | Lung | Kidney/spleen | Gastrointestinal/ liver | Brai |
| Number of metastases | — | 1–4 | 5–8 | >8 |
| Previous failed chemotherapy | — | — | Single drug | 2 or re drugs |

Format for reporting to FIGO Annual Report: In order to stage and allot a risk factor score, a p s diagnosis is allocated to a stage as represented by a Roman numeral I, II, III, and IV. This is then s ed by a colon from the sum of all the actual risk factor scores expressed in Arabic numerals for examp ge II:4, stage IV:9. This stage and score will be allotted for each patient.

**Stage I includes all patients with persistently elevated hCG levels and tumor con ed to the uterine corpus.**

**Stage II comprises all patients with metastases to the vagina and/or pelvis.**

**Stage III includes all patients with pulmonary metastases with or without uterine, vaginal, or pelvic involvement.** The diagnosis is based on a rising hCG level in the presence of pulmonary lesions on a chest film, rather than a computed tomography (CT) scan.

**Stage IV patients have far advanced disease with involvement of the brain, liver, kidneys, or gastrointestinal tract.** These patients are in the highest-risk category, because they are most likely to be resistant to chemotherapy. In most cases, their disease follows a nonmolar pregnancy and has the histologic pattern of choriocarcinoma. An isolated cerebral metastases noted in a magnetic resonance imaging (MRI) of the head is shown (Fig. 15.5).

Stage I and low risk stage II&III patients are treated with single agent as shown in table below.

| Table 15.11 Single-Drug Treatment |
|---|
| ***I. Actinomycin D* treatment** |
| **A. 5-d *actinomycin D*** |
| *Actinomycin D* 12 µg/kg IV daily for 5 d |
| CBC, platelet count, aspartate aminotransferase daily |
| With response, retreat at the same dose |
| Without response, add 2 µg/kg to the initial dose or switch to *methotrexate* protocol |
| **B. Pulse *actinomycin D*** |
| *Actinomycin D* 1.25 mg/m$^2$ every 2 wk |
| ***II. Methotrexate* treatment** |
| **A. 5-d *methotrexate*** |
| *Methotrexate* 0.4 mg/kg IV or IM daily for 5 d |
| CBC, platelet count daily |
| With response, retreat at the same dose |
| Without response, increase dose to 0.6 mg/kg or switch to *actinomycin D* protocol |
| **B. Pulse *methotrexate*** |
| *Methotrexate* 40 mg/m$^2$ IM weekly |

IV, intravenous; CBC, complete blood count; IM, intramuscular.

**Note:** if no response to single agent, give combination drugs.
Stage IV and high risk stage II & III patients receive combination chemotherapy. The current standard regimen for combination therapy is EMA–CO with dose and schedule as shown below.

**Table 15.13 EMA-CO Regimen for Patients with Gestational Trophoblastic Neoplasia**

| | *Regimen* |
|---|---|
| ***Course 1 (EMA)*** | |
| **Day 1** | *VP-16 (etoposide),* 100 mg/m$^2$, IV infusion in 200 mL of saline over 30-min *Actinomycin D,* 0.5 mg, IV push<br>*Methotrexate,* 100 mg/m$^2$, IV push, followed by a 200 mg/m$^2$ IV infusion over 12 hr |
| **Day 2** | *VP-16 (etoposide),* 100 mg/m$^2$, IV infusion in 200 mL of saline over 30-min *Actinomycin D,* 0.5 mg, IV push<br>*Folinic acid,* 15 mg, IM or orally every 12 hr for 4 doses beginning 24 hr after start of *methotrexate* |
| ***Course 2 (CO)*** | |
| **Day 8** | *Vincristine,* 1 mg/m$^2$, IV push<br>*Cyclophosphamide,* 600 mg/m$^2$, IV in saline |

This regimen consists of two courses: (a) course 1 is given on days 1 and 2; (b) course 2 is given on day 8. Course 1 might require overnight hospital stay; course 2 does not. These courses can usually be given on days 1 and 2, 8, 15, and 16, 22, etc., and the intervals should not be extended without cause.

IV, intravenous; IM, intramuscular.

Note:
- Cycles are repeated after every 14 days until β–hCG is normal
- Surgery and/or radiotherapy may be considered in some cases of metastasis

**Follow-up**
- Weekly measurement of hcg level until they are normal for 3 consecutive weeks
- Monthly hcg levels until levels are normal for 12 consecutive months
- Effective contraception during the entire period of hormonal follow–up

## 22.1.5 Cancer of the Ovary

Epithelial tumours comprise 90% of all ovarian malignancies. Due to anatomical location, most patients present with advanced disease.

**Diagnostic Criteria**
- Minimal or no symptoms in early stage
- Abdominal distension with palpable mass, pain and ascites are all late signs

**Investigations:**
- Inspection and bimanual examination under anesthesia (EUA) recto–vagina are mandatory to exclude primary disease or extension from other sites such as cancer of the cervix
- FBC, RFT, LFT, CA 125 & CEA
- CXR
- CT scan of the Abdominal and pelvic
- Pelvic and abdominal ultrasound
- Histology of oophorectomy specimen or biopsy obtained at laparotomy

**Staging:** Is based on surgical diagnosis (laparotomy): FIGO: IA, IB, IC, IIA, IIB, IIC, III, and IV

**Management: Surgery**
Total hysterectomy with Bilateral Salpingo –Oophorectomy (TAH+BSO) and omentectomy should be performed in resectable tumor. If total tumor removal is not possible, then maximum debulking (Cyto –reductive) surgery is done. Unilateral salpingo-oophorectomy is only justified for stage IA tumour with favourable histology

**Pharmacological Treatment**
*Adjuvant chemotherapy*
Indicated in all patients at high risk i.e. stage IC or II, high grade or clear cell cancers of any stage.
Standard regimens include combination of platinum and taxanes

**S:** Carboplatin AUC 6 IV Day 1 + IV Paclitaxel 175 mg/m$^2$ over 3 hrs day1, repeated every 3weeks for 6 cycles

**For recurrent disease** give same regimen if tumor is platinum sensitive (recurrence after 6 months since last chemotherapy cycle)
For platinum resistant disease give gemcitabine or bevacizumab as single agent or in combination with taxanes. When available, liposomal doxorubicin is active and indicated in recurrent disease.

**S:** Gemcitabine IV 1000 mg/m$^2$ Day 1, D8 and D15, Repeat every 4 weeks for 6 courses.

**S:** Bevacuzimab 15 mg/kg IV day1, every 3 weeks until disease progression

**Endocrine therapy** is indicated in selected cases with recurrent disease.

**S:**Tamoxifen 20mg PO bid, daily + s/c Goserelin 3.6mg once a month

**Note:** All patients must be referred to a gynecologist and cancer specialized center for evaluation and proper management

## 22.2 BREAST CANCER

Worldwide breast cancer is the most common malignancy in women. It is the second commonest female malignancy in sub–Sahara African countries after cervical cancer. It arises from glandular or lobular tissue of the breast. Ductal carcinoma is the commonest histological type followed by lobular carcinoma.

**Diagnostic criteria**
A solitary hard lump or mass in the breast that may be associated with

- Changes of breast skin appearance or ulceration
- Nipple retraction
- Presence of axillary lymphadenopathy or elsewhere
- Attachment/fixed to chest wall muscles

Other symptoms and signs include cough, bone pain/fracture, or neurological symptoms depending on site of metastasis

**Investigations**

- FBC, LFTs, urea, creatinine
- ECHO Mammogram or Mammography where indicated
- CXR, abdominal USS
- Bone scan
- CT scan and or Pet CT where indicated
- Open biopsy for histopathology and IHC
- IHC – ER, PR and Her 2

**Staging:** TNM
**Management:** Includes surgery, chemotherapy, radiotherapy, hormonal therapy and targeted therapy

**Surgery**
Surgery is the mainstay of treatment. It is either Breast Conserving Surgery (BCS) or mastectomy depending on the tumour characteristics, patient status and patient preference.

Mastectomy modalities include:

- Modified radical mastectomy
- Simple mastectomy with axillary node dissection
- Toilet mastectomy to improve patient's quality of life

**Radiotherapy** is strongly indicated in the following conditions:

- After BCS
- T3–4 tumor
- Positive surgical margin
- If ≥ 4 sampled lymphnodes are positive
- Palliation for fungating and bleeding tumor, mets to bones, brain etc.

**Radiotherapy dose**: 50Gy/25fr given in 5 weeks. For palliative intent usually 30Gy/10fr in 2 weeks

**Pharmacological Treatment**

Chemotherapy is indicated for almost all patients as neo-adjuvant, adjuvant or palliative. Patients, who are planned for surgery and have ≥ T3 tumors, should receive neo-adjuvant chemotherapy before operation. Several regimens are available. Few of them include:

- **Dosing schedules for combinations for HER 2 negative disease:**

  Dose-dense Adrimycin + Cyclophosphamide **followed by** paclitaxel

  **S:** Doxorubicin 60 mg/m$^2$ IV day 1 + Cyclophosphamide 600 mg/m$^2$ IV day 1 given every 2 weeks for 4 cycles

  **THEN**

  **S:** Paclitaxel 175 mg/m$^2$ by 3hr IV infusion day 1, given every 14 days for 4 cycles.

  Dose-dense Adrimycin + Cyclophosphamide **followed by** weekly Paclitaxel

  **S:** Doxorubicin 60 mg/m$^2$ IV day 1 + Cyclophosphamide 600 mg/m$^2$ IV day 1 given every 14 days for 4 cycles **followed by**
  **S:** Paclitaxel 80 mg/m$^2$ by 1 h IV infusion weekly for 12 weeks.

  Adrimycin + Cyclophosphamide followed by Taxanes

  **S:** Doxorubicin 60 mg/m$^2$ IV on day1 + Cyclophosphamide 600 mg/m$^2$ IV day 1 given every 21 days for 4 cycles then **followed by** S:Paclitaxel 175 mg/m$^2$ by 3 h IV infusion day 1, given every 21 days for 4 cycles

  **OR**

  **S:**Docetaxel 100 mg/m$^2$ IV day 1 Cycled every 21 days for 4 cycles.

  TAC chemotherapy regimen

  **S:** Docetaxel 75 mg/m$^2$ IV day 1+ Doxorubicin 50 mg/m$^2$ IV day 1+ Cyclophosphamide 500 mg/m$^2$ IV day 1 given every 21 days for 6 cycles.

**NOTE:** FBC, RFT, LFT before each cycle

**Dosing schedule for combinations for HER2-Positive disease**:

**S:** Adrimycin + Cyclophosphamide **followed by** Taxane chemotherapy with Trastuzumab

**S:** Doxorubicin 60 mg/m2 IV day1 **AND** Cyclophosphamide 600 mg/$m^2$ IV day 1 given every 21 days for 4 cycles **followed by** Paclitaxel 80 mg/$m^2$ by 1 h IV weekly for 12 wks

**AND**

**S:** Trastuzumab 4 mg/kg IV with first dose of paclitaxel followed by Trastuzumab 2 mg/kg IV weekly to complete 1 y of treatment.

As an alternative, Trastuzumab 6 mg/kg IV every 21 days may be used following the completion of Paclitaxel, and given to complete 1 year of Trastuzumab treatment.

**NOTE**. 1. All cycles are with myeloid growth factor support
2. FBC, RFT, LFT before each cycle
3. Cardiac monitoring at baseline, 3, 6, and 9 months.

**Endocrine therapy**

Premenopausal ER/PR Positive

**S:** Tamoxifen 20 mg (PO) daily for 5 years

Post-menopausal ER/ PR Positive

**S:** Anastrazole 1 mg daily for 5 years OR Tamoxifen 20 mg daily for 2 years followed Anastrazole 1 mg daily for 3 years.

**NOTE**:

● All patients must be referred to a specialized oncology center for proper management.

● For prevention and early detection, all women aged 25 years and above should be taught on breast self–examination and should be advised to have regular physical check with a heath provider and have a regular annual ECHO mammogram or mammography. They should also be encouraged on physical excise and proper diet

## 22.3 CANCER OF THE SKIN

Skin cancers are usually classified into non melanoma and malignant melanoma.

### 22.3.1 Non-melanoma Skin Cancers

Basal cell carcinoma (BCC) and squamous cell (SCC) are the most common non melanoma skin cancers. SCC is more aggressive than BCC and has the potential to metastasis. The main cause of these skin cancers is overexposure to Ultraviolet radiation. Risk factors include light-coloured skin (e.g albinism), previous burn and immunosuppression eg after transplant or HIV infection

**Diagnostic Criteria**

The most common warning sign of skin cancer is a change in the appearance on exposed areas of the skin, such as a new growth or a sore that will not heal. Occasionally, such changes may appear on an old burn area.

**Investigations**

- None if lesion is small
- Local x-ray if bone involvement is suspected
- CXR if undifferentiated tumour
- Biopsy – preferably excisional biopsy where possible for histology

**Management**

Surgery is the primary treatment. Wide local excision that achieves negative surgical margins is adequate. Skin grafting may be required after surgery. Amputation sometimes is done for palliation. Locally destructive methods such as curetting or cryotherapy may be employed

**Radiotherapy**

Indication: Positive margin, high grade disease or inoperable tumour.

**Pharmacological Treatment**

Topical 5-fluorouracil for very superficial lesions or carcinoma in situ
Systemic chemotherapy is given for palliation in advanced stage or as radio sensitizer.

**Note:** Prevention or early detection is through frequent self–health check–up or screening exercise and prompt treatment of early skin lesions. For light skinned people–avoid UV light

## 22.3.2 Malignant Melanoma

**Diagnostic criteria**

History of a pre-existing naves which has changed recently –itching, colour change, increase in size, satellite lesions, elevated surface, ulceration and/or oozing.

**Investigations**

- CXR or CT Scan
- Abdominal pelvic CT Scan
- PET CT when available
- Excisional biopsy of suspicious lesion for histopathology

**Staging:** Clark's or Breslow classifications are used. Tumour size closely correlates with prognosis. Detection/ prevention: Frequent self –check up or screening exercise and prompt treatment of naves

**Management: Surgery** is the primary treatment.

- Wide local excision and graft
- Amputation sometimes for advanced useless limb

**Pharmacological Treatment**

Dacarbazne IV 250mg/$m^2$ Day1–Day 5 every 3 weeks for 4 cycles

**OR**

Temozolomide (PO) 200mg/$m^2$ Day 1–Day 5 every 4weeks

**Radiotherapy** used for palliation if:

- Lesion is inoperable. May use large fractions: 30Gy/6F/1 wk
- Excision margins are involved or very close
- Palliative intent (brain mets, fungation or profuse bleeding, bone pain etc)

### 22.3.3 Kaposi's sarcoma (KS)

It is a malignant tumour of angio–formative cells usually starting from the skin but occasionally involving many other organs of the body. Kaposi sarcoma can be primarily categorized into four types: epidemic of AIDS–related, immunocompromised, classic or sporadic, and endemic (African). Here we have non AIDS related (endemic) KS and AIDS related (epidemic) KS where the late is more common 80–85%.

**Diagnostic criteria**

KS presents as a firm, dark brown nodules or plaque in the skin. Usually more on the limbs

In young children and those with immunodeficiency it presents as wide spread lymphadenopathy with or without skin lesions. Presence of B symptoms (fever, sweating and weight loss) is commonly associated with epidemic type. Clinical course can be indolent especially endemic KS or aggressive.

**Investigations**

- FBC,LFTs, Urea & Creatinine, HIV test (if positive CD4 count and viral load
- CXR, abdominal pelvic ultrasound or CT scan of chest, abdominal pelvic CT, Bronchoscopy and Endoscopy
- Skin biopsy for histological confirmation

**Note**: Histological appearance for all types is the same

**Staging of KS**: Epidemic Kaposi sarcoma use AIDS clinical trials group (ACTG) system and for endemic/classical Kaposi sarcoma use Mitsuyasu classification system

**Management:**

Treatment is palliative irrespective of type and stage hence careful assessment and decision is required to choose the best palliative treatment. ARVs should be initiated in epidemic KS patients who have not started the treatment. Choice of palliation depends on clinical presentation and patient general condition.

**Radiotherapy:** Is the best palliative treatment in symptomatic patient with local or extensive disease.

- 8Gy single fraction for disease on limbs or lower half body
- 6Gy single fraction for upper half body
- Dose of 9Gy/3# is usually prescribed for lesions elsewhere.

**Pharmacological Treatment**

Palliative chemotherapy is usually given in patient with generalized disease. Commonly used regimen is ABV.

- Adriamycin IV 25 mg/$m^2$ Day1 + Bleomycin IV 10 IU/$m^2$ Day1+Vincristine IV 1.4mg/$m^2$ (max.2mg)Day1 Give every 3 weeks for 6 –8 cycles

- Paclitaxel IV 100mg/$m^2$ Day1 every 2 weeks or docetaxel 75mg/$m^2$ day1 every 3 weeks is given for persistent or recurrent after ABV.

## 22.4 Head and Neck Cancers

Cancer of the head and neck include the following:
The oral cavity, pharynx, larynx, nasal cavity, para nasal sinuses, salivary glands, and thyroid. In Tanzania there is no national prevalence data about head and neck cancers but data available at ORCI shows that they contribute about 7% of all cancers. These tumours may present with a neck mass due to lymph node metastases, with or without findings from the primary disease site. Important etiological factors are smoking, excessive alcohol, viral infections (eg HPV and EBV), genetic predisposition, previous exposure to radiation and industrial chemicals. Squamous cell carcinoma is the commonest histological type for the malignancies but salivary gland tumors are mostly adenocarcinoma

### 22.4.1 Nasopharyngeal Cancer

Nasopharyngeal carcinoma is the predominant tumor type arising in the epithelium of the nasopharynx

**Diagnostic Criteria**

- Neck mass, unilateral hearing loss, tinnitus, nasal obstruction, epistaxis, and cranial nerve palsies

**Investigations:**

- FBC, RFT, LFT, HIV
- Chest X-ray
- Abdominal ultrasound
- CT scan and/or MRI of the nasopharynx, skull base, and neck
- Nasopharyngoscopy
- Endoscopic guided biopsy of the primary tumor for histology
- Pet CT may be required if available
- Immunohistochemistry may be needed to further confirm the diagnosis

**Staging:** TNM staging system

**Management**
Due to deep location of nasopharynx, and anatomic proximity to critical structures, radical surgery is typically not possible. Nasopharyngeal cancer is mainly treated by radiotherapy either alone or in combination with chemotherapy.

| Stage | Management |
|---|---|
| Stage I | Radiotherapy alone to primary disease and neck |
| Stage II–IVB | Concurrent chemotherapy and radiation to the primary disease and neck |
| Stage IVC | palliative care (which may include chemotherapy and radiotherapy) |
| Induction chemotherapy can | if delays are anticipated in initiation of concurrent |

| | |
|---|---|
| be considered for stage III–IVB | chemotherapy and radiation. |
| Local recurrence | Chemotherapy, surgery or re-irradiation |

## 22.4.2 Laryngeal Cancer

Laryngeal cancer is one of the most common cancers of head and neck. It is predominantly found in men and mostly in those with history of tobacco smoking and alcohol intake. It is divided into three major anatomic regions; supraglottis, glottis and subglottic.

**Diagnostic Criteria**

- Hoarseness, stridor, difficulty in breathing, neck mass, odynophagia, cough

**Investigations:**

- FPC, RFT, LFT
- Chest X-ray
- CT scan and/or MRI of the neck
- Laryngoscopy
- Pathology: Definitive diagnosis is confirmed by laryngoscopy-guided biopsy of the primary tumor

**Staging:** TNM.

**Management:** General concept

| Stage | Management |
|---|---|
| **Stage I and II** | Primary site: Partial or total laryngectomy OR radiotherapy alone. |
| **Stage III–IVB** | Concurrent chemoradiation or total Laryngectomy and neck dissection followed by adjuvant radiotherapy or chemo radiotherapy |
| **Stage IVC** | Palliative |

## 22.4.3 Hypopharyngeal Cancers:

Hypopharyngeal cancer includes tumors arising from the pyriform sinus, posterior pharyngeal wall, postcricoid region.It is associated with tobacco use, alcohol consumption, and Plummer–Vinson syndrome. It is mostly seen in patients above 40 years.

**Diagnostic Criteria**:

- Dysphagia, odynophagia, change in speech (dysarthria), neck mass, referred otalgia, throat pain, weight loss, sensation of mass in throat and hoarseness of voice.

**Investigations**

- FPC, RFT, LFT.History
- Hypopharyngoscopy and biopsy and biopsy for histopathology
- Chest X-ray
- CT scan and/or MRI of the neck

**Staging**: TNM staging system.

**Management**
Radiation therapy is the mainstay of first-line local treatment for early stage hypopharyngeal carcinoma. For more advanced disease, concurrent chemoradiation reduces the rate of distant metastasis, and improves local control.

## 22.4.4 Salivary gland cancer

Salivary gland cancers arise from major or minor salivary glands in the head and neck region. The most common malignant salivary gland tumors are mucoepidermoid carcinoma and adenocarcinoma

**Presentation:** Depends on primary site involved.

- Mass, pain, nerve palsies, neck mass

**Investigations:**

- FPC, LFT, and RFT
- Chest X-ray
- CT scan and/or MRI of head and neck
- Biopsy of the primary tumor for histology. Imaging reports (CT Scan/MRI of head and neck)

**Staging**: TNM staging system:
**Treatment:**

- Complete surgical resection with adjuvant radiotherapy if adverse features are present
- If disease is not resectable, definitive radiotherapy or concurrent chemoradiotherapy is indicated
- Neck dissection is indicated for high-grade tumors or clinically positive neck disease

## 22.4.5 Nasal Cavity and Paranasal Sinus Cancer

These are tumors arising from nasal cavity and the four paired paranasal sinuses (frontal, ethmoid, maxillary, and sphenoid).

**Diagnostic Criteria:**
Nasal obstruction, epistaxis, proptosis, double vision, cheek mass, loss of sensation of the cheek and loosening or pain of the teeth

**Investigations:**

- FBC, RFT, LFT
- Chest X-ray
- Abdominal Ultrasound
- CT scan and/or MRI of the para nasal sinuses and neck
- Direct fibre-optic endoscopy
- Endoscopic guided biopsy of the primary tumor for histopathology

**Staging**: TNM
**Treatment:**

- Treatment is by surgery and or radiotherapy with or without chemotherapy.
- Surgical resection of the primary tumor and neck dissection followed by radiotherapy can be done in early disease stages. It may also be used for management persistently enlarged lymph nodes, persistent or recurrent disease after radiotherapy.
- Stage I–IINO: complete surgical resection followed by radiotherapy alternatively definitive radiotherapy.
- Radiotherapy can be given as an alternative definitive treatment, either alone or in combination with chemotherapy. It is used in palliative care for advanced diseases
- Chemotherapy is used in induction, concurrent or adjuvant therapy.

## 22.4.6 Oral Cavity Cancer

Oral cavity consists of the upper and lower lips, gingivobuccal sulcus, buccal mucosa, upper and lower gingiva, retromolar trigone, hard palate, floor of mouth, and anterior two–third of the tongue. Risk factors include smoking, excessive consumption of alcohol, poor oral hygiene, prolonged focal denture irritation, betel nut chewing, and syphilis.

**Diagnostic Criteria**:

- Non-healing ulcer, speech difficulty, hypersalivation, neck mass, dysphagia and otalgia

**Investigations**:

- FBC, LFT, RFT, HIV test
- Chest X-ray
- CT scan and/or MRI of the primary and neck
- Mirror and fibre-optic endoscopic examination
- Biopsy for histologic confirmation

**Management:** Surgery and Radiotherapy
Surgery is the mainstay treatment modality for cancer of the oral cavity. Single modality treatment with surgery or radiation therapy is preferred for early-stage oral cavity cancer. Definitive radiation with concurrent chemotherapy is the current standard for unresectable locally advanced disease. Radiotherapy can be given as palliative treatment to primary or metastatic area. Chemotherapy may also be given as palliative care in a very advanced disease.

## 22.4.7 Oropharyngeal Cancer

Oropharynx is located between the soft palate superiorly and the hyoid bone inferiorly. The oropharynx has four walls; soft palate, tonsillar region, base of tongue, and pharyngeal wall. It is associated with tobacco use and alcohol consumption and HPV. Tonsillar and pharyngeal tongue tumors frequently are initially recognized by nodal metastases.

**Clinical Presentation**

- Sore throat, non-healing oropharyngeal ulcers, dysphagia, referred otalgia, hoarseness (with larynx invasion), odynophagia, hot potato voice and impaired tongue movement, including protrusion.

**Investigations and Staging:**

- As for oral cancers

**Management:**

Oropharyngeal cancers are mainly treated by Radiotherapy in combination with chemotherapy. Surgery can be used in selected cases.

- **Note:**
- Head and neck tumour patients must be referred to cancer specialized centers for evaluation and definitive management.
- Curative radiotherapy dose for head and neck cancers is 66–70Gy given at conventional fraction of 1.8–2Gy/f
- Follow up visits: 1st visit at 4–6weeks then after each 3–4 months in the 1st year, 6 monthly in the 2nd year thereafter yearly.

## 22.4.8 Thyroid Carcinoma

These tumours present as 'goitre' and can remain silent for decades without any discomfort. There are four main types – papillary, follicular, medullary and anaplastic thyroid cancers

**Diagnostic Criteria**

- Thyroid mass, laryngeal nerve palsy, hoarseness, dyspnea, dysphagia

**Investigations:**

- Thyroid function tests (T3, T4, TSH), FBC, LFTs, Urea & creatinine, serum calcitonin, serum thyroglobulin levels
- Thyroid scan, CXR, isotope bone scan, CT scan of the neck, Fine needle aspiration cytology (FNAC) of a thyroid lesion

**Treatment:**

Surgery is the mainstay of treatment; total or near total thyroidectomy. Radiotherapy is indicated in all cases of anaplastic carcinoma

**Pharmacological Treatment**

- Radioactive iodine ablation is indicated in all patients with well differentiated thyroid cancer after surgery
- Thyroid-stimulating hormone (TSH) suppression therapy (levothyroxine)
  - TSH suppression to < 0.1 mU/L is indicated in intermediate and high–risk disease. TSH maintenance at or slightly below the lower–normal limit (0.3–2 mU/L) may be considered for low-risk disease
  - In patients with persistent disease, the serum TSH should be maintained below 0.1mU=L indefinitely in the absence of specific contraindication

- In patients who are clinically and biochemically free of disease but who presented with high risk disease, consideration should be given to maintaining TSH suppressive therapy to achieve serum TSH levels of 0.1–0.5mU=L for 5–10 years.
- In patients free of disease, especially those at low risk for recurrence, the serum TSH may be Kept within the low normal range (0.3–2mU=L).
- In patients who have not undergone remnant ablation who are clinically free of disease and have undetectable suppressed serum Thyroglobulin(Tg) and normal neck ultrasound, the serum TSH may be allowed to rise to the low normal range (0.3–2mU=L).

**Chemotherapy for anaplastic, recurrent or metastatic cancer**

**S:** Placliataxel IV 175mg/$m^2$ day 1 plus Doxorubicin IV 60mg/$m^2$ day1 every 3 weeks up to 6 cycles.

Note: All patients must be referred to a cancer specialized center for proper management.

## 22.5 GASTROINTESTINAL MALIGNANCIES

### 22.5.1 Esophageal Cancer

Esophageal cancer is the 4th most common cause of cancer death in developing countries and is more common in men. Histologically there are two types; SCC and adenocarcinoma. Tobacco and alcohol abuse are major risk factors for SCC whereas obesity, gastroesophageal reflux disease (GERD) and Barrett's esophagus are the major risk factors for adenocarcinoma.

**Diagnostic Criteria**

- Difficult in swallowing (dysphagia) is the commonest symptom which is associated with weight loss and poor performance status

**Investigation**

- FBC, LFTs, urea, creatinine
- Barium swallow and meal
- Chest and Abdominal CT scan
- Abdominal USS
- Rigid oesophagoscopy or oesophagoduodenoscopy (OGD) and biopsy for histology

**Staging**: TNM

**Management: Surgery and radiotherapy**

Surgery is a major component of treatment for resectable disease. Surgery and or radiotherapy may be curative in early diseases. However, most patients present in late stages, hence the goal of treatment is to prolong survival and relieve symptoms. Radiation (alone or in combination with chemotherapy) is given as a definitive, preoperative or postoperative therapy.

**Chemotherapy**
There are several chemotherapy drug combinations given as neo-adjuvant, adjuvant or palliative, these include:

**S:** 5–FU IV 1000 mg/m$^2$day 1–day 5 plus cisplatin IV 75 mg/m$^2$ day1 given every 3 weeks up to 6 cycles

**OR**

**S:** Paclitaxel IV 175 mg/m$^2$ Day 1 plus cisplatin 75 mg/m$^2$ Day 1 given every 3 weeks, 6 cycles

**OR**

**S:** Paclitaxel IV 175mg/m$^2$ day 1plus IV carboplatin AUC 5 on day 1 every 3 weeks, 6 cycles

**OR**

**S:** Docetaxel IV 75mg/m$^2$ day 1 plus IV cisplatin 75mg/m$^2$ day 1 every 3 weeks, 6 cycles

**OR**

**S:** Capecitabine 1000mg/m$^2$ (PO) 12 hourly on day 1–14, cycled every 3 weeks, 6 cycles or until disease progression or intolerable toxicity

Note:
● All patients should be referred to cancer specialized centers for proper management.
● Stenting, gastrostomy and parenteral nutrition are employed to provide feeding when there is total dysphagia.

## 22.5.2 Gastric Cancer

Gastric cancer is often diagnosed at an advanced stage. Among the risk factors include age, gender, genetic factors, smoking, smoke or salt preserved food, diet less of fruits and vegetables, infection with H.Pylori and Epstein Barr Virus. About 90–95% of the tumors are adenocarcinoma.

**Diagnostic Criteria:**

- Epigastric pain worsened by food intake, early satiety
- Distal tumours may present with obstructive symptoms
- Occult of manifest bleeding may be a feature
- Other symptoms include epigastric mass, pallor, weight loss, supraclavicular nodes, hepatomegaly, periumbilical nodes

**Investigations:**

- FBC, LFTs, stool for occult blood, carcinoembryonic antigen
- CXR, Ba meal (double contrast), abdominal USS
- Abdominal and pelvic CT scan
- Endoscopy and biopsy for histology

**Staging:** TNM
**Management:**
Surgery is the primary treatment for early stage gastric cancer. Total or partial gastrectomy is performed together with lymph node dissection. Bypass surgery is done to relieve obstructive symptoms.

**Pharmacological Treatment**
There are several chemotherapy regimens for locally advanced and metastatic gastric adenocarcinoma. Few of them include

**S:** Paclitaxel 175mg/$m^2$ IV plus carboplatin AUC 5 IV on day 1, cycled every 3 weeks for 6 cycles

**OR**

**S:** Docetaxel IV 60mg/$m^2$ day 1 +IV cisplatin 60mg/$m^2$ day1 + 5–FU 750mg/$m^2$ IV continuous infusion over 24 hours on day1–4, cycled every 3 weeks for 6 cycles

**Note:**

- Radiotherapy with IMRT technic may be given as adjuvant to surgery otherwise is used in palliative setting to control bleeding and pain
- Gastric lymphoma are primarily managed with chemotherapy.
- Patients with CD 117 positive gastro intestinal stromal tumor respond well to imatinib.

## 22.5.3 Hepatocellular Carcinoma

Associated with chronic Hepatitis B infection

**Diagnostic criteria**

- An arterial bruit and ascites may be present
- Right upper abdominal swelling and pain often associated with weight loss, fever, jaundice

**Investigation**

- FBC, LFTs, biochemistry, serum alpha feto protein, HBsAg, HBcore antibody,partial thromboplastin time (PTT)
- CXR, Abdominal and pelvic USS or CT Scan
- Biopsy or FNAC of the liver

**Staging:** TNM
**Management**
Lobectomy where feasible but in the abscess of regular health check-up almost all patients present with advanced disease hence palliative therapy.

**Pharmacological Treatment**
Single agent doxorubicin is used for palliation

**S:** Doxorubicin IV 60 mg/$m^2$ Day1 given every 3 weeks for 4–6 cycles

**Prevention:** Vaccination for Hepatitis B

## 22.5.4 Colorectal Cancer

Risk factors include: inherited genetic syndromes, diet high in red and processed meat, smoking and alcohol abuse, having inflammatory bowel disease, type ll diabetes and obesity. Histology; commonest is adenocarcinoma – 95%.

**Diagnostic Criteria:**

- Change in bowel habit eg constipation or diarrhea, sense of incomplete bowel emptying.
- Rectal bleeding or blood in stool.
- Abdominal mass with or without obstructive symptoms
- Unexplained weight loss and other symptoms of advanced disease.

**Investigations:**

- FBC, ESR, LFTs,CEA, Stool for occult blood
- CXR, Barium enema (double contrast), abdominal and pelvic USS.
- Digital rectal examination
- EUA and biopsy
- Colonoscopy
- Biopsy at colonoscopy or laparatomy
- Abdominal and pelvic CT scan

**Staging:** TNM

**Management**

Surgery is the primary treatment for early disease. Hemicolectomy with lymphnode dissection is commonly performed in colon cancer. Give preoperative chemotherapy for locally advanced disease to shrink the tumor. Radiotherapy plays a role in rectal tumor as neo–adjuvant, adjuvant or palliative.

**Pharmacological Management:**

Management of locally advanced and metastatic colorectal cancer involves various active chemotherapy drugs, either in combination or as single agents: 5–FU, leucovorin, capecitabine, oxaliplatine, irinotectecan and bevacizumab are available for various combination regimens and schedules.

**Neo-adjuvant chemo radiotherapy in rectal tumors**

**S:** 5–FU IV 350 mg/$m^2$ over 20 min + Leucovorin IV 20 mg/$m^2$ Day1–Day 5 given on 1st and 5th weeks of RT, concurrent with RT: 45 Gy/25#/5weeks followed by surgery in 4–10 weeks.

3–10 weeks after surgery continue with chemo as below:

**S:** 5–FU IV 350 mg/$m^2$ over 20 min Day1–Day5 + Leucovorin IV 20 mg/$m^2$ Day1–Day5 every 3 weeks for 4 cycles

**Adjuvant chemo Radiotherapy**

- 3–10 weeks after surgery

  Bolus IV 5–FU 500 mg/$m^2$ day1–5 & day 29–33, concurrent with RT:45 Gy/25#/5 weeks.
- Four weeks after completion of chemo radiation; continue with chemo: IV 5–FU 450 mg/$m^2$ bolus D1–D5, Every 4 weeks for 2 cycles

**Note:** colorectal cancers are usually asymptomatic until advanced stage hence regular screening with annual digital rectal examination, stool for occult blood + colonoscopy and is recommended starting at 50 years of age.

## 22.6 LUNG CANCER

Worldwide lung cancer is the leading cause of cancer-related death. Approximately 85 %–90% of lung cancer cases are caused by cigarette smoking. There are 2 main types of lung cancer; Non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC). These 2 types have different prognosis and management approach.

### 22.6.1 Non-small cell lung Cancer

Accounts for approximately 85% of all lung cancer cases

**Diagnostic Criteria**

- Chronic chest symptoms in a smoker
- Haemoptysis
- May present with superior vena cava obstruction (SVCO) syndrome
- cough in patient exposed to asbestos
- Findings of chest symptoms, weight loss, poor karnofsky performance scale (KPS)

**Investigations:**

- FBC, LFTs, urea, creatinine
- CXR PA & lateral views or CT scan of thorax and abdomen
- Abdominal USS
- Bronchoscopy and Biopsy for histopathology
- Cytology of sputum or bronchial aspirate examination

**Staging:** TNM
**Management:** Surgery (pneumonectomy or lobectomy) is curative for stage I and some stage II disease.

**Pharmacological Treatment:**
Several active chemotherapy drugs like carboplatine, cisplatin, paclitaxel, docetaxel, gemcitabine, Capecitabine and targeted therapy (bevacizumab) are available; to administered as single or in combination for adjuvant, unresectable or recurrent and metastatic disease. Below is an example of the commonly used combination regimen.

S: Carboplatin IV AUC 6 Day1 +Paclitaxel IV 175 mg/m$^2$ Day 1 every 3 weeks for 6 cycles

**Radiotherapy**
With advanced radiotherapy machine and treatment technic, RT may be given for neo–adjuvant or adjuvant to surgery. Palliative Radiotherapy is frequently used in metastatic disease to bone, spinal cord compression,brain, liver and in case of superior vena cava obstruction (SVCO), atelectasis, obstructive pneumonitis and fungating masses. Dose of 30GY/10fr/2weeks gives good symptom relief.

### 22.6.2 Small cell lung cancer

SCLC is characterized by early development of widespread of metastases. It is highly sensitive to initial chemotherapy and radiotherapy; however, most patients eventually die of recurrent disease.

**Diagnostic criteria and investigations**: As in non – small cell lung cancer (NSCLC) however brain scan and bone marrow aspirate are necessary
**Staging:** Limited disease versus extensive disease

**Pharmacological Treatment**
Aim is for local control and palliation. Cure rate is low
Platinum + Etoposide are the major drugs for which the tumor is sensitive.

**S:** Cisplatin IV 60 mg/m$^2$ Day 1 + Etoposide IV 100 mg/m$^2$ Day1–3 , Every 3 weeks for 4 –6 cycles

**OR**

**S:** Carboplatin IV AUC 5 Day 1 + Etoposide IV 100 mg/m$^2$ Day1–3, every 3 weeks for 4–6 cycles

Other available active drugs include irinotecan and gemcitab

**Radiotherapy:**
Consolidation to primary site and mediastinum: 50Gy/25F/5weeeks

- Prophylactic brain irradiation in complete responders
- Temporary relief of respiratory, bone or CNS symptoms: 30Gy/10F/2wks

## 22.7 CARCINOMA OF THE PROSTATE

Prostate cancer is among the most common malignancies and is the second most common cause of cancer related death in men. However, most men die with their prostate cancer rather than from it and management must balance the potential toxicity of active treatment, with the chances of benefit in a disease with a long natural history. The most common type of prostate cancer is adenocarcinoma (95 %)

Tumours are stratified by T stage, Gleason score (GS), and PSA into three prognostic groups of low, intermediate and high risk.

- Low risk: T1–T2a and PSA < 10 ng/ml and GS ≤ 6
- Intermediate risk: T2b or PSA 10 – 20 ng/ml or GS 7
- High risk: T2c–T4 or PSA > 20ng/ml or GS 8–10

Patient can be offered appropriate treatment options according to stage of disease, prognostic risk group and estimated survival taking into account performance status and comorbidity.

**Diagnostic Criteria**

- May be asymptomatic in early stages of the disease
- May present incidentally following examination for benign prostatic hypertrophy or elevated serum prostatic specific antigen (PSA)
- Prostatic symptoms are associated with advanced stages of the disease, which include: reduced potency, urinary frequency and nocturnal, poor stream, hesitancy and terminal dribbling
- Very often patients may present with bone pain including backache or pathological fracture
- Digital Rectal Examination (DRE) typically reveals a hard, irregular prostate. TURP is carried out to both confirm the diagnosis and also as part of the treatment (to relieve obstruction).

**Investigations**

- Laboratory: FBC, LFTs, urea, creatinine, serum PSA, ALP
- X-rays of the painful bone or spine
- CXR
- Abdominal and pelvic USS and or CT Scan
- Pelvic MRI in early stage disease
- Bone scan
- Biopsy for histopathology

**Staging:** TNM

**Treatment:**

Treatment depends on disease profile and patient factors as noted above. Options include:

- Watchful waiting
- Active surveillance
- Surgery (curative or palliative
- Radiotherapy (curative or palliative)
- Hormonal therapy (chemical vs surgical castration)
- Chemotherapy

**Surgery**

Early stages can be treated with either radical prostatectomy or radical RT with cure intent. However, surgery may cause postoperative impotence and impaired urinary control. TURP is carried out to both confirm the diagnosis and also as part of relieving obstruction.

**Radiotherapy**

Radical RT for early stages, EBR up to 70 Gy/35 , given with 3D technic. Palliative radiotherapy is valuable to bone metastases, massive hematuria, spinal cord compression and brain mets,

**Hormonal Therapy**

Hormonal manipulation is by surgical or medical castration. It is carried out in patients with locally advanced or metastatic disease. Bilateral orchydectomy is a surgical hormonal manipulation and should not be regarded curative surgery.

**Pharmacological Treatment:**

**S:** Goserelin 3.6 mg subcutaneous every 4 weeks or 10.8mg every 12 weeks with or without oral bicalutamide 50mg once daily

Note:

- Gosereline is not required after orchydectomy but patient may receive Biculutamide.
- Treatment with gosereline and bicutamide may be given up to 2 years depending on patient condition and Prostate Specific Antigen (PSA) levels

**Chemotherapy**

Current recommended chemotherapy drug is mainly:

**S:** Doctetaxel, 75mg/$m^2$ IV Day1 given every 3 weeks up to 6 cycles. It is mainly reserved in hormonal refractory prostate cancer.

For Bone metastases/osteolytic/tumour induced hypercalcemia:
**S:** Zolendronic acid IV 4mg over 15min given 4 Weekly

## 22.8 URINARY BLADER CANCER

Bladder cancer, as from 2005–2016, affected about 1,537 people in Tanzania. This is according to data available at ORCI. Risk factors for bladder cancer include smoking, family history, prior radiation therapy, frequent bladder infections, and exposure to certain chemicals. The most common type is transitional cell carcinoma. Other types include squamous cell carcinoma and adenocarcinoma.

**Diagnostic Criteria**

- Symptoms include blood in the urine, pain with urination, and low back pain.

**Investigations**

- FBC, RFT, LFT, Alkaline phosphatase, urinalysis, culture and sensitivity, urine for cytology
- CXR and /or CT chest, Bone scan, abdominal pelvic USS or CT scan
- Cystoscopy with bladder mapping & Biopsy
- EUA
- Bimanual examination
- TURBT with random biopsies of normal appearing mucosa to exclude CIS. (If trigone involved, biopsy prostatic urethra)

**Staging:** TNM

**Management**

Treatment of Urinary bladder cancer depends on how deeply the tumor invades into the bladder wall.

**Surgery**: Several modalities that may extend from bladder preserving surgery–TURB; to radical cystectomy with urine diversion depending bladder muscle invasion. Post operation patient may receive adjuvant chemo and/or radiotherapy

**Chemotherapy:** chemotherapy in bladder cancer may be offered before surgery or after surgery. It may also be given concurrent with radiotherapy or as palliative in inoperative tumor. Among chemotherapy regimens include Gemcitabine in combination with Cisplatin, commonly used in locally advanced and metastatic disease.

**S:** Gemcitabine 1000mg/$m^2$ IV over 30mins day 1, 8 & 15 + Cisplatin 70mg/$m^2$ iv over 30mins day 2 given every 4 weeks for 6 cycles

Other drugs commonly given in combination include MVAC regimen;

- Methotrexate 30mg/$m^2$ iv day1, 15 & 22
- Vinblastine 3mg/$m^2$ iv day2, 15 & 22
- Doxorubicin 30mg/$m^2$ iv day2
- Cisplatin 70mg/$m^2$ iv over 30mins day2

**Radiotherapy**
Radiotherapy may be given after bladder preserving surgery or alone in small lesions with a dose up to 65Gy/33fr concurrent with cisplatin. It is also commonly used as palliative therapy to control bleeding and or pain locally advanced and metastatic disease. Palliative dose 30Gy/10fr or 20Gy/5fr

## 22.9 Lymphomas

World Health Organization broadly classifies lymphomas into Hodgkin lymphoma (HL) and non-Hodgkin lymphoma (NHL).

### 22.9.1 Non-Hodgkin's lymphoma

NHLs are a heterogeneous group of diseases which are mainly linked by their origin within the lymphoid system and its different cellular components. They are sub classified based on the stage of maturation (immature vs. mature) and cell of origin [B cell, T cell, or natural killer cell (NK) cell].

**Diagnostic Criteria**

- Peripheral Lymph node enlargement (commonest site-neck)
- Hepatomegally and/or splenomegally in advanced stages
- B-symptoms :Unexplained weight loss, fever, night sweats
- Coughing, trouble breathing, or chest pain in case of Superior vena cava obstruction (SVCO)

**Investigations:**

- CXR
- Chest and abdominopelvic computed tomography (CT)
- FBC, differential and film
- Bone marrow aspirate and trephine
- Immunohistochemistry
- LDH, urea and electrolyte, creatinine, albumin, aspartate transaminase (AST), bilirubin, alkaline phosphatase, serum calcium, uric acid
- Pregnancy test in females of child–bearing age
- Hepatitis B and C
- HIV status
- Tissue Biopsy for histopathology

**Staging:** Ann Arbor classification.

**Management:**
NHL diseases are sensitive to both chemotherapy and radiotherapy

#### 22.9.1.1 Indolent lymphoma

CHOP regimen which include:

**S:** Cyclophosphamide IV day1 750 mg/m$^2$ AND Adriamycin IV 50 mg/m$^2$ day AND Vincristine IV 1.4 mg/m$^2$ (maximum 2mg) day, AND Prednisolone 100mg (PO) once a day, day 1–5, every 3 weeks for 6–8 cycles.

#### 22.9.1.2 Aggressive lymphoma with CD 20 positive

R–CHOP

**S:** Rituximab IV 375 mg/m$^2$ Day1 **AND** Cyclophosphamide IV 750 mg/m$^2$ Day1 **AND** Adriamycin IV 50 mg/m$^2$ Day1 **AND** Vincristine IV 1.4 mg/m$^2$ (max 2mg) D1 **AND** Prednisolone 100 mg (PO) Once a day D1–D5, every 3 weeks for 6–8 cycles.

**Radiotherapy**

- Radiotherapy is directed to genuinely stage IA and IIA Disease
- Mantle or inverted Y: 40Gy/20fr/4weeks with shielding of the critical organs.
- Involved field RT (IFRT): 45Gy/23fr/4.5wks

### 22.9.2 Hodgkin's disease (HD)

Classified into two main types:

- Nodular lymphocyte predominant Hodgkin lymphoma–NLPHL
- Classical Hodgkin lymphoma–CHL, which is sub–divided into:
    - Nodular sclerosis classical Hodgkin lymphoma–NSHL
    - Mixed cellularity classical Hodgkin lymphoma–MCHL
    - Lymphocyte–rich classical Hodgkin lymphoma–LRCHL
    - Lymphocyte–depleted classical Hodgkin lymphoma–LDHL

**Diagnostic Criteria**

- Enlarged painless lymph nodes in the neck or elsewhere
- B symptoms (weight loss, night sweats, and fever), pruritus, alcohol induced pain, general condition, throat, lymph nodes (site, number, size, consistency, mobility, matting), respiratory system, abdomen (liver, spleen, other masses), bone tenderness

**Investigations:**

- CXR
- CT Scan of neck, chest, abdomen and pelvis
- FBC
- ESR
- Bone marrow aspirate and biopsy (Not required in Stage I or II A)
- Biopsy histological diagnosis
- Liver function profile
- Renal function profile
- LDH

**Management:**

As it is for NHL, HL diseases are sensitive to both chemotherapy and radiotherapy.

**Pharmacological treatment**
Chemotherapy aims at cure for any stage of the disease. It is indicated in Stages II–IV. Current standard regimen is ABVD which include combination of the following drugs:

**S:** Adriamycin IV 25 mg/$m^2$
**AND**
**S:** Bleomycin IV 10 IU/$m^2$
**AND**
**S:** Vinblastine IV 6 mg/$m^2$
**AND**
**S:** Dacarbazine IV 375 mg/$m^2$, all given on day 1 & 15, every 4 weeks for 4–8 cycles.

**Radiotherapy:** can either be; involved field RT or mantle or inverted Y depending on site of disease: 1.8–2Gy/fr for 30–40Gy total dose.

## 22.10 ONCOLOGICAL EMERGENCIES

Important oncological emergencies include hypercalcemia, superior venous caval obstruction, spinal cord compression and neutropenic sepsis.

### 22.10.1 Superior vena cava syndrome (SVCS)

Superior vena cava syndrome (SVCS) is the clinical expression for obstruction of blood flow through the SVC. Malignancy (90%) is the most frequent cause of SVC obstruction. SVC obstruction is a strong predictor of poor prognosis in patients with non–small cell lung cancer. SVC obstruction in cancer patients can result from

- Extrinsic compression of SVC
    - Lung Cancer (65%)
    - Lymphomas (15%)
    - Other cancers (10%)
- Intrinsic compression

**Diagnostic Criteria**
Common symptoms and physical findings of SVCS are:

- dyspnea
- headache
- oedema and change in colour in the areas drained by SVC(examples–face and upper limb)
- venous distension of neck, upper chest and arms
- cough
- Pemberton's sign (development of facial flushing, distended neck and head superficial veins, inspiratory stridor and elevation of the jugular venous pressure (JVP) upon raising both of the patient's arms above his/her head simultaneously, as high as possible (Pemberton's maneuver)

**Investigations:**

- CXR
- CT scan Chest Abdomen and Pelvis
- Tissue diagnosis for appropriate treatment modality

**Non-pharmacological treatment:** Treatment of SVC syndrome is divided into supportive and definitive therapy

**Supportive measures**

- Head elevation–To decrease the hydrostatic pressure and thereby the edema. There are no data documenting the effectiveness of this manoeuvre, but it is simple and without risk.
- Glucocorticoid therapy (dexamethasone, 4 mg every 6 h) to relieve inflammation and oedema (to be avoided before biopsy if lymphoma is suspected as steroid induced tissue necrosis might obscure the diagnosis)
- Loop diuretics (Furosemide) are also commonly used, but it is unclear whether venous pressure distal to the obstruction is affected by small changes in right atrial pressure.

**Definitive Therapy**

- Radiation treatment to the malignant mass.
- Chemotherapy–in chemo sensitive cancers like lymphoma, germ cell tumours or small cell lung cancer
- SVC Stent–can be useful in cases of thrombosis and for patients not responding to cancer treatment
- Removal of central venous device.

**Note:** It is advisable to avoid placement of intravenous lines in the arms so that fluid is not injected into the already compressed SVC.

## 22.10.2 Hypercalcaemia

Hypercalcaemia refers to elevated calcium level in blood (normal range 2.2–2.6 mmol/L) that occurs in 10–20% patients with advanced cancers (most commonly in cancer of the breast, kidney, lung, prostate, head and neck and multiple myeloma)

**Diagnostic Criteria**

- Symptoms of hypercalcaemia include nausea, vomiting, constipation, polyuria and disorientation
- Psychiatric overtones (depression 30–40%, anxiety, cognitive dysfunction, insomnia, coma)
- Clinical evidence of volume contraction secondary to progressive dehydration may be apparent. Severe hypercalcaemia (above 3.75–4.0 mmol/L) is a medical emergency and a poor prognostic sign

**Investigations** include

- Specific biochemistry like PTH,
- ECG to detect arrhythmias and
- Imaging with Bone Scan or PET–CT scan to identify metastatic bone disease.

**Pharmacological Treatment**

Treat the hypercalcaemia first and the cause later:

- Hydration & dieresis: 1–2 litres of isotonic saline (NS) over 2 hours with 30–40 mg of furosemide expands intravascular volume and enhances calcium excretion.
    - In elderly and cardiac patients, rate of hydration needs to be slower.

- Bisphosphonates–via a complex mechanism inhibit osteoclast and in turn both normal and pathological bone resorption. Commonly used bisphosphonates are:

  **S:** Zolendronic acid infused as 4mg in 100 mls of NS over 15 mins.
  Normalisation of serum calcium occurs in 4–10 days and lasts 4–6 weeks. Therefore, if re–treatment is required, dose is repeated after 7 days

  **OR**

  **S:** Ibandronate 6 mg as 2 hour infusion or 50 mg (PO) daily

  **OR**

  **S:** Pamidronate 90 mg IV over 1–2 hours

**Note**:

- Bisphosphonates and Denosumab cause increasing risk of osteonecrosis of jaw following extraction of teeth or oral surgical procedures. Therefore, a dental review may be necessary to make sure the necessary dental procedures are completed prior to commencing therapy.
- Calcitonin – a thyroid hormone given 4–8 IU/kg IM or SC every 6–8 hours can bring about a rapid decline in calcium levels, however tachyphylaxis limits its utility.

### 22.10.3 Spinal–cord Compression

Spinal cord compression threatens mobility, independence and longevity in patients with metastatic cancer and may be the first presentation of curable malignancy in others. It most commonly occurs due to an enlarging vertebral metastasis encroaching on the epidural space or due to pathologic fracture of a vertebra infiltrated by malignancy.

**Management**

- Immobilising the patient and obtaining urgent MRI whole spine should be priorities.
- Corticosteroids should be initiated on suspicion of cord compression.
  **A:** Dexamethasone IV 10 mg immediately followed by 16 mg daily in divided doses.
- Bladder catheterisation is appropriate.
- Once spinal cord compression is confirmed, urgent neurosurgical opinion should be sought. There are potential improvements in outcomes for patients treated with surgery upfront, though appropriateness for this will depend upon spinal stability, patient and malignancy related factors.
- Radiotherapy: for patients who are not candidates for upfront surgery.
- Palliative dose: 8Gy single fraction or 20Gy/5fr or 30Gy/10fr.

**Note:** All patients suspicious for spinal cord compression should be referred to neurosurgeon and radiation oncologist as soon as possible.

# CHAPTER TWENTY THREE
# MENTAL HEALTH CONDITIONS

## 23.1 AGGRESSIVE DISRUPTIVE BEHAVIOUR

These are agitated and acutely disturbed patients, who may or may not have a psychiatric condition. Many acute medical conditions and substance abuse can also present with agitation.

**Diagnostic Criteria**

- Agitation
- Aggressive behaviour

**Non-Pharmacological Treatment**

- Ensure the safety of the patient and those caring for them.
- Caution is needed with elderly and frail patients as they are vulnerable to falls and further injury if sedated.
- The use of physical restraint should only be employed when there is a need to protect the patient and surrounding people in an acute setting and it should be for as short time as possible with a constant monitoring of patients safety
- Assess for sign of delirium.

**De-escalation Techniques should be Attempted first:**

- Calm the patient
- Manage in a safe environment
- Ensure the safety of all staff members

**Pharmacological Treatment**

**C:** Diazepam, 10 mg (PO) **stat**

**OR**

**C:** Lorazepam, 4 mg, (PO) **stat**

If oral treatment fails after 30–60 minutes, OR If there is significant risk to the patient and others give

**Parenteral treatment as follows:**

**A:** Haloperidol 5 mg (IM) repeat in 30–60 minutes, if required. (Max dose: 20 mg within 24 hours)

**AND**

**A:** Diazepam 10 mg (IV), stat. Repeat after 30–60 minutes if needed.

**OR**

**A:** Promethazine 25–50 mg (deep IM). Repeat after 30–60 minutes if needed.

**OR**

**C:** Lorazepam 4 mg (IM), stat. Repeat after 30–60 minutes if needed [3].

If haloperidol is unavailable,

**A:** Chlorpromazine 25–50 mg (deep IM). May be repeated as necessary 4 times in 24 hours.

If patient is known to suffer from schizophrenia and is not neuroleptic naïve give:

**S:** Zuclopenthixol acetate 50–150 mg (IM) Repeat after 2–3 days, if necessary

If patient develops acute dystonia give:

**A:** Promethazine deep IM 25–50 mg. In the elderly 25 mg.

**OR**

Anticholinergic agent, e.g.: **S:** Biperiden, IM/IV, 2 mg. Repeat as necessary.

**Note:** repeated doses of high potency antipsychotics may lead to the development of the life-threatening neuroleptic malignant syndrome, characterized by hyperthermia, muscle rigidity, autonomic dysfunction and alterations in consciousness. Serum CK is typically markedly elevated. If suspected, stop antipsychotic, and institute supportive care.
*Always monitor vital signs of sedated patients

## 23.2 DELIRIUM

Delirium or acute confusion state is a condition characterised by altered level of consciousness**,** disorientation to time, place and sometimes to person. There may be fluctuating mental status. The patient may also present with behaviour and psychotic symptoms including agitation, hallucinations and paranoia. It is generally caused by organic brain disease including some medical emergencies. Avoid misdiagnosing delirium as an acute psychotic episode.

**Diagnostic Criteria**

- Altered level of consciousness
- Disorientation
- Agitation
- Hallucinations
- Paranoia

**Non-Pharmacological Treatment**

- Control the acute disturbance.
- Perform proper physical assessment as well as investigations in order to rule out or ascertain the underlying medical condition and treat accordingly

**Pharmacological Treatment**

Treat the underlying medical condition, if present.

**Acute management**

**C:** Haloperidol IM 5 mg.

- This can be repeated in 60 minutes, if required
- Maximum dose: 10 mg within 24 hours
- Monitor vital signs and beware of acute dystonia and neuroleptic malignant syndrome

- Dosing may vary according to clinical circumstances,

**AND/OR**

**A:** Diazepam IV 10 mg.

**OR**

**C:** Lorazepam IM 1–4 mg.

Switch to oral route once containment is achieved.

**Note:**

- Benzodiazepines, especially diazepam IV, can cause respiratory depression. Monitor patients closely
- In the frail and elderly patient or where respiratory depression is a concern, reduce the dose by half.
- The safest route of administration is oral followed by IM with the IV route having the highest risk of respiratory depression and arrest. Use the safest route wherever possible.
- Monitor vital signs closely during and after administration.
- Use haloperidol instead of benzodiazepines in patients with respiratory insufficiency.
- To avoid benzodiazepines toxicity , allow at least 15-30 minutes before repeating the IM dose

## 23.3 SCHIZOPHRENIA

It is characterized by altered thinking process, emotions, drive, behaviour and withdrawal from reality. Symptoms vary from patient to patient and from time to time.

**Diagnostic Criteria**

- Bizarre appearance
- Reduced motor activity
- Social withdrawal
- Flattened affect
- Delusions
- Hallucinations

**Non-Pharmacological Treatment**

- Family counselling and psycho-education
- Cognitive Behavioural Therapy (CBT) for stabilised patients
- Supportive group therapy for patients with schizophrenia
- Rehabilitation may be enhanced by assertive community programs, work assessment, occupational therapy and bridging programmes prior return to the community

**Pharmacological Treatment**

**In acute attacks:**

Treat like under section: on aggressive disruptive behaviour.

**For maintenance:**

**B:** Haloperidol 3-4.5 mg (PO) 12hourly

**OR**

**A:** Chlorpromazine 100–600 mg (PO) daily in divided doses [6]

**OR**

**S:** Olanzepine 5–10mg (PO). Maximum dose 25mg/day [6]

**OR**

**S:** Risperidone 1mg (PO) 12 hourly then increase by 1mg every 2–3 days to 2–3mg 12 hourly. Maximum dose 16mg/day [7]

**Note:**

- The above medicines should not be given in combination
- The atypical antipsychotics have been shown to be comparatively more effective in treatment of negative symptoms

**For patients who have poor compliance**

**D:** Fluphenazine deaconate 12.5–50 mg (IM) every 4 weeks.

**OR**

**S:** Flupenthixol deaconate (IM) 20–40 mg every 4 weeks

**Adjunct Treatment**

Antiparkinsonian drugs should only be used if extrapyramidal side effects occur, or at higher doses of antipsychotics likely to cause extrapyramidal side effects. Any of the following can be used:

**C:** Benzhexol 5mg once to two times a day (PO) last dose before 1400 hours to avoid insomnia

**OR**

**S:** Procyclidine 10mg two times a day last dose before 1400 hours

**Referral**

Refer to the next level in the following situations:

- First psychotic episode
- High suicidal risk or risk of harm to others
- Children and adolescents
- The elderly
- Pregnant and lactating women
- No response to treatment
- Intolerance to medicine treatment
- Concurrent medical or other psychiatric illness

## 23.4 BIPOLAR MOOD DISORDER

It is a lifelong illness, which may have an episodic, variable course. The presenting episode may be manic, hypo manic, depressive or mixed. By definition, a diagnosis of bipolar disorder requires either a current or previous episode of mania or hypomania. Bipolar disorder causes substantial psychosocial morbidity, frequently affecting patients' relationships within the family as well as their occupation and other aspects of their lives

**Diagnostic Criteria**

An episode of mania is typically characterised by:

- Elevated mood /extreme happiness
- Irritability
- Increased energy/activity
- Talkativeness
- Reduction in the need for sleep
- Grandiose and/or religious delusions

**Non-Pharmacological Treatment**

- Hospitalisation may be required during acute mania
- Psychotherapy, usually after the manic episode has been controlled with medication
- Family therapy and psycho-education of patient and family to increase compliance and knowledge of the condition
- In severe cases, psychiatrist directed electroconvulsive therapy may be required.

**Pharmacological Treatment**

**For Manic or Mixed Episodes**

For agitated and acutely disturbed patient: See section on aggressive disruptive behaviour.

**Maintenance therapy**

**C:** Sodium valproate 20 mg/kg/day (PO) in 2–3 divided doses

**OR**

**A:** Carbamazepine 600mg (PO) daily, increase by 200mg at three day interval up to a maximum of 2000mg

**OR**

**S:** Lithium carbonate 400–1000mg (PO) as a single dose or in 2 divided doses. Elderly 400mg daily

**Note:** Consider oral haloperidol with adjunctive benzodiazepines in patients who are difficult to manage, i.e. not settling with mood stabiliser monotherapy, and especially where there are features of psychosis.

**Treatment for Severe Depressive Episodes in Bipolar Patients**

Give antidepressant in combination with mood stabilizer and antipsychotic if there is psychosis:

**Drug of choice:**

**A:** Amitriptyline 50mg nocte daily

**AND**

**A:** Carbamazepine 300mg twice a day

**AND**

**B:** Haloperidol 3–4.5 mg 12 hourly (if there is psychosis)

**Note:** Do not use monotherapy antidepressants in bipolar patients.

**Referral**
Refer to the next level in the following situations:

- Mixed or rapid cycling biplolar disorder
- Depressive episodes in bipolar patients not responding to treatment
- Manic episodes not responding to treatment

## 23.5. MAJOR DEPRESSIVE DISORDER

It is a mood disorder characterised by at least 2 weeks of depressed mood and/or diminished interest and pleasure in activities. It is associated with impairment in level of functioning in different areas including social and occupational.

**Diagnostic Criteria**
Psychological symptoms

- Depressed mood
- Feeling of worthlessness
- Guilt
- Diminished concentration
- Thoughts of death and suicide

Somatic symptoms

- Change in appetite
- Sleep disturbances
- Agitation
- Retardation
- Loss of energy

**Non-Pharmacological Treatment**
Effective psychotherapies include:

- Cognitive Behavioural Therapy
- Interpersonal psychotherapy
- Stress management / coping skills
- Marital and family issues

**Pharmacological Treatment**
**Adults:**

**A:** Amitriptyline (PO) 50–75 mg daily at night, increase gradually to a maximum of 150 mg daily. Elderly: Initially 25–50 mg. Max. 75mg

**OR**

**S:** Fluoxetine (PO) 20mg daily (preferably in the morning), may increase up to 60mg/day)

**OR**

**S:** Fluvoxamine (PO) initially 50–100mg daily

**OR**

**D:** Citalopram (PO) 20mg daily in the morning or evening increase if necessary to a maximum of 60mg daily (Elderly maximum 40mg daily)

**Referral**
Refer to the next level in the following situations:

- Suicidal ideation
- Major depression with psychotic features
- Failure to respond to available antidepressants
- Patients with concomitant medical illness, e.g. heart disease, epilepsy
- Poor social support systems
- Pregnancy and lactation

## 23.6. GENERALISED ANXIETY DISORDER

Generalised anxiety disorder is characterized by excessive, exaggerated anxiety and worry about everyday life events with no obvious reasons for worry.

**Diagnostic Criteria**
Symptoms include

- Persistent worry
- Disturbances in sleep
- Poor concentration
- Mood disturbances
- Muscle tension
- Tremors

**Non-Pharmacological Treatment**

- Psychotherapy
- Most patients can be treated as outpatients

**Pharmacological Treatment**
Indicated where symptoms are interfering with normal functions of daily living. Where there is concomitant drug/alcohol dependence or co-morbid major depressive episode, an antidepressant may be more appropriate.

**Acute management**
For an acute episode or intense prolonged anxiety:

**C:** Diazepam 2–5 mg (PO) as a single dose.

- Repeat if required up to 12 hourly
- Duration of therapy: up to 2 weeks, taper off to zero within 6 weeks

**Maintenance Therapy**

**S:** Fluoxetine (PO) 10–40mg (PO) daily

**OR**

**D:** Citalopram (PO) 10–40mg (PO) daily

**OR**

**A:** Amitriptyline (PO) 25–75mg daily at night

- Duration of therapy: variable, although the condition tends to be chronic.
- Extended medicine treatment should be monitored by a specialist.

**Note:**

- Prolonged treatment with benzodiazepines often leads to tolerance and withdrawal symptoms if the medicine is discontinued abruptly
- Avoid combining more than one benzodiazepine.

**Referral**
Refer to the next level if there is lack of improvement with treatment.

## 23.7 PANIC DISORDER

Panic disorder is an anxiety disorder characterized by recurrent unexpected panic attacks. A panic attack is characterised by an acute onset of intense anxiety accompanied by a sense of dread/impending threat, usually for no apparent reason.

**Diagnostic Criteria**
The patient will experience significant fear and emotional discomfort, typically peaking within 10 minutes and resolving within 30 minutes. There will usually be accompanying physical symptoms including:

- Rapid pulse/palpitations
- Shortness of breath
- Dizziness
- Sweating

**Non-Pharmacological Management**

- Psycho-education and reassurance
- Psychotherapy, e.g. cognitive-behaviour therapy
- Exclude an underlying medical condition, e.g. thyrotoxicosis

**Pharmacological Treatment**
**Panic attack**
Acute management
The initial aim is to control the panic symptoms and exclude an underlying medical cause.

**C:** Diazepam (PO) 5mg stat (repeated as necessary to control symptoms)
**OR**
**C:** Lorazepam (PO) 2mg stat (repeated as necessary to control symptoms)
**OR**
**D:** Clonazepam (PO) 1mg stat (repeated as necessary to control symptoms)

**Panic disorder**
**S:** Fluoxetine (PO) 20–40mg daily
**OR**
**S:** Citalopram (PO) 10–40mg daily
**OR**
**A:** Amitriptyline (PO) 25–75mg daily at night

**Note:**

- Initiate at low dose and gradually titrate to therapeutic dosages according to tolerability.
- Duration of therapy: variable, initially 6 months–1 year.
- Long term medicine treatment may be necessary.
- Relapses may occur when treatment is discontinued.
- Consider short term co-administration of a benzodiazepine, due to the slow onset of action and the potential for increased anxiety during the initial phase of treatment with antidepressants.

**Referral**
Refer to the next level in the following situations:
Treatment resistance or need for benzodiazepine treatment beyond 6 weeks

## 23.8. OBSESSIVE-COMPULSIVE DISORDER

This condition is characterised by the presence of persistent intrusive thoughts or concerns, and is usually associated with compulsions, which are mental acts or behaviours which an individual engages in to attempt to get rid of the obsessions and/or decrease his or her distress i.e. excessive hand washing. Obsessive thoughts and compulsions may interfere with daily functioning. The features are usually distressing to the patient.

**Diagnostic Criteria**

- A pattern of repetitive behaviours
- Anxiety symptoms

**Non Pharmacological Treatment**

- Psycho-education
- Psychotherapy
- Behaviour therapy

**Pharmacological Treatment**

**S:** Fluoxetine, oral. Initial dose: 20 mg. If there is no or partial response after 4–8 weeks, increase to 40 mg, if well tolerated.

**OR**

**C:** Citalopram, oral. Initial dose: 20 mg. If there is no or partial response after 4–8 weeks, increase to 40 mg, if well tolerated.

**Referral**
Refer to the next level in the following situations: Inadequate response to treatment

## 23.9 ACUTE STRESS DISORDER AND POST-TRAUMATIC STRESS DISORDER

Acute stress and post-traumatic stress disorder arise in response to stressful events. The patient should have experienced the event as life threatening or as a physical threat to themselves or others, at which time they felt fear and helplessness.

**Diagnostic Criteria**
Symptoms associated with both of these conditions include:

- Re-experiencing of the event, e.g. flashbacks, dreams
- Avoidance of situations associated with the event
- Features of anxiety or increased arousal, e.g. hyper vigilance, heightened startle response and insomnia

The conditions are symptomatically similar but differ with regard to the duration and time of onset of symptoms. The symptoms of acute stress disorder arise within 4 weeks of the event and last up to 4 weeks, whereas the symptoms post-traumatic stress disorder last longer than 4 weeks, and may arise more than 4 weeks after the traumatic incident.

**Non-Pharmacological Treatment**

- Reassurance and support of patient and family
- Psychotherapy, supportive/cognitive-behavioural therapy

**Pharmacological Treatment**

**Acute stress disorder:**
For acute anxiety or agitation give:

**D:** Clonazepam 0.5–2 mg (PO) in divided doses

**Note:** Prolonged use of benzodiazepines > 1 week may be detrimental to adaptation, leading to higher rates of post-traumatic stress disorder

**Post-traumatic stress-disorder:**

**A:** Amitriptyline (PO) initially 50–75 mg daily at night, increase gradually to a maximum of 150 mg daily. Elderly: Initially 25- 50 mg. Max. 75mg.

**OR**

**S:** Fluoxetine, (PO), initial dose 20 mg in the morning (If there is no or partial response after 4–8 weeks, increase dose to 40 mg, if well tolerated)

**OR**

**D:** Citalopram, (PO), initial dose 20 mg daily. (If there is no or partial response after 4–8 weeks, increase dose to 40 mg, if well tolerated)

**Note:** An adequate antidepressant trial of treatment is 8–12 weeks, before an alternative treatment should be considered.

**Referral**
Refer to the next level in the following situations:

- Inadequate response to treatment
- Co-morbid conditions

## 23.10. WITHDRAWAL FROM SUBSTANCE OF ABUSE

### 23.10.1. Heroin

Heroin addiction, is a chronic, relapsing brain disease that is characterized by compulsive substance seeking and use, despite harmful consequences. When your body has become

dependent on heroin, a number of unpleasant withdrawal symptoms will arise when the drug hasn't been used for a certain amount of time.

**Diagnostic Criteria**
Features include:

- Myalgia
- Gooseflesh
- Diarrhoea
- Rhinorrhoea
- lacrimation
- Agitation
- Anxiety
- Insomnia
- Sweating
- Yawning
- Abdominal cramping
- Dilated pupils
- Nausea and Vomiting

**Pharmacological Treatment**

**D:** Methadone (PO) 30mg daily as minimum dose, up to 120mg daily max. dose for 1 to 2 years or more.

**OR**

**S:** Buprenorphine (Sublingual) 2mg daily as minimum dose, up to 8mg daily max. dose for 1 to 2 years.

**OR**

**S:** Naltrexone (PO) 25mg daily as minimum dose, up to 50mg daily as max. dose for 6 months.

**Symptomatic Treatment**

**C:** Diazepam 5–20 mg (PO) once daily or in divided doses only as inpatient, taper off over 5–7 days [6]

**OR**

**A:** Promethazine 50mg (PO) once daily at sleeping time

**OR**

**A:** Chlorpromazine 50–00mg (PO) once daily at sleeping time

**For abdominal cramps give:**

**A:** Hyoscine butyl bromide 20 mg (O) up to 3 times daily as required

**OR**

**C:** Diclofenac tablets 50mg (O) 8hourly

**For diarrhoea give:**

**B:** Loperamide 4 mg (O) immediately, then 2 mg after each loose stool

## 23.10.2. Alcohol

For an individual with alcohol use disorder, abstinence from alcohol usually leads to withdraw symptoms. Alcohol detoxification requires the use of medication to prevent the symptoms which could become severe and potentially lead to mortality.

**Diagnosis Criteria**

Withdrawal symptoms include:

- Insomnia
- Tremors
- Chills
- Anxiety

**Non-Pharmacological Treatment**

- Support group that encourage abstinence
- Inpatient rehabilitation programme where necessary

**Pharmacological Treatment**

**C:** Thiamine 300 mg I.M every 24 hours

**For the CNS symptoms**

**A:** Diazepam 10 mg (PO) every 4–6 hours on the first 24 and reduce by 20% over 3–5 days (only in inpatient care)

**OR**

**S:** Chlordiazepoxide tablets 20–60mg (PO) daily in divided doses and taper over month

**Relapse prevention following detoxification**

**S:** Naltrexone 50mg (PO) daily decreases the craving for alcohol

## 23.10.3. Alcohol Withdrawal Delirium (Delirium Tremens)

It is an acute episode of delirium that is usually caused by withdrawal from alcohol. Although the typical delirium occurs 2–3 days following cessation of prolonged alcohol intake, reaching a peak at around 5 days, some withdrawal symptoms such as tremor may start within 12 hours.

**Diagnosis Criteria**

- Visual hallucinations
- Disorientation
- Fluctuating level of consciousness
- Agitation
- Tachycardia
- Hypertension
- A low-grade fever may be present
- Withdrawal tonic-clonic seizures may occur between 24 and 48 hours following cessation of alcohol intake

**Note:** It is important to consider alternative causes, when making the diagnosis. This is especially true for cases with an atypical presentation.

**Emergency Care**

- Secure airway
- Ensure breathing
- Circulation
- Give IV fluid (Dextrose Normal Saline) to prevent hypoglycaemia and hypotension
- Monitor for respiratory depression

**Pharmacological Treatment**

**A:** Diazepam IV 10 mg

**OR**

**C:** Lorazepam IM/IV, 2 mg for immediate sedative or hypnotic action. If no response give a second dose.

**Note:**

- Do not administer at a rate over 5 mg/minute
- Switch to oral once containment is achieved

**OR**

**S:** Chlordiazepoxide 20–60mg taper over one month

**AND**

**C:** Thiamine IM 300mg daily

**OR**

**A:** Vitamin B Complex 1 ampoule in half litre of 5% Dextrose

## 23. 10.4. Cocaine

**Non-Pharmacological Treatment**

These patients usually do not require admission, however beware of depression and assess suicide risk

**Pharmacological Treatment**

- No substitute drug available for detoxification
- For severe anxiety, irritability and insomnia

**A:** Diazepam 5–10mg (PO) 8hourly times daily for 5–7 days

**Referral:** Refer patients to specialized clinic

# CHAPTER TWENTY FOUR
# NUTRITIONAL DISORDERS

Nutrition disorders can be caused by an insufficient intake of food or of certain nutrients, or by an inability of the body to absorb and use nutrients, or by overconsumption of certain foods. Examples of such disorders include obesity, which is caused by excess energy intake; anaemia caused by insufficient intake of iron and impaired sight because of inadequate intake of vitamin A. Nutritional disorders can be particularly serious in children, since they interfere with growth and development, and may predispose them to many health problems, such as infection and chronic diseases.

**Major nutritional disorders in Tanzania are:**

- Nutritional anaemia (deficiency of iron, folic acid and vitamin $B_{12}$)
- Iodine deficiency disorders
- Vitamin A deficiency
- Protein-energy malnutrition (deficiency of carbohydrates, fats, protein)

## 24.1 ANAEMIA

This is a condition characterised by low haemoglobin concentration, clinically recognised by pallor. It is commonly caused by:

- Nutritional deficiency of iron or folate.
- Chronic systemic diseases such as HIV, TB, malignancy.
- Blood loss (bleeding/haemorrhage) e.g. caused by parasites, ulcers, tumours, abnormal menstruation.

Other causes include:

- Vitamin $B_{12}$ deficiency.
- Infiltration or replacement of the bone marrow.
- Abnormal Hb or red cells.
- Haemolysis.

**Diagnostic Criteria**

| Class | Hb less than |
|---|---|
| Women | 12gm/dl or 11g/dl in pregnancy |
| Men | 13g/dl |
| Children 1–5 years of age | 10g/dl |
| Children >5 years of age | 11g/dl |

Children < 5 years of age:

- Anaemia is most often due to iron deficiency (See Section 24.1.1, iron deficiency Anaemia).

Children > 5 years of age and Adults:

- Request a full blood count.
- If MCV is normal (normocytic), then systemic disease is the most likely cause.

- If MCV is low (microcytic), then iron deficiency is the most likely cause.
- If MCV is high (macrocytic), then folate and/or vitamin $B_{12}$ deficiency is the most likely cause.

Pregnant women: (See Section 11.5.1, Anaemia in pregnancy).

**Referral** is recommended if:
- Cause is unknown
- Symptomatic anaemia (e.g. palpitations and shortness of breath).
- Evidence of cardiac failure
- Signs of chronic disease (first investigate for HIV and TB)
- Anaemia is associated with enlargement of the liver, spleen or lymph nodes
- Evidence of acute blood loss or bleeding disorder
- Menorrhagia or dysfunctional uterine bleeding
- Blood in stool or melaena

### 24.1.1 Iron Deficiency Anaemia (IDA)

Anaemia due to deficiency of iron. Common causes of iron deficiency are chronic blood loss or poor nutritional intake. A common cause of anaemia in younger children and women of childbearing age. A full blood count showing a low MCV suggests the diagnosis of iron deficiency anaemia.

**Note:** Iron deficiency anaemia in children > 5 years of age, adult males and no menstruating women, is generally due to occult or overt blood loss

**General Measures**
- Identify and treat the cause. Exclude other causes.
- Lifestyle and dietary adjustment.

**Dietary advice:**
- Avoid drinking tea/coffee with meals
- Increase vitamin C intake (e.g. citrus fruit, orange juice, broccoli, cauliflower, guavas, and strawberries) with meals to maintain iron in its reduced state
- Increase dietary intake of iron rich foods like liver, kidney, beef, dried beans and peas, green leafy vegetables, fortified wholegrain breads and cereals

**Pharmacological Treatment:**
Children < 5 years of age:

Iron 1–2 mg/kg/dose of elemental iron (PO) 8 hourly with meals
- Follow-up Hb after 14 days.
- If Hb is lower than before, refer.
- If Hb is the same/higher, continue treatment and repeat after another 28 days.
- Continue treatment for 3 months after Hb normalises

Adults:

**A**:Ferrous sulphate compound BPC (PO) 170 mg (± 65 mg elemental iron) 8 hourly with food.

**OR**

**A**:Ferrous fumarate (PO) 200 mg (± 65 mg elemental iron) 8 hourly with food

- Follow up at monthly intervals
- The expected response is an increase in Hb of ≥ 2 g/dL in 4 weeks.
- Continue for 3–6 months after the Hb normalises in order to replenish body iron stores.
- Do not take iron tablets within 4 hours of taking calcium tablets.

Pregnant women: (See Section 11.5.1: Anaemia in pregnancy)

**Prophylaxis**

Infants from 6 weeks: If < 2.5 kg at birth:

**A**:Ferrous lactate (PO) 0.3 mL daily until 6 months of age.

**OR**

**A**:Ferrous gluconate syrup (PO) 0.8 mL daily until 6 months of age.

During pregnancy:

**B**:Ferrous sulphate compound BPC (PO)170 mg (± 65 mg elemental iron), 12 hourly.

**Referral:** (As in Section 24.1: Anaemia)

Children > 5 years of age, men and non-menstruating women.

- No or inadequate response to treatment

## 24.1.2 Macrocytic or Megaloblastic Anaemia (Vitamin $B_{12}$ Deficiency)

Anaemia with large red blood cells is commonly due to folate or vitamin $B_{12}$ deficiency. Folate deficiency is common in pregnant women and in the postpartum period. Macrocytic anaemia in these women may be assumed to be due to folate deficiency and does not require further investigation (See Section 11.5.1 Anaemia in pregnancy. Vitamin $B_{12}$ deficiency occurs mainly in middle-aged or older adults, and can cause neurological damage if not treated. Macrocytic anaemia outside of pregnancy or the postpartum period requires further investigations to establish the cause.

**Diagnostic Criteria:** FBC will confirm macrocytic anaemia.

- Elevated MCV
- White cell count and/or platelet count may also be reduced.
- If there is a poor response to folate, a serum vitamin $B_{12}$ should be done.

**General Measures:**

- Dietary advice: Increase intake of folic acid rich foods such as:liver, eggs, fortified breakfast cereals, citrus fruit, spinach and other green egetables, lentils, dry beans, peanuts.
- Reduce alcohol intake.

Vitamin $B_{12}$ deficiency anaemia:

- High protein diet is recommended (1.5 g/kg/day).
- Increase intake of dietary vitamin $B_{12}$ sources, including meat (especiallyliver), eggs and dairy products.

**Pharmacological Treatment:**

Folic acid deficiency:

**A**:Folic acid (PO) 5 mg daily until Hb is normal

- Check Hb monthly

Folic acid given to patients with vitamin $B_{12}$ deficiency can mask the situation and eventually lead to neurological damage, unless vitamin B12 is also given.

**Referral:**

- Patients with suspected vitamin $B_{12}$ deficiency
- Chronic diarrhoea
- Poor response within a month of treatment
- Macrocytic anaemia, of unknown cause

## 24.2 Iodine Deficiency Disorders (IDDA)

Iodine is an essential component of the thyroid hormones (Triiodothyronine-*T3*) and Tetraiodothyonine-T4 or Thyroxine). The hormones have profound influence on energy metabolism, protein synthesis, growth and development. They also play part in the conversion of carotene to Vitamin A and synthesis of cholesterol. Insufficient level of iodine leads to inadequate production of the hormones. This, in turn, affects brain development, physical growth and functioning of muscles, heart, liver and kidneys.

**Manifestation of Iodine Deficiency:**

- Goitre - enlarged thyroid gland from over-activity
- Hypothyroidism - dry skin, weight gain, puffy face, frequent constipation and lethargy from under-active thyroid
- Hyperthyroidism - exophthalmia, rapid pulse and weight loss from over-active thyroid
- Cretinism

**General Measures**

- Use of iodated salt (strategy for control of iodine deficiency worldwide)
- Use of of iodine rich foods like: Drinking water (reflecting amount of I2 present in the soil) , Fish, Sea weeds (Sea weeds are rich in iodine but are a rare component of the diet).

**Pharmacological Treatment**

Injection iodized oil (IM).

- The iodine is retained in the body tissues for a long period of time (three to five years), maintaining the thyroid hormones at normal levels.

**A:** Iodinated oil, 400mg (PO) repeated after one to two years

**B:** Lugol's solution, 3 drop (21 mg) once

## 24.3 VITAMIN DEFICIECIES

### 24.3.1 Vitamin A Deficiency (VAD)

A condition predominantly affecting the skin, mucous membranes and the eyes. It is most common in children of 1–5 years of age. If associated with measles and diarrhoea there is an increased risk of illness and death. If not identified and treated early, it can cause blindness.

**Clinical features:** include

- Night blindness or inability to see in the dark
- White foamy patches on the eye (Bitot's spot) or conjunctival and corneal dryness
- keratomalacia or wrinkling and cloudiness of cornea
- Corneal ulceration or the cornea becomes soft and bulges

**General measures:** Dietary supplementation with vitamin-A rich food include:

- fortified maize meal and/or bread, fortified margarine
- carrots, sweet potato, mangoes and pawpaw, broccoli, sprouts
- dark green leafy vegetables e.g. *matembele, mnafu* and spinach
- apricots, melon, pumpkin
- liver, eggs, full cream milk and fish

**Pharmacological Treatment**
**For Prophylaxis**
Vitamin A (retinol), oral, every 6 months up to the age of 5 years.

| **Age range** | **Dose units** | **Capsule 100,000u** | **Capsule 200,000 u** |
|---|---|---|---|
| Infants 6–11 months | 100,000 | 1 capsule | - |
| Children 12 months–5 years | 200,000 | 2 capsule | 1capsule |

**For Treatment**
Children 0–5 years of age, with:

- Severe under nutrition/malnutrition
- Persistent diarrheoa
- Any of the clinical signs of vitamin A deficiency
- Measles

**A:** Vitamin-A (retinol), oral, every 6 months up to the age of 5 years.

| **Age range** | **Dose** Unit(IU) | **Capsule** 100,000IU | **Capsule** 200,000IU |
|---|---|---|---|
| Infant < 6 months | 50,000 | ½ capsule | - |
| Infants 6–11 months | 100,000 | 1 capsule | - |
| Children 12 months–5 years | 200,000 | 2 capsule | 1 capsule |

Administration of a vitamin A capsule

- Cut the narrow end of the capsule with scissors.
- Open the child's mouth by gently squeezing the cheeks.
- Squeeze the drops from the capsule directly into the back of the child's mouth. If a child spits up most of the vitamin A liquid immediately, give one more dose.

Children > 5 years of age and adults with:

- Any clinical signs of vitamin A deficiency
- Measles

**Note:** Do **NOT** give the capsule to the mother or the caretaker to take home.

- Children who received a prophylactic dose within the previous month should not receive the treatment dose of vitamin A.
- If a child is scheduled to receive a routine prophylactic dose of vitamin A and has received a treatment dose within the past month, postpone the routine dose for approximately one month.
- Wait at least one month between doses.
- Children receiving routine multivitamin syrup can still receive vitamin A supplements.

**Referral:**
All complicated cases.

## 24.3.2 Vitamin B Deficiencies

A condition in which some of the B group vitamins are deficient. This occurs commonly in malnutrition and alcoholism.

**General measures**

- Lifestyle adjustment
- Discourage alcohol abuse

**Pharmacological Treatment:** For all forms of vitamin B deficiencies:

**A:** Vitamin B complex, oral, 2 tablets 3 times daily for one week, then 1 tablet daily for 3 months.

### 24.3.2.1 Vitamin $B_3$/Nicotinic Acid Deficiency (Pellagra)

Pellagra is a condition associated with nicotinic acid deficiency. It is usually accompanied by other vitamin deficiencies.

**Clinical features:** include

- diarrhoea
- dementia
- dermatitis with darkening of sun-exposed skin

**General measures**

Lifestyle adjustment including discouraging of alcohol abuse.

**Dietary advice**: Increase intake of

- liver, kidneys, other meats, poultry and fish
- peanuts
- milk
- pulses, whole meal wheat and bran

**Pharmacological Treatment**
**For severe deficiency**
Children: **C:** Nicotinamide, oral, 50 mg 8 hourly for one week.
Adults **C:** Nicotinamide, oral, 100 mg 8 hourly for one week.

**For mild deficiency**
Children **C:** Nicotinamide, oral, 50 mg daily for one week.
Adults **C:** Nicotinamide, oral, 100 mg daily for one week.

**Referral:** On failure to respond on above treatment.

**24.3.2.2 Vitamin $B_6$/Pyridoxine Deficiency**
Commonly presents as signs of peripheral neuropathy including:

- tingling sensation
- burning pain or numbness of the feet

Pyridoxine deficiency is related to:

- Malnutrition
- Alcoholism
- Isoniazid or combination TB therapy

**General measures:**
**Dietary advice**: Increase intake of pyridoxine rich foods such as:

- Liver, meat, fish and offal,
- Wholegrain cereals, fortified breakfast cereals,
- Peanuts, bananas, raw vegetables,
- Walnuts and seeds, avocados, dried fruits,
- Potatoes and baked beans.

**Pharmacological Treatment**
**For deficiency**
Children: **B:** Pyridoxine 12.5mg (PO) daily for 3 weeks.
Adults: **B:** Pyridoxine, 25 mg (PO) daily for 3 weeks.

**For medicine-induced neuropathy**
Children **C:** Pyridoxine, 50mg (PO) daily for 3 weeks.
Adults **C:** Pyridoxine, 200mg (PO) daily for 3 weeks.

Then followed by:
**C**:Pyridoxine, 25mg (PO) daily as maintenance dose (for patients on TB therapy/isoniazid)

**Referral:**

- Failure to respond.
- Children.

**24.3.2.3 Vitamin $B_1$/Thiamine Deficiency (Wernicke Encephalopathy and Beriberi)**
**Clinical features:** include

- confusion
- short term memory loss
- paralysis of one or more of the ocular muscles or ophthalmoplegia
- nystagmus
- ataxia
- peripheral neuropathy
- cardiac failure

Alcoholics may present with Wernicke encephalopathy, neuropathies or cardiac failure associated with multiple vitamin deficiencies.

**General Measures**
Lifestyle adjustment including discouraging of alcohol abuse.
**Dietary advice**: to increase intake of thiamine rich foods such as:

- Whole wheat breads, oatmeal
- Pulses, nuts, yeast
- Fortified cereals
- Pork, bacon and marmite
- Potatoes and peas

**Pharmacological Treatment**
**Peripheral neuropathy and cardiac failure**
Thiamine, oral, 100 mg daily.

**24.3.2.4 Vitamin $B_{12}$ (Cobalamin) Deficiency**
(See section 24.1.2 on megaloblastic anaemia)

## 24.4 SEVERE ACUTE MALNUTRITION (SAM)

Diagnostic criteria for SAM in children aged 6-59 months (any one of the following):

| Indicator | Measure | Cut off |
|---|---|---|
| Severe wasting | Weight for height Z-Score (WHZ) | <-3 |
| Mid upper arm circumference | MUAC | <11.5cm |
| Bilateral pitting oedema | Clinicasign | |

**Severe underweight**

- WHZ < -3 (usually clinically reflective of marasmus) where no other explanation is present, and/or clinically severe wasting (usually clinically reflective of marasmus – thin arms, thin legs, "old man" appearance, baggy pants folds around buttocks, wasted buttocks)

**Nutritional oedema:**

- Supported by findings of skin changes, fine pale sparse hair, enlarged smooth soft liver, moon face.

### 24.4.1 Complicated SAM

Any child with SAM who has any **ONE** of the following features:

- < 6 months of age or weighs < 4 kg
- Bilateral pitting oedema
- Refusing feeds or is not eating well (poor appetite)
- Any of the danger signs listed below

**Danger Signs**

- dehydration
- hypoglycaemia
- vomiting
- hypothermia
- respiratory distress (including fast breathing)
- convulsions
- not able to feed
- shock
- lethargy (not alert)
- jaundice
- weeping skin lesions

All children with complicated SAM are at risk of complications or death.

- Refer urgently!
- Stabilise before referral.
- Initiate treatment while waiting for transport to hospital

**General Measures**

- Keep the child warm.
- Test for and prevent hypoglycaemia in all children.

**If the child is able to swallow:**

- If breastfed: ask the mother to breastfeed the child, or give expressed breastmilk.
- If not breastfed**:** give a breastmilk substitute (F-75). Give 30–50 mL before the child is referred.
- If no breastmilk substitute is available, give 30–50 mL of sugar water

To make sugar water:

- Dissolve 4 level teaspoons of sugar (20 g) in a 200 mL cup of clean water. Repeat 2 hourly until the child reaches hospital.

**If the child is not able to swallow:**

- Insert a nasogastric tube and check the position of the tube.
- Give 50 mL of milk or sugar water by nasogastric tube (as above).

If blood sugar < 3 mmol/L treat with 10% Glucose

- Nasogastric tube: 10 mL/kg.
- Intravenous line: 2 mL/kg.

**NOTE:**

- The only indication for intravenous infusion in a child with severe acute malnutrition is circulatory collapse caused by severe dehydration or septic shock when the child is lethargic or unconscious (excluding cardiogenic shock);
- All children with severe acute malnutrition with signs of shock with lethargy or unconsciousness should be treated for septic shock. This includes especially children with signs of dehydration but no history of watery diarrhoea, children with hypothermia hypoglycaemia, and children with both oedema and signs of dehydration;
- In case of shock with lethargy or unconsciousness, intravenous rehydration should begin immediately, using 15 mL/kg/h of one of the recommended fluids;
- It is important that the child is carefully monitored every 5–10 min for signs of overhydration and signs of congestive heart failure.
- If signs of overhydration and congestive heart failure develop, intravenous therapy should be stopped immediately;
- If a child with severe acute malnutrition presenting with shock does not improve after 1 h of intravenous therapy, a blood transfusion (10 mL/kg slowly over at least 3 h) should be given;
- Children with severe acute malnutrition should be given blood if they present with severe anaemia, i.e. Hb <4 g/dL or <6 g/dL if with signs of respiratory distress;
- Blood transfusions should only be given to children with severe acute malnutrition within the first 24 h of admission.

**CAUTION!!:**

Children with SAM and signs of shock or severe dehydration, and who cannot be rehydrated orally or by nasogastric tube should be treated with intravenous fluids, either:

**A:** Ringer's lactate solution + Dextrose 5%

If neither is available, A: 0.45% saline + Dextrose 5% should be used

Give an additional dose of Vitamin A:Vitamin A (retinol) (PO)

| Age range | Dose unit | Capsule |
|---|---|---|
| Infants 6–11 months | 100,000U | 1 |
| Children 12 months–5 years | 200,000U | 2 |

**Pharmacological Treatment**
Treat other medical conditions as per IMCI guide

## 24.4.2 Uncomplicated SAM

Children with SAM who meet the following criteria:

- The child is > 6 months of age and weight > 4 kg, and
- There is no pitting oedema, and
- The child is alert (not lethargic), and
- The child has a good appetite and is feeding well, and
- The child does not have any danger signs or severe classification.

All cases require careful assessment for possible TB or HIV.

**General Measures**

- Provide RUTF (ready to use therapeutic food regular nutritional supplements) and/or other nutritional supplements according to supplementation guidelines.
- Counsel according to IMCI guidelines.
- Regular follow-up to ensure that the child gains weight and remains well.
- Discharge with supplementation, once the following criteria are met:
    - WHZ (weight-for-height z-score): > –2
    - WHZ for two consecutive visits at least one month apart and/or
    - MUAC: > 11.5 cm (preferable at 12 cm, if MUAC used alone).
- Follow-up patients for at least 6 months to ensure sustained growth.

**Pharmacological Treatment**
Do not repeat if child has received these during inpatient stay:

- Give an additional dose of Vitamin A:
    - High dose of vitamin A (50,000 IU, 100,000 IU or 200,000 IU, depending on age) should be given to all children with SAM and eye signs of vitamin A deficiency on day 1,
    - Second and a third dose on day 2 and day 15 (or at discharge from the programme), irrespective of the type of therapeutic food they are receiving;
- To all children with SAM with recent measles on day 1, with a second and a third dose on day 2 and day 15 (or at discharge from the programme), irrespective of the type of therapeutic food they are receiving

**Empiric treatment for worms:**

**A:** Mebendazole, oral.
Dose: Children 1–2 years: 100 mg (PO) 12 hourly for 3 days.
Children > 2–5 years: 500 mg (PO) as a single dose.

**Referral:**

- When RUTF cannot be provided and follow-up on an ambulatory (outpatient) basis is not possible.
- The child develops pitting oedema or any of the danger signs (see above).
- Failure to gain weight despite provision of nutritional supplements.

## 24.5 NOT GROWING WELL/GROWTH FALTERING/FAILURE TO THRIVE

Children and infants who have either:

- Unsatisfactory weight gain (growth curve flattening or weight loss) on the Road to Health chart/ booklet.

  **OR**

- Low weight for age, i.e. WHZ < –2 but > –3

**Note:** Babies who were premature and are growing parallel to or better than the Zscore line, should not be classified as having failure to thrive or not growing well.

**Not growing well** may be due to:

- Insufficient food intake due to anorexia and illness or poor availability of food.
- Insufficient uptake of nutrients, e.g. malabsorption.
- Insufficient use of nutrients for growth due to chronic disease.
- Increased demand for nutrients due to illness such as TB and HIV and AIDS
- Conduct a feeding and clinical assessment to determine the cause. Exclude anaemia.

**Check for malnutrition and anaemia** in all children: Plot the weight on the Road to Health chart/booklet, Look at the shape of the weight curve:

- Is the weight curve rising parallel to the reference lines?

  **OR**

- Is it flattening?

  **OR**

- Is there weight loss?
  - Look for visible wasting.
  - Look and feel for oedema of both feet.
  - Look for palmar pallor.
- Check Hb if anaemia is suspected.

**General measures**

- Counseling on nutrition.
- Nutritional supplementation should be supplied unless there is a correctable cause.
- Assess the general condition of the child.
- Assess the child for possible HIV and TB, and manage appropriately.
- Assess for other long-term health conditions, and manage appropriately.
- Assess the child's feeding and recommend actions as outlined below.
- Provide supplements according to a child's age to meet specific nutritional needs.
- Provide adequate intake of micronutrients.
- Ensure that immunisations are up to date. Record the dose given on the RTHB.
- Follow up monthly. If responding review the child every two months.
- Refer for social assistance if needed.

**Feeding recommendations for all children:**

**0–6 months of age**

- Breastfeed exclusively - feed at least 8 times in 24 hours.
- If formula is medically indicated (refer below) or if the mother has chosen to formula-feed the child, discuss safe preparation and use with the mother.

**6–12 months of age**

- Continue breastfeeding (breastfeed before giving foods).
- Introduce complementary foods at six months of age.
- Start by giving 2–3 teaspoons (modified family food) of iron-rich food such as mashed vegetables or cooked dried beans.

**Children 6–8 months**

- Should be given two meals daily, gradually increasing the number of meals so that at 12 months the child is receiving 5 small meals.
- For children who are not growing well, mix margarine, fat, or oil with their porridge 12 months to 2 years of age
- Continue breastfeeding. If the child is not breastfed, give 2 cups of full cream cow's milk every day.
- Make starchy foods the basis of the child's meal.
- Give locall available protein at least once a day, and fresh fruit or vegetables twice every day.

**2–5 years of age**

- Give the child his/her own serving of family foods 3 times a day. In addition, give nutritious snacks e.g. bread with peanut butter, full cream milk or fresh fruit betwee meals.

**Conditions which Justify Recommending that Mothers Do Not Breastfeed**

- Infants with a small number of metabolic diseases qualify to receive specialized infant formula. These infants should be managed in tertiary centres.
- Maternal medical condition that may justify temporary or permanent avoidance :
- Severe illness that prevents a mother from caring for her infant, for example sepsis, renal failure.
- Herpes simplex virus type 1 (HSV-1): direct contact between lesions on the mother's breasts and the infant's mouth should be avoided until all active lesions have resolved.
- Maternal medications: sedating psychotherapeutic medicines, anti-epileptic medicines and opioids (may cause drowsiness and respiratory depression in the infant), radioactive iodine-131, excessive use of topical iodine or iodophors (especially on open wounds or mucous membranes), cytotoxic chemotherapy.
- Infants who qualify to receive infant formula as part of the supplementation scheme
- The mother has died or infant has been abandoned.
- Other individual circumstances deemed necessary by a multidisciplinary team.

# CHAPTER TWENTY FIVE
# POISONING

Poison is any substance (liquid, solid, gas), that is harmful to the body, when ingested, inhaled, injected or absorbed through the skin. It is estimated that about 7 in 100,000 people in Tanzania die due to unintentional poisoning[1]. Pesticides were important cause of poisoning in the east Africa region followed by snake bites. Otherwise, poisoning is under-reported and data are very scarce in Tanzania.

## 25.1 COMMON POISONS

These can be intentional or accidental. Suspect poisoning in any unexplained illness in a previously healthy child/adult. Traditional medicines can also be a source of poisoning. The common poisoning in our setting are:

- Household agents:
    - Organophosphate e.g malathion (insecticide)
    - Pesticides - nuvan top, rat poison, hydrocarbons e.g kerosene
    - Disinfectants and bleach
- Medicines - Aspirin, paracetamol, anticonvulsants (carbamazpine), haematinic (Iron and Vitamins)
- Major tranquilizers and herbal products
- Foods-eg Mushroom, infected foods

## 25.2 GENERAL PRINCIPLES OF MANAGEMENT OF POISONING

In managing a patient who has been exposed to toxins holistic approach should be considered. These include[4].

A. Resuscitation and stabilization
B. Diagnosis
C. Treatment of a poison (specific antidotes)
D. Supportive care
E. Psychosocial intervention

- The investigations depend on the poison ingested:
- If the toxin cannot be identified then toxidrome (signs and symptoms) can be used

| **Sympathomimetic toxidrome** | | |
|---|---|---|
| **Signs and syptoms** | **Possible toxins** | **Investigations** |
| Anxiety / Delirium<br>Hypertension<br>Tachycardia<br>Hyperpyrexia<br>Mydriasis<br>Diaphoresis | Cocaine, amphetamines, phencyclidine (PCP), Lysergic acid (LSD)<br>Withdrawal from narcotics, benzodiazepine, alcohol, long term beta-blocker therapy | RBG-bedside<br>ECG<br>Serum electrolytes and renal function<br>Liver function test<br>Creatinine kinase<br>Clotting screen: PT/PTT/INR |

| | | |
|---|---|---|
| | | Full Blood Count<br>Arterial blood gas<br>Serum osmolality and osmolality gap<br>Abdominal X-ray may be useful in diagnosing |
| **Cholinergic toxidrome** | | |
| **Signs and symptoms** | **Possible toxins** | |
| Salivation<br>Lacrimation<br>Urinary incontinence<br>Defaecation<br>Gastric cramping, hypermotility<br>Emesis | Organophosphate compounds<br>Carbamate insecticides | |

## 25.2.1. Management of Ingested Poisons

Ingested toxins is suspected in any patient with signs and symptoms irrespective of reported dose ingested[5]

**Diagnostic Criteria**

- General clinical features-Nausea, vomiting, drowsiness, blurred vision, and dizziness
- Central Nervous System toxicity-Altered level of consciousness ,convulsions, acute confusion and coma,
- Renal Toxicity-Acute kidney injury/failure and papillary necrosis
- Metabolic derangement-Metabolic acidosis, respiratory acidosis, hypoglycemia.
- Allergic Reactions:-Urticaria, angioederma, anaphylaxis
- Haematological toxicity:-Aplastic anaemia, agranulocytosis

**Non-Pharmacological Treatment**

- Gastric decontamination within one hour of ingestion.

**Gastric Lavage**

- Gastric lavage should not be employed routinely in the management of a poisoned patient
- Only do it in health care facilities if staff has experience in the procedure, and if the ingestion was within one hour and is life threatening, and there has been no ingestion of corrosives or petroleum derivatives
- Make sure a suction apparatus is available in case the patient vomits
- Place the patient in the left lateral/ head down position
- Insert a large NGT. Ensure the tube is in the stomach
- Perform lavage with 10 ml/kg body weight of warm .9% sodium chloride (0.9%). The volume of lavage fluid returned should approximate to the amount of fluid given.

- Lavage should be continued until the recovered lavage solution is clear of particulate matter. Note that tracheal intubation may be required to reduce risk of aspiration.
- **General care:** Keep the patient under observation 4–24 hours depending on the poison swallowed

**Contraindications to Gastric Lavage:**
- An unprotected airway in an unconscious patient
- Ingestion of corrosives or petroleum products e.g. kerosene
- Bowel obstruction
- Bowel perforation
- GI bleeding
- Identify the specific agent and remove or adsorb it as soon as possible.

**Note:**
- Treatment is most effective if given as quickly as possible after the poisoning event, ideally within 1 hour.
- If the patient has swallowed kerosene, petrol or petrol-based products (note that most pesticides are in petrol-based solvents) or if the patient's mouth and throat have been burned (for example with bleach, toilet cleaner or battery acid) do not vomit the patient but give water orally?
- Never use salt as an emetic as this can be fatal.

**Pharmacological Treatment**

**C:** Activated charcoal, single dose (if available) within one hour of ingestion and do not induce vomiting; give by mouth or NG tube according to the dosage below:

Dose: Children below one year : 1 g/kg
Children 1 to 12 years of age: 25–50g
Adolescents and adults: 25–100g

Content mixing:
- Mix the charcoal in 8–10 times the amount of water, e.g. 5 g in 40 ml of water.
- If possible, give the whole amount at once; if the child has difficulty in tolerating it, the charcoal dose can be divided.
- If charcoal is not available, then induce vomiting but only if the patient is conscious by rubbing the back of the patient throat with a spatula or spoon handle;

**Referral:**

Consider transferring patient to next referral level hospital, where this can be done safely, if the patient is:
- unconscious or deteriorating conscious level
- has burns to mouth and throat
- in severe respiratory distress
- cyanosed
- heart failure

### 25.2.2 Principles of Management of Poisons in Contact with Skin or Eyes

#### 25.2.2.1 Management of Skin contamination

- Remove all clothing and personal effects and thoroughly flush all exposed areas with copious amounts of water
- Use soap and water for oily substances
- Attending staff should take care to protect themselves from secondary contamination by wearing gloves and apron
- Removed clothing and personal effects should be store d safely in a see-through plastic bag that can be sealed, for later cleansing or disposal

#### 25.2.2.2 Management of Eye contamination

- Rinse the eye for 10–15 minutes with clean running water or saline, taking care that the run-off does not enter the other eye.
- The use of tetracaine hydrochloride eye drops will assist irrigation[8]. Evert the eyelids and ensure that all surfaces are rinsed.
- In the case of an acid or alkali irrigate for 20 minutes
- Where possible, the eye should be thoroughly examined under fluorescein staining for signs of corneal damage.
- If there is significant conjunctival or corneal damage, the patient should be seen urgently by an ophthalmologist.
- Refer when further eye evaluation cannot be performed.

### 25.2.3 Principles of Management of Inhaled Poisoning

- Remove from the source of exposure.
- Administer supplemental oxygen if required.
- Inhalation of irritant gases may cause swelling and upper airway obstruction, bronchospasm and delayed pneumonitis.
- Intubation, bronchodilators and ventilator support may be required

## 25.3 SPECIFIC POISONS

### 25.3.1 Corrosive Compounds Poisoning

Examples—sodium hydroxide (Soaps-drain/oven cleaners), potassium hydroxide, acids, bleaches or disinfectants.

**Non-Pharmacological Treatment**

- Give small volume of water as soon as possible-beneficial within 30mins
- Give oxygen therapy if respiratory distress

**Surgical review**

- Arrange for surgical review to check for:
    - Esophageal damage/rupture, if severe.
    - Perforation, mediastinitis and peritonitis if suspected

**Note**: Do not induce vomiting or use activated charcoal

## 25.3.2 Petroleum Compounds Poisoning

Examples—kerosene, turpentine substitutes and petrol

**Diagnostic Criteria:**

- GIT-abdominal pain, bloody stool, vomiting
- RS-Throat swelling, pneumonitis and/or pulmonary oedema-cough, tachypnea, cyanosis, crepitation and rhonchi
- CNS-Headache, dizziness, euphoria, restlessness, ataxia, convulsion, encephalopathy and coma

**Non-Pharmacological Treatment**

- Remove the patient from source
- Remove contaminated cloth and thoroughly wash the skin with soap and water
- Give supplemental oxygen if needed
- If large amount of petroleum compound has been ingested less than an hour earlier lavage may be considered and the patient should be intubated

**Note**: Do not induce vomiting

## 25.3.3 Organo-Phosphorus and Carbamate Compounds Poisoning

These can be absorbed through the skin, ingested or inhaled. Examples:

- Organophosphorus – Malathion, Parathion, Tetraethyl Pyrophosphate (TEPP), mevinphos and
- Carbamates – methiocarb and carbaryl.

**Diagnostic Criteria**

- Vomiting, diarrhoea, blurred vision or weakness.
- Signs of excess parasympathetic activation: salivation, sweating, lacrimation, slow pulse, small pupils, convulsions, muscle weakness/twitching, then paralysis and loss of bladder control, pulmonary oedema, and respiratory depression.

**Non-Pharmacological Treatment**

- Remove poison by irrigating eye or washing skin (if in eye or on skin).
- Give activated charcoal if ingested and within 1 hour of the ingestion.
- Do not induce vomiting because most pesticides are in petrol-based solvents.
- In a serious ingestion where activated charcoal cannot be given, consider careful aspiration of stomach contents by NG tube (the airway should be protected).
- Auscultate the chest for signs of respiratory secretions and monitor respiratory rate, heart rate and coma score (if appropriate)
- Give oxygen if oxygen saturation is less than 90%

**Pharmacological Treatment**

- If there are signs of excess parasympathetic activation (see above) give:
  **A**: Atropine, boluses of 5mg IV
    - Repeat every 10minutes until satisfactory atropinization (i.e. no chest signs of secretions, HR>80b/min, Systolic BP >80mmHg, pupils no longer pinpoint, Dry axillae) 9.

- Paediatric patient can start at 0.05mg/kg, then double the dose every five minutes, stop doubling the dose when parameters have improved

**S:** Obidoxime (a cholinestarase activator) 5mg/kg IV if <24 hours. It may be given 5minutes after the first dose of atropine, if available.

- If muscle weakness give:

**S:** Pralidoxime (cholinesterase reactivator) 50mg/kg diluted with 15 ml water for injection by IV infusion over 30 minutes

- Repeated once to twice
- Followed by 10–20 mg/kg/hour, as necessary.

### 25.3.4 Paracetamol Poisoning

Paracetamol (N-acetyl-p-aminophenol) is a common antipyretic and analgesic, that is used worldwide. It is the commonest taken drug overdose.

**Diagnostic Criteria**

- Phase-1: 0.5–24 hours after ingestion: asymptomatic, to nonspecific symptoms (anorexia, nausea, vomiting and malaise). Pallor , diaphoresis
- Phase-2: 18–72 hours after ingestion: Right upper quadrant abdominal pain, anorexia, nausea and vomiting, Tender right upper quadrant, tachycardia, hypotension and oliguria.
- Phase-3: 72–96 hours after ingestion: all of the above and jaundice, coagulopathy, hypoglycemia and hepatic encephalopathy, Acute Renal failure.
- Phase-4: 4th day to 3weeks after ingestion: patient who survive critical illness in phase 3, have complete recovery.

**Investigation**

- Liver Function Test- ALT, AST, ALP, PT with INR (International Normalization Ratio)
- Glucose
- Renal Function Test: Electrolytes, BUN, creatinine
- ABG-Arterial Blood Gas

**Non-Pharmacological Treatment**

- Rescucitation
- Usually there is no immediate threat to the airway, breathing and circulation with paracetamol poisoning
- Correct hypoglycaemia (Give glucose or sugar or honey)
- If within 1 hour of ingestion of 150mg/kg or more paracetamol give activated charcoal, if available, or induce vomiting.

**Pharmacological Treatment**

**A:** Activated charcoal (1gm/kg, up to 50gm) if less than 2 hours.

If more than 8 hours after ingestion, or the patient cannot take oral treatment, give:

- **C:** Acetylcystein 150mg/kg IV in 200mls of 5% Dextrose over 20 minutes, then 50mg/kg in in 500mls of 5% dextrose over 4 hours, then 100mg/kg in 1 liter of 5% dextrose over 16 hours.

- In severe poisoning a further 100mg/kg may be given over the next 24 hours

Children <20kg: Give loading dose of 150mg/kg in 3ml/kg of 5% glucose, over 15 minutes, followed by 50 mg/kg in 7 ml/kg of 5% glucose over 4 hours, then 100 mg/kg IV in 14 ml/kg of 5% glucose over 16 hours.

For conscious and not vomiting or when there is severe reaction to N-acetylcysteine give:

- S: Methionine (<6 years: 1 gram every 4 hours - 4 doses; 6 years and above: 2.5 grams every 4 hours for 4 doses).

## 25.3.5 Acetyl Salicylic Acid (Aspirin) and other Salicylates Poisoning

**Diagnostic Criteria**

- Initial signs and symptoms
  - Tinnitus and impaired hearing, rapid breathing (acidotic-like breathing), vomiting, dehydration, fever, double vision and feeling faint
- Late signs
  - Drowsiness, bizarre behavior
  - Unsteady walking and coma

**Investigations**

- Blood gases
- pH and bicarbonates and serum electrolytes

**Non-Pharmacological Treatment**

- Give activated charcoal within one hour of ingestion if available. If charcoal is not available and a severely toxic dose has been given, then perform gastric lavage or induce vomiting as above
- Replace fluid losses (Plasma potassium concentration should be corrected before giving sodium bicarbonate as hypokalaemia may complicate alkalinisation of urine)
- Monitor blood glucose every 6 hours and correct as necessary
- Monitor urine pH hourly.

**Pharmacological Treatment**

**C:** Sodium bicarbonate (IV) 1 mmol/kg over 4 hours to correct acidosis and to raise the pH of the urine to above 7.5 so that salicylate excretion is increased.

- Give 0.9% sodium chloride as maintenance requirements
- Hemodialysis is required if the concentration exceeds 700mg/liter or in presence of severe metabolic acidosis

## 25.3.6 Iron Poisoning

**Diagnostic Criteria**

- Nausea, vomiting, abdominal pain and diarrhoea.
- The vomitus and stools are often grey or black.
- In severe poisoning there may be gastrointestinal haemorrhage, hypotension, drowsiness, convulsions and metabolic acidosis.
- Gastrointestinal features usually appear in the first 6 hours and a patient who has remained asymptomatic for this time probably does not require antidote treatment.

**Non-Pharmacological Treatment**

- Gastric lavage if potentially toxic amounts of iron were taken.

**Pharmacological Treatment**

- Give antidote treatment:
  **D:** Deferoxamine (deep IM injection) 50mg/kg up to a maximum of 1g by repeated every 12 hours; if very ill, give IV infusion 15 mg/kg/hour to a maximum of 80mg/kg in 24 hours.

## 25.3.7 Carbon-monoxide Poisoning

Carbon monoxide is a byproduct of burning organic compounds, and may of its exposure occur in private residences. So its toxicity is usually due to improper use of gasoline portable generators and indoor use of charcoal for cooking and heating.

**Diagnostic Criteria**

- Dull headache, general body weakness
- Dizziness, nausea or vomiting
- Shortness of breath, blurred vision, loss of consciousness

**Investigations**

- Blood gases and serum electrolytes

**Non pharmacological Treatment**

- Give 100% oxygen to accelerate removal of carbon monoxide (note patient can look pink but still be hypoxemic) until signs of hypoxia disappear.

## 25.3.8 Opiod Poisoning

Opiate intoxication can occur any time from birth (Delivery/ maternal opiod usage) to terminal care. Drugs that may be involved include: Codeine, Diamorphene, Di Hydrocodeine, Fentanyl, Heroin, Loperamide, Methadone, Morphine, opium, Tramadol (etc.) alone or in combination.

**Risk factors for Toxicity**

- Drug users
- Social disadvantaged
- People who had used the drug earlier for treatment
- Those using alcohol and other sedatives

**Diagnostic Criteria**

- Acute toxicity: drowsiness, nausea and vomiting
- Chronic toxicity: constipation, loss of appetite± nausea and vomiting
- Respiratory depression, tachycardia, hypotension and pin point pupils

**Non Pharmacological Treatment**

- Check the airway
- Intubate the patient who cannot protect their airway
- Give oxygen

**Pharmacological Treatment**

Antidote:

**C:** Naloxone

- Hypoventilating patient with spontaneous ventilation Naloxone
- Adults & children> 20kg: Initial dose 0.5mg titrated upward until Respiratory Rate is ≥12
- Children (<20kg): 0.01mg/kg IV (Maximum 2mg/dose), increase till hypoventilation resolves

Patients with apnoea:

- Newborn with apnoea secondary to maternal opiod: 0.01mg/kg IV/IM (Maximum 0.4mg/kg/dose)
- Children: <20kg 0.1mg/kg (Maximum 2mg/dose) start then repeat doses with continuous infusion as required.
- Adults and children>20kg Higher dose of naloxone (0.2-1mg and titrate to clinical response

For life threatening Opioid toxicity

- Pediatrics (< 20kg) dosing: 0.1mg/kg/IV (Maximum 2mg/dose). Repeat dose/continuous infusion as required
- Adults and children (More than 20kg): 2mg IV.
    - The dose should be repeated every 3 min until improvement of Respiratory Distress Syndrome
    - If maximal cumulative dose of 10mg is reached and the respiratory insufficiency has not improvement, consider other pathology

**NOTE:** Withdrawal reaction might be life threatening in neonatal period, hence low doses should be given

## 25.4 HEAVY METAL POISONING

### 25.4.1 Lead Poisoning

Lead is a heavy metal, ubiquitous in our environment that has no physiologic role in biological systems. Lead toxicity is a particularly insidious hazard with the potential of causing irreversible health effects associated with chronic toxicity.

**Diagnostic Criteria:**
The clinical presentation varies widely, depending upon the age at exposure, the amount of exposure, and the duration of exposure

- New born: Be born prematurely, Have lower birth weight, slowed growth,
- Children: Developmental delay, Learning difficulties, Irritability, Loss of appetite, Weight loss, Sluggishness and fatigue, Abdominal pain, Vomiting, Constipation, Hearing loss, Seizures, Eating things, such as paint chips, that aren't food (pica), lower IQ , anxiety, depression and ADHD Like symptoms
- Adults: High blood pressure, joint and muscle pain, difficulties with memory or concentration, headache, abdominal pain, mood disorders, reduced sperm count and abnormal sperm, miscarriage, stillbirth or premature birth in pregnant women, anaemia, Fanconi's syndrome, wrist drop

**Investigations**

- Lead blood levels <10 µg/dL
- Free erythrocyte protoporphyrin (FEP) level
- FBC
- Imaging studies according to presentation,-chest, bones, abdomen etc are ordered as appropriate.

**Non-Pharmacological Treatment**

- Remove the source of lead exposure
- Closely monitor cardiovascular and mental status
- Maintain an adequate urine output.
- Assess renal and hepatic functions.

**Pharmacological Treatment**
Blood Lead levels are 25–40 µg/dL

**D:** Give D-penicillamine 30-40mg/kg/day PO 1-6months, 2hours before or three hours after meals

Blood Lead levels are 45–70 µg/dL Chelate the patient using

**D:** 2,3-Dimercapto-succinic acid (DMSA or succimer) 10mg/kg by deep IM, 8 hourly for 5 days, followed by 10mg/kg 12hourly for 14 days.

Blood Lead levels of <70 µg/dL and/or encephalopathy

**D:** Dimercaprol 3mg/kg deep IM 4 hourly for 48 hours followed by 3mg/kg 12 hourly for 10 days

**AND**

**D:** Ethylene diamine tetra-acetic acid (CaNa2 EDTA) IV 10mg/kg 8hourly for 5 days

## 25.4.2 Mercury Toxicity

Mercury in any form is poisonous. Poisoning can result from mercury vapour inhalation, mercury injection and absorption of mercury through the skin

**Diagnostic Criteria**

- Inorganic Mercury:
    - Ash-gray mucous membrane, haematochesia, severe abdominal pain, foul breath, hypovolaemic shock, Metallic taste, stomatitis, gingival irritation loosening of teeth and Renal tubular necrosis
- Organic Mercury:
    - Visual distaubances, - Eg, scotomata, visual field constriction, ataxia, paresthesias (early signs), hearing loss, dysarthria, mental deterioration, muscle tremor, movement disorders, paralysis and death (with severe exposure)

**Investigations:**

- Blood and Urine Mercury levels
- FBC
- RFT
- Hair, Toenail, and CSF mercury level for chronic exposure
- Plain X-ray of the abdomen

**Non-Pharmacological Treatment:**

- Remove from the exposure
- Airway Breathing and Circulation (ABC)
- Give oxygen
- Copious irrigation of the skin if skin involvement
- Do gastric lavage if ingested mercury and observed in the abdominal radiographs
- Do Hemodialysis when renal function has declined.

**Pharmacological Treatment:**

**A:** Activated Charcoal as in ingested poisons

**D:** 2,3-dimercapto succinic acid (DMSA or succimer) 10 mg/kg PO 8 hourly for 5 days; follow by 10 mg/kg/dose 12hr for 14 days; not to exceed 500 mg/dose

In acute inorganic mercury poisoning:

**D:** Dimercaprol:

- Day 1: 5mg/kg deep IM once for 1 day
- Day 2–11: 2.5mg deep IM 12 hourly for 10 days

**Surgical intervention:** To remove mercury that has been logged in the intestine or colon

## 25.5 PREVENTION OF POISONING

Educate the patient on Dos and Don'ts of poisoning prevention.

**Do's**

- Keep medicines and poison in proper containers and out of reach of children
- Use containers with child resistant caps
- Keep all products in their original container
- Read medicine labels carefully to avoid mistake

**Don'ts**

- Leave container open
- Transfer products from their origin
- Remove labels from the medicine products
- Put tablets into another containers such as purse or envelope
- Medicine/tablets as sweet
- Take your medicine in front of children as they often copy

## 25.6 ALCOHOL INTOXICATION

It is a physiological state that include psychological alteration of consciousness induced by ingestion of ethanol (alcohol), methanol.

**Diagnostic Criteria:**

- Nausea, vomiting, abdominal pain, euphoria, slurred speech, ataxia, altered level of consciousness, CNC depression, hypothermia, airway compromise, respiratory depression and hypotension and hypoglycaemia, hypokalaemia and metabolic acidosis and renal failure

**Investigations:**

- Blood glucose
- ECG
- Ethanol levels

**Non-Pharmacological Treatment:**

- Airway protection-intubation and ventilation
- Insert urinary catheter
- NGT for aspiration

**Pharmacological Treatment:**

**D:** Fomepizole

- Load 15 mg/kg IV infusion over 30 min;
- Then 10 mg/kg IV 12 hourly for 4 doses;
- Then increase to 15mg/kg 12 hourly until Ethylene glycol or Methanol levels are <20mg/dL

**A:** Give Ethanol

Adults: Loading dose 600 mg/kg IV (i.e, 7.6mL/kg of 10% ethanol (EtOH) solution) or 600–700mg/kg PO/NG using a 95% solution diluted to ≤ 20% with water or juice

- Maintenance dose: 155 mg/kg/hr depending on alcohol consumption status (lower for non-drinkers)
- Oral maintenance: 0.15 mL/kg/hr (IV = 1.4 mL/kg/hr) 10% EtOH
- Chronic alcoholics and hemodialysis patients need increased dose; increased maintenance dose of EtOH by 50%; non-alcohol users may need less.
- Maintain serum ethanol of 100-150mg/dL [21.7-32.55 mmol/L]

Children: Oral loading dose
- 95% EtOH: 0.8–1 mL/kg
- 40% EtOH (80 proof undiluted liquor): 2 mL/kg
- 43% EtOH (86 proof undiluted liquor): 1.8 mL/kg

Maintenance dose (orally)
- 43% EtOH: 0.1 mL/kg/hr
- 95% EtOH: 0.1 mL/kg/hr

IV dose (10% EtOH)
- 10% EtOH = 7.9 g/dL
- Loading: 8-10 mL/kg IV; not to exceed 200 mL
- Maintenance: 0.83 mL/kg/hr IV
- 10% EtOH = 7.9 g/dL
- 40% EtOH (80 proof undiluted liquor) = 31.6 g/dL
- 43% EtOH (86% proof undiluted liquor) = 34 g/dL
- 95% EtOH (absolute alcohol) = 75 g/dL
- Continue maintenance dose until methanol or ethylene glycol levels are below 10 mg/dL

**Note:**
- Asses for toxic co-ingestion, aspiration pneumonia, head injury,
- Children and adolescent with suicidal ideation-visit psychiatrist

## 25.7 BITES AND STINGS

The insect that is responsible for the majority of serious sting related reactions belong to the order hymenoptera. This include bees, wasps, spiders, scorpions, ants and centipedes.

**Diagnostic Criteria**
- Pain, swelling, redness, and itching to the affected area

**Non-Pharmacological Treatment**
- Clean the area with soap and water to remove contaminated particles left behind by some insects
- Refrain from scratching because this may cause the skin to break down and results to an infection

**Pharmacological Treatment**

**A:** Ibuprofen
Adults: 400–800mg (PO) 8 hourly for 3 days
Children: 10mg/kg 8hourly maximum 400mg per day for three days

**B:** Prednisolone, 2 mg/kg/day (PO) in single daily not to exceed 80 mg/day for 5 days
Where there is an anaphylactic reaction treat according to guideline.
**C:** Diphenhydramine
Adults: 50 mg (PO) 6 hourly not exceeding 300mg/day for 5days. In severe reaction 50mg IV 6 hourly not exceed 400mg/day for 5 days

Children: 2–6 years: 6.25mg (PO) 6 hourly; not to exceed 37.5 mg/day for 5 days

6-12 years: 25mg (PO) 6hr; not to exceed 150 mg/day for 5 days

>12 years: 25–50mg (PO) 6 hourly ; not to exceed 300 mg/day for 5 days

**D:** Cimetidine/Ranitidine
Adults :5–10 mg/kg IV 6hourly for 5days
Neonates: (<28 days old): 1–5 mg/kg IV 8 hourly for 5days
Infants: 2–5 mg/kg IV 6 hourly for 5 days

## 25.7.1 Management of Specific Bites/Stings

### 25.7.1.1 Bee and Wasps Sting

Bee Venom contains many toxins including: Haemolytic enzyme, a neurotoxic factor, histamine and lytic peptide. Wasp Venom contains Hyaluronidase and 5-hydroxytryptamine.

**Diagnostic Criteria:**

- Locally: Itching, pain, erythema, and swelling, cellulites
- Systemic: Oedema, fatigue, nausea, vomiting, fever, unconsciousness, Anaphylaxis, diarrhea or stool incontinence, dizziness, hypotension, haemolysis, rhabdomyosid, haemoglobinuria and myoglobinuria

**Non-Pharmacological Treatment:**

- Airway and breathing
- Remove stingers by forceps or scrap with care
- Elevation of the affected limb
- Clean wound

**Pharmacological treatment**

**A:** Adrenaline IV 0.5mg (0.1Ml) of 1;1000 solution diluted in 10ml of 0.9% sodium chloride slowly over 2min23 Give Ranitidine IV
**A**: IV 0.9% sodium chloride 10–20mls/kg as a bolus
**A**: Paracetamol 1g for adult or 15mg/kg for children 8hourly for 48hours
**D:**IV Methylprednisolone 125mg stat in patient with respiratory and cardiovascular compromised

**Note**:

- Patient with multiple stings: observe for 24 hours
- Healthy adults >50stings,
- Children 1 sting

### 25.7.1.2 Scorpion Sting (Envenoming)

Scorpion stings can be very painful for days. Systemic effects of venom are much more common in children than adults.

**Diagnostic Criteria**

- Local pain and/or paresthesia at the site of envenomation,
- Pain and/or paresthesia remote from the site of sting,
- Blurred vision, roving eye movement, hypersalivation, tongue fasculation, dysphagia, dysphonia, restless,
- Severe involuntary shaking or jerking extremities

**Non-Pharmacological Treatment**

- Provide adequate airway, ventilation and perfusion
- Calm the patient to lower the heart rate and blood pressure, thus limiting the spread of the venom
- Give oxygen
- Monitor vitals: oxygen saturation, heart rate respiratory rate and blood pressure

**Pharmacological Treatment**

**S:** Centruroides scorpion immune F(ab)2 injection
Initial dose: infuse 1vial of the 3vials over 10minutes, observe for 60minutes
If symptoms persist you may repeat the remaining 2 vials, one vial at a 30 minutes interval.

**A:** Paracetamol (PO) or IV
**OR**
**C:** Morphine (PO) or IM according to severity

If very severe, infiltrate site with
**A:** 1% lignocaine.

**25.7.1.3 Snake Bite**

Less than 10% of 3500 snake species are poisonous and they include cobras and mambas (Elapidac), sea snakes (hydrophidac) and the boom slang and vine snakes (columbidac). Clinical ccondition depends on the type of snake bite and amount of poison (venom) injected. Hence envenomation (poisoning) will be:

- Neurotoxin in cobra, mambas and sea snakes
- Haemotoxic in vipers and boom slang.

Snake bites should be considered in any severe pain or swelling of a limb or in any unexplained illness presenting with bleeding or abnormal neurological signs. Some cobras spit venom into the eyes of victims causing pain and inflammation.

**Diagnostic Criteria:**

- General signs include shock, vomiting and headache
- Bite for local necrosis, bleeding or tender local lymph node enlargement
- Specific signs depend on the venom and its effects. These include:
    - Shock
    - Local swelling that may gradually extend up the bitten limb
    - Bleeding: external from gums, wounds or sores; internal especially intracranial

- Signs of neurotoxicity: respiratory arrest or paralysis, ptosis, bulbar palsy (difficulty swallowing and talking), limb weakness
- Signs of muscle breakdown: muscle pains and black urine

**Investigations:**

- Haemoglobin
- Bleeding indices

**Non-Pharmacological Treatment:**

- Reassure the patient;
- Splint the limb to reduce movement and absorption of venom.
- If the bite was likely to have come from a snake with neurotoxin venom,
  - Clean the site with clean water to remove any poison and remove any fangs;
- If any of the above signs, transport to hospital which has antivenom as soon as possible.
- Paralysis of respiratory muscles can last for days and requires intubation and mechanical ventilation or manual ventilation (with a mask or endotracheal tube and bag) by relays of staff and/or relatives until respiratory function returns.
- Do endotracheal intubation +/- elective tracheotomy.
- Elevate limb if swollen
- Give
  **A:** Anti-Tetanus prophylaxis
- Monitor very closely immediately after admission, then hourly for at least 24 hours as envenoming can develop rapidly.

**Pharmacological Treatment:**

- Treat shock, if present.
- **A:** 0 .9% sodium chloride 10–20mls/kg bolus, repeat after 30min if still in shock
- Give fluids orally or by NG tube according to daily requirements. Keep a close record of fluid intake and output fluid daily requirements to be inserted
- If there are systemic signs or severe local signs (swelling of more than half of the limb or severe necrosis), give
  **A:** Antivenom (polyvalent). Follow the directions given on the antivenom preparation.
  - Dilute antivenom in 2–3 volumes of 0.9% saline and give intravenously over 1 hour
  - Give more slowly initially and monitor closely for anaphylaxis or other serious adverse reactions.

  **A:** Epinephrine (adrenalin), IM dose of 1:1000 (Repeat after 5 min if no improvement)
  - Children > 12 years and Adults 500 µg (0.5ml)
  - Children 6-12 years 300 µg (0.3ml)
  - Children < 6 years 150 µg IM (0.15ml)

  **AND**

  **B:** IV Chlorpheniramine and be ready if allergic reaction occurs. Dosage as below

- Children under 6 years: 4mg 8hourly needed
- 6–12 years: 8mg (PO) 12 hours as needed
- >12 years and older 12mg 12hourly needed

**NOTE**

- If itching/urticarial rash, restlessness, fever, cough or difficult breathing develop, then stop antivenom and give Epinephrine 0.01 ml/kg of 1/1000 or 0.1 ml/kg of 1/10,000 solution subcutaneously and IM or IV/SC Chlorpheniramine 250 micrograms/kg.
- When the patient is stable, re-start antivenom infusion slowly.
- More antivenom should be given after 6 hours if there is recurrence of blood in-coagulability or after 1–2 hr if the patient is continuing to bleed briskly or has deteriorating neurotoxin or cardiovascular signs.
- Blood transfusion should not be required if antivenom is given.
- Response of abnormal neurological signs to antivenom is more variable and depends on type of venom.

**Surgical Intervention**

- Excision of dead tissue from wound
- Incision of facial membranes to relieve pressure in limb compartments, if necessary
- Skin grafting, if extensive necrosis
- Tracheotomy if paralysis of muscles involved in swallowing occurs

# NATIONAL ESSENTIAL MEDICINES LIST (NEMLIT) FOR TANZANIA MAINLAND

**5TH LIST**
**DECEMBER, 2017**

**LEVELS OF MEDICINES USE**

**A** Medicines used at Dispensaries level
**B** Medicines used at Health centers level
**C** Medicines used at Council Hospital level
**D** Medicines used at Regional Referral Hospitals
**S** Medicines used at Zonal Referral, National and Special Hospitals

| Name of drug | Dosage forms and Strengths | Level |
|---|---|---|
| **1.0 Anasthetics, Preoperative Medicines And Medical Gases** | | |
| **1.1 General Anaesthetics and Oxygen** | | |
| **1.1.1 Inhalational medicines** | | |
| Halothane | Liquid for inhalation, bottle 250ml | **B** |
| Isoflurane | Liquid for inhalation, 250ML | **D** |
| Nitrous oxide | Cylinder (F gas) for inhalation | **C** |
| Oxygen | Cylinder (medical gas) for inhalation | **B** |
| Sevoflurane | Inhalational | **S** |
| **1.1.2 Injectable medicines and other pre-medication** | | |
| Etomidate | Powder for injection 20mg/ml | **S** |
| Ketamine | Injection (hydrochloride), 10mg/ml in 20ml | **B** |
| Midazolam | Injection 1mg/ml, 5mg/ml | **D** |
| Propofol | Injection 10mg/ml, 20mg/ml | **D** |
| Thiopental | Powder for injection (sodium salt), in 20ml | **C** |
| Atropine | Injection 1mg (as sulphate in 1ml ampoule) | **A** |
| Glycopyrrolate | Injection 200mcg/ml in 1ml, 600mcg in 3ml | **S** |
| Ondansetron | Injection 2mg/ml | **D** |
| Sodium citrate | Solution 0.3 moles | **D** |
| Fusidine | Injection 25mg/ml | **D** |
| Lipid emulsion | Solution 20% | **S** |
| Ephedrine injection | Injection 30mg/ml | **B** |
| Phenylephrine | Injection 10mg/ml | **S** |
| Metaraminol | Injection 1mg/ml | **S** |

| | | |
|---|---|---|
| Noradrenaline | Injection 2mg/ml | **S** |
| Labetalol | Injection 10mg/ml | **S** |
| Dexmedetomidine | Inj 100mcg/ml | **S** |
| Clonidine | Injection 500mcg/ml | **S** |
| Calcium chloride | Injection 10mcg/ml | **D** |
| **1.2 Local Anaesthetics** | | |
| Bupivacaine | Injection 0.5% (hydrochloride) in 7.5% dextrose spinal | **C** |
| Levobupivacaine | Injection 2.5mg/ml, 5mg/ml, 7.5mg/ml | **D** |
| Lignocaine | Injection hydrochloride 1% & 2%; | **A** |
| Lignocaine | Jelly 2% & 5%; Spray 10% | **B** |
| Lignocaine in Dextrose | Injection (hydrochloride), 5% in 7.5% dextrose | **B** |
| Lignocaine + epinephrine (adrenaline) | Injection (hydrochloride) 2% with adrenaline 1:100,000 in 2ml ampoule for dental use | **A** |
| **1.3 Muscle Relaxants and Cholinesterase Inhibitors** | | |
| Neostigmine | Injection (hydrochloride or hydrogen tartarate),1mg/ml in 1ml ampoule, Injection (hydrochloride or hydrogen tartarate), 2.5mg/ml in 1ml ampoule | **C** |
| Pancuronium | Injection (bromide) 4mg/ml in 2ml ampoule | **C** |
| Suxamethonium | Powder for injection (bromide or chloride) 50mg/ml in 2ml vial | **B** |
| Rocuronium | Injection 50mg/5ml | **S** |
| Atracurium | Injection 50mg/5ml | **S** |
| | | |
| **2.0 Medicines for Pain and Palliative Care** | | |
| **2.1 Non-opioids and Non-steroidal anti-inflammatory medicines (NSAIMs)** | | |
| Acetylsalicylic acid | Tablets 300mg | **A** |
| Diclofenac | Injection 25mg/ml;<br>Tablets (sodium/potassium salt) 50mg, 100mg;<br>Recto caps 100mg (slow release);<br>Jelly. | **C** |

| | | |
|---|---|---|
| Ibuprofen | Tablets 200mg | **A** |
| Paracetamol | Tablets 500mg, Syrup 125mg/5ml, suppository | **A** |
| Paracetamol | IV 1g/100ml | **B** |
| Meloxicam | Tablets 7.5mg, 15mg | **C** |
| Piroxicam | Tablet 10, 20mg | **C** |
| **2.2 Opioid Analgesics** | | |
| Morphine | Tablets 10mg (morphine hydrochloride or morphine sulfate);<br>Granules (slow-release: to mix with water) 20mg-200mg (morphine sulfate);<br>**Or**al liquid: (10mg morphine hydrochloride or morphine sulfate)/5ml;<br>Injection: 10mg (morphine hydrochloride or morphine sulfate) in 1ml ampoule | **C** |
| Naloxone | Injection (hydrochloride) 0.4mg/ml in 1ml ampoule | **C** |
| Fentanyl | Injection 100mcg/2ml | **S** |
| Pethidine | Injection (hydrochloride) 50mg/ml in 1ml and 2ml ampoule | **C** |
| Methadone | Tablets: 5mg; 10mg (as hydrochloride); Oral liquid: 5mg/5ml; 10mg/5ml (as hydrochloride); Concentrate for oral liquid: 5mg/ml; 10mg/ml (as hydrochloride) | **C** |
| Tramadol | Tablets 50mg; Injection 50mg/ml in 2ml | **B** |
| | | |
| **2.3 Medicines for Other common symptoms in Palliative Care** | | |
| Amitriptyline | Tablets 25mg | **A** |
| Haloperidol | Injection: 5mg/1ml ampoule; Tablets 5mg | **B** |
| Hydrocortisone | Powder for injection (as sodium succinate) 100mg in vial | **A** |
| Hyoscine butyl bromide | Tablets 10mg | **A** |
| Hyoscine butyl bromide | Injection: 20mg/ml | **C** |

| | | |
|---|---|---|
| Loperamide | Tablets 2mg | **C** |
| Metoclopramide | Injection: 5mg/2ml ampoule (as hydrochloride) | **B** |
| Imipramine | Tablet 25mg | **A** |
| **3.0 Anti-allergies and Medicines Used in Anaphylaxis** | | |
| Cetirizine | Oral solution 5mg/5ml; Tablets (hydrochloride) 10mg | **A** |
| Chlorpheniramine | Injection (maleate 10mg/ml in 1ml ampoule); Elixir (maleate) 2mg/5ml; Tablets (maleate) 4mg | **A** |
| Dexamethasone | Injection: 4mg/ml in 1ml ampoule (as disodium phosphate salt); Tablets: 2mg; 4mg | **B** |
| Epinephrine (Adrenaline) | Injection: 1mg (as hydrochloride or hydrogen tartrate) in 1ml ampoule | **A** |
| Loratadine | Syrup 5mg/5ml; Tablet 10mg | **C** |
| Promethazine | Injection (hydrochloride) 25mg/ml in 2ml; Syrup 5mg/5ml; Tablets (hydrochloride) 25mg | **A** |
| **4.0 Antidotes and Other Substances Used in Poisonings** | | |
| **4.1 Antidotes (Non-specific)** | | |
| Charcoal, activated | Tablets or Powder, 50g | **A** |
| Magnesium sulphate | Powder salt, 5g | **C** |
| | | |
| **4.2 Antidotes (Specific)** | | |
| Acetylcysteine | Injection: 200mg/ml in 10ml ampoules | **C** |
| Atropine | Injection 1mg (as sulphate in 1ml ampoule) | **A** |
| Calcium gluconate | Injection 100mg/ml in 10ml | **C** |
| Deferoxamine | Powder for inj 500mg(mesylate )in vial | **D** |
| Fomepizole | Injection 5mg/ml in 20ml | |
| Naloxone | Injection: 400 microgram (hydrochloride) in 1 ampoule | **C** |
| Flumazenil | Injection:100mcg/ml in 5ml | **D** |
| Sodium bicarbonate | Injection | **C** |
| Sugammadex | Injection 100mg/ml | **S** |

| | | |
|---|---|---|
| Obidoxime | 250mg/ml amps | **S** |
| Pralidoxime | Injection 600mg | **S** |
| Methionine | Tablets/ Capsules 500mg | **S** |
| 2,3-Dimercapto-succinic acid (or Succimer) | Capsules 100mg | **D** |
| D-penicillamine | Tablets 250mg | **D** |
| Dimercaprol | Injectable 50mg/ml in 2ml ampule | **D** |
| Ethylenediaminetetra-acetic acid (EDTA) | Injection 200mg/ml in 5ml | **D** |
| | | |
| **5.0 Anticonvulsants and Antiepileptics** | | |
| Carbamazepine | Syrup 100mg/5ml; Tablets 100mg, 200mg | **A** |
| Diazepam | Tablets 5mg | **C** |
| Diazepam | Injection 5mg/ml in 2ml ampoule | **A** |
| Gabapentin | Capsules 100mg, 300mg | **D** |
| Pregabalin | Tablets/Capsules 75mg | **D** |
| Lorazepam | Injection: 2mg/ml in 1ml ampoule; 4mg/ml in 1ml ampoule, Tablets 1mg/2mg | **C** |
| Magnesium sulphate | Injection 50mg/ml in 10ml vial | **A** |
| Phenobarbital | Injection (as sodium salt), 100mg in 2ml ampoule; | **B** |
| Phenobarbital | Tablets (as sodium) 30mg, 100mg | **A** |
| Phenytoin | Suspension (as sodium salt) 30mg/5ml; Tablets/Capsules (as sodium salt) 50mg, 100mg | **C** |
| **6.0 Anti-Infective Medicines** | | |
| **6.1 Antihelminthics** | | |
| **6.1.1. Intestinal anthelminthics** | | |
| Albendazole | Suspension 100mg/5ml in 30ml bottle; Tablets 200mg, 400mg, chewable | **A** |
| Mebendazole | Suspension 100mg/5ml in 30ml bottle; Tablets 100mg, chewable | **A** |
| **6.1.2 Antifilariasis** | | |
| Ivermectin | Tablets 3mg, 6mg | **A** |

| | | |
|---|---|---|
| **6.1.3 Anti-schistosomiasis and other anti-trematode medicines** | | |
| Praziquantel | Tablets 600mg | **A** |
| Thiabendazole | Tablets 500mg, chewable | **A** |
| Albendazole | Tablets 200mg, 400mg chewable | **A** |
| **6.2 Antibacterial** | | |
| **6.2.1 Beta-lactam Medicines** | | |
| Ampicillin | Powder for injection (as sodium salt) 250mg, 500mg in vial | **A** |
| Amoxicillin | Capsules (as trihydrate) 250mg; Dispersible Tablet 250mg, 125mg | **A** |
| Amoxicillin + Clavulanic acid | Powder for suspension (as trihydrate) 125mg+ 31.25mg (as potassium salt) in 5ml AND 250mg amoxicillin + 62.5mg clavulanic acid/5ml; Tablets (as trihydrate) 500mg + 125mg clavulanic acid (as potassium salt) | **B** |
| Benzathine benzyl penicillin | Powder for injection 1.44g (2,400,000 IU) in vial | **A** |
| Benzyl Penicillin | Powder for injection (as sodium or potassium salt) 3g ( 5,000,000 IU) in vial | **A** |
| Cephalexin | Capsules 250mg (as monohydrate); Powder for reconstitution 125/5mi; 250mg/ml | **C** |
| Ceftazidime | Powder for injection (as pentahydrate) 250mg in vial | **D** |
| Cefixime | Capsules 200mg/ 400mg | **D** |
| Cefipime | Injection 1000mg | **S** |
| Cefotaxime | Powder for Injection 500mg in vial | **D** |
| Ceftriaxone | Injection 250mg, 500mg, 1g in vial | **A** |
| Ceftriaxone+salbactam | Injection 1.5 mg vial | **D** |
| Cefaclor | Injection 250mg | **D** |
| Penicillin, phenoxy methyl- | Powder for suspension 125mg/5ml; (as potassium salt), 250mg | **A** |
| | | |

| 6.2.2 Other Antibacterial Medicines | | |
|---|---|---|
| Amikacin | Injection 250mg/ml (as sulfate) | **D** |
| Ampicilin with cloxacillin | Capsule 250/250mg | **B** |
| Azithromycin | Capsules/Tablets (as dihydrate) 250mg, 500mg;<br>Oral liquid 200mg/5ml | **A** |
| Clarithromycin | Tablets 250mg, 500mg | **D** |
| Chloramphenicol | Oily injection 0.5g (as sodium succinate)/ml in 2ml ampoule; Powder for injection (as sodium succinate) 1g, 125mg/5ml injection (as phosphate), 150mg/ml in 2ml ampule | **B** |
| Ciprofloxacin | Tablets (as hydrochloride) 250mg, 500mg | **A** |
| Ciprofloxacin | Solution for IV infusion 2mg/ml in 100ml | **C** |
| Clindamycin | Capsules 150mg (as hydrochloride);<br>Injection (as phosphate) 150mg/ml in 2ml ampule | **S** |
| Cloxacillin | Powder for injection (as sodium salt) 250mg, 500mg in vial | **B** |
| Doxycycline | Capsules (as hydrochloride), 100mg | **A** |
| Erythromycin | Powder for suspension (as ethylsuccinate), 125mg/5ml in 100ml bottle; Tablets (as stearate or ethyl succinate), 250mg, film coated | **A** |
| Flucloxacillin | Injection (sodium) 250mg; Syrup 125mg/5ml | **B** |
| Flucloxacillin 250mg | Tablets (or as combination with amoxicillin) | **C** |
| Gentamycin | Injection (as sulphate) 40mg/ml in 2ml ampoule, 20mg/ml in 2 ml ampoule | **A** |
| Metronidazole | Injection (I.V) 5mg/ml in 100ml bottle; | **B** |
| Metronidazole | Suspension as (benzoate) 200mg/5ml in 100ml;<br>Tablets 200mg | **A** |
| Meropenem | Injection 500mg, 1000mg | **S** |
| Nalidixic acid | Tablets 500mg | B |

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| Sulfamethoxazole + trimethoprim | Suspension (Sulphamethoxazole 200 mg/5ml + trimethoprim 40mg/5ml in 100ml bottle; Tablets 480mg (Sulphamethoxazole 400mg/trimethoprim 80mg) | **A** |
| Vancomycin | Capsules: 125mg; 250mg (as hydrochloride) | **D** |
| **6.2.3 Antileprosy Medicines** | | |
| Clofazimine | Capsule: 50mg; 100mg | **A** |
| Dapsone | Dapsone Tablets 50mg, 100mg | **A** |
| Rifampicin | Tablets 25mg; 50mg; 100mg | **A** |
| **6.2.4 Antituberculosis Medicines** | | |
| Ethambutol | Tablets (as hydrochloride) 400mg | **A** |
| Ethambutol+Isoniazide | Tablets 400mg + 100mg | **A** |
| Ethionamide | Tablets 125mg, 250mg | **S** |
| Isoniazid | Tablets 100mg | **A** |
| Pyrazinamide | Tablets 500mg | **A** |
| Rifampicin+Isoniazid | Capsules/Tablets 150mg+75mg, 150mg+150mg | **A** |
| Rifampicin+Isoniazid+Pyrazinamide+Ethambutol | Tablets 150mg + 75mg + 400mg + 275mg | **A** |
| **6.2.5 Reserved second-line for treatment of Multidrug Resistance Tuberculosis (MDR-TB)** | | |
| Cycloserine | Tablets 250mg | **S** |
| Bedaquiline | Tablets 100mg | **S** |
| Capromycine | Powder for injection 1g (as sulfate) in a vial | **S** |
| Delamanide | Tablets 50mg | **S** |
| Kanamycin | Powder for injection: 1g (as sulfate) in vial | **S** |
| Levofloxacin | Tablets 250mg | **S** |
| Linezolid | Injection for intravenous administration: 2mg/ml in 300ml bag; Tablets 400mg; 600mg | **S** |
| Moxifloxacin | Tablets 400mg | **S** |
| p-Amino salicylic acid (PAS) | Granules 4g in a sachet; Tablets | **S** |

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| | 500mg | |
| Streptomycin | Powder for injection 1g (as sulfate) in vial | **A** |
| **6.3 Antifungal Medicines** | | |
| Amphotericin B | Amphotericin B Powder for injection 50mg in vial | **D** |
| Flucytocine | IV 2.5g/ml 250ml | **D** |
| Clotrimazole | Clotrimazole Vaginal cream (nitrate) 1%, 10%; Clotrimazole Pessaries 100mg; 500mg | **A** |
| Fluconazole | IV infusion 2mg/ml in vial; | **C** |
| Fluconazole | Tablets/Capsules 150mg, 200mg | **A** |
| Griseofulvin | Tablets 500mg | **A** |
| Itraconazole | Capsules 100mg | **C** |
| Miconazole | Miconazole Oral gel 2% | **C** |
| Nystatin | Suspension oral 100,000 IU/ml | **A** |
| Terbinafine | Cream 1%, Tablets 250mg | **C** |
| **6.4 Antiviral Medicines** | | |
| **6.4.1 Antiherpes Medicines** | | |
| Acyclovir | Cream 5%; Tablets 200mg, 400mg, IV | **B** |
| **6.4.2 Antiretrovirals (ARVs)** | | |
| **6.4.2.1 Nucleoside/Nucleotide reverse transcriptase inhibitors** | | |
| Abacavir (ABC) | Tablet: 300mg (as sulphate) | **A** |
| Lamivudine (3TC) | Oral Liquid 50mg/ml; Tablets: 150mg | **A** |
| Tenofovir disoproxil fumarate (TDF) | Tablet: 300mg | **A** |
| Zidovuine (AZT) | Capsules 250mg; Oral liquid 50mg/5ml | **A** |
| **6.4.2.2 Non-nucleoside transcriptase inhibitors** | | |
| Efavirenz (EFV) | Tablet: 200mg; 600mg | **A** |
| Nevirapine (NVP) | Oral liquid: 50mg/5ml; Tablets 50mg (dispersible); 200mg | **A** |
| **6.4.2.3 Protease inhibitors** | | |
| Atazanavir | Tablets 100mg; 300mg (as sulfate) | **C** |
| Atazanavir + Ritonavir | Tablets: 300mg (as sulfate) + | **C** |

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| | 100mg | |
| Lopinavir + Ritonavir (LPV/r) | Capsules 40mg + 10mg; Oral liquid 400mg + 100mg/5ml; Tablets 100mg + 25mg; 200mg + 50mg | **C** |
| Ritonavir | Oral liquid 400mg/5ml; Tablets 25mg; 100mg | **C** |
| Darunavir | Tablets 75mg, 400mg, 600mg, 800mg | **S** |
| **6.4.2.4 Integrase Inhibitors** | | |
| Raltegravir | Tablet 25mg, 100mg, 400mg | **S** |
| **6.4.2.5 Fixed Dose Combinations** | | |
| Abacavir/Lamivudine | Dispersible tablets 60/30mg; Dispersible tablets; 120/60mg Tablets 600/300mg Scored | **A** |
| Tenofovir /Emtricitabine | Tablets 300/200mg | **A** |
| Tenofovir/Emtricitabine/Efavirenz | Tablets 300/200/600mg | **A** |
| Tenofovir/Lamivudine/Efavirenz | Tablets 300/300/600mg | **A** |
| Tenofovir/Lamivudine/Dolutegravir | Dispersible Tablets 60/30mg; Tablets 300/300/50mg | **A** |
| Zidovudine/Lamivudine | Tablets 300/150mg | **A** |
| Zidovudine/Lamivudine/Nevirapine | Tablets 300/150/200mg | **A** |
| **6.4.2.6 Medicines for prevention of Opportunistic Infections** | | |
| Isoniazide | Tablet 300mg | **A** |
| Pyridoxine | Tablet 25mg | **A** |
| Sulphamethoxazole + trimetoprim | Tablet 400mg + 80mg | **A** |
| **6.4.3 Antihepatitis Medicines** | | |
| **6.4.3.1 Medicines for Hepatitis-B** | | |
| Tenofovir disoproxil fumarate (TDF) | Tablet: 300mg | **A** |
| Entecavir | Tablets 0.5mg | **S** |
| **6.4.3.2 Medicines for Hepatitis-C** | | |
| Sufosbuvir | Tablet 400mg | **S** |
| Ledpasvir | Tablets 90mg | **S** |
| Ribavirin | Tablets 600mg | **S** |
| **6.5 Antiprotozoal Medicines** | | |
| **6.5.1 Antiamoebic and antigiardiasis Medicines** | | |

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| Metronidazole | Suspension 200mg/5ml in 100ml; Tablets 200mg | **A** |
| Tinidazole | Tablets 500mg | **B** |
| Secnidazole | Tablets 1000mg | **C** |
| **6.5.2 Anti-malarial Medicines** | | |
| Artemether/Lumefantrine | Tablets 20mg/120mg | **A** |
| Artemether | Injection 80mg/ml ampoules | **A** |
| Artesunate | Injection: ampoule, containing 60mg anhydrous artesunic acid with separate ampoule of 5% sodium bicarbonate solution | **A** |
| Dihydroartemisinin+Piperaquine (DPQ) | Tablets 40mg+320mg, 20mg+160mg | **B** |
| Quinine | Tablets (as sulfate or bisulfate) 300mg;<br>Injection (as dihydrochloride) 300mg/ml in 2ml ampoule | **A** |
| **6.5.3 Malaria Prophylaxis** | | |
| Sulfadoxine + Pyrimethamine | Tablets 500mg + 25mg | **A** |
| **7.0 Antimigraine Medicines** | | |
| **7.1 Medicines for Treatment of Acute Attack** | | |
| Acetylsalicylic acid | Tablets 300mg | **A** |
| Ibuprofen | Tablets 200mg; 400mg | **A** |
| Ergotamine tartarate | Tablet 1mg,2mg | **C** |
| | | |
| **7.2 Medicines for Prophylaxis** | | |
| Propranolol | Tablets 40mg (as hydrochloride) | **A** |
| **8.0 Antineoplastics and Immunosuppressives** | | |
| **8.1 Cytotoxic and Adjuvant Medicines** | | |
| Allopurinol 100mg; 300mg | Tablets | **B** |
| Cyclosporin | Injection: 50 mg/ml in 1-ml ampoule;<br>Capsule: 25 mg; 50mg | **S** |
| Antithymocite globulin (ATG) | Injection 25mg/ml in 5ml | **S** |
| Danazol | Capsule 100mg | **S** |
| Methotrexate | Tablets 2.5mg; Injection 200 mg/ml | **S** |
| Cisplatin | Powder for injection 50 mg in vial. | **S** |

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| Actinomycin D | Powder for injection: 500 micrograms in vial | **S** |
| Etoposide | Capsule: 100 mg;<br>Injection 100 mg/ml; Injection 50mg/5ml | **S** |
| Paclitaxel | Injection 6mg/mL in 5-mL ampoule | **S** |
| 5-fluorouracil | Injection: 50 mg/ml in 5-ml ampoule; 750mg/ml | **S** |
| Adriamycin | Concentrate for infusion 2mg/ml, powder for reconstitution 50mg vial | **S** |
| Vincristine | Powder for injection: 1 mg; 5 mg (sulfate) in vial. | **S** |
| Bleomycin | Powder for injection: 15 mg (as sulfate) in vial | **S** |
| Oxaliplatin | Powder for injection 50mg in vial; 85 mg/ml | **S** |
| Dacarbazine | Powder for injection: 100 mg in vial; 250mg/ml | **S** |
| Capecitabine | Tablets 500mg | **S** |
| Folinic acid | Tablets 15mg, injection 6mg | **S** |
| Tamoxifen | Tablets 20mg | **D** |
| Docetaxel | Concentrate for infusion 40mg/ml; injection 75mg/ml | **S** |
| Imatinib | Tablet 400mg | **S** |
| Zolendronic acid | Injection 4mg | **S** |
| Ibandronate | Tablet 20mg, 50mg | **S** |
| Pamidronate | Tablets 150mg | **S** |
| Rituximab | Injection 375 mg/m2 | **S** |
| Filgrastim | Injection 5mcg/kg | **S** |
| Bicalutamide | Tablet 50mg | **S** |
| Melphalan | Tablets 2mg | **S** |
| Chlorambucil | Tablets 2mg | **S** |
| Carboplatin | Injection 450mg | **S** |
| Finasteride | Tablets 5mg | **S** |
| Goserelin | Injection 3.6mg, 10.8mg | **S** |
| Bicalutamide | Tablets 150mg, 50mg | **S** |
| Irinotecan | Injection 180mg/ml | **S** |

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| Gemcitabine | Injection 1000mg/ml | **S** |
| Trastuzumab | Injection 4mg/kg | **S** |
| Anastrazole | Tablets 1mg | **S** |
| Temozolomide | Injection 200mg/m | **S** |
| Leucovorin | Injection 200 mg/ml | **S** |
| Vinblastine | Injection 3mg/ml | **S** |
| Dutasteride | Capsules 0.5mg | **S** |
| Tamsulosin | Tablets 0.4mg (move to urology) | **D** |
| Alfuzosine | Tablets 10mg | **S** |
| Hydroxyurea | Capsules 500mg | **S** |
| **8.2 Hormones, Antidiabetic agents And Related Medicines** | | |
| **8.2.1 Insulin and Anti-diabetic Agents** | | |
| Glibenclalmide | Tablets 5mg | **A** |
| Gliclazide | Tablets 40mg | **A** |
| Glimepiridine | Tablets 1mg, 2mg | **A** |
| Glipizide | Tablets 2.5mg, 5mg | **A** |
| Glucagon | Powder for reconstitution 10mg/vial | **C** |
| Insulin-short acting | Insulin-short acting (human) soluble100 IU/ml100 | **A** |
| Insulin-intermediate acting | Insulin-intermediate acting (human) 100 IU/ml | **A** |
| Metformin | Tablets 500mg | **A** |
| Pre-mixed Insulin | Intermediate and short acting insulin (70/30) | **A** |
| **8.2.2 Oestrogens** | | |
| Ethinyloestradiol | Tablets 50mcg | **A** |
| **8.2.3 Ovulation Inducers** | | |
| Clomiphene | Tablets 50mg | **C** |
| **8.2.4 Oral Contraceptives** | | |
| Ethinyloestradiol + Norgestrel | Ethinyloestradiol + Norgestrel Tablets 0.03mg + 0.3mg | **A** |
| Ethinyloestradiol Levonorgestrel | Ethinyloestradiol Levonorgestrel Tablets 0.03mg + 0.15mg | **A** |
| Ethinyloestradiol Desogestrel | Ethinyloestradiol Desogestrel Tablets 0.03mg + 0.15mg | **A** |

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| **8.2.5 Barrier and Other Contraceptives** | | |
| Condoms male | Condoms male Latex | **A** |
| Condoms female | Condoms female Polyurathane sheet 15cm x 7cm | **A** |
| **8.2.6 Progesterone** | | |
| Levonorgestrel Tablets | Levonorgestrel Tablets 0.03mg, 0.07mg, 0.75mg | **A** |
| Medroxyprogesterone | Medroxyprogesterone Injection acetate (depot) 150mg | **A** |
| Levonorgesterol | Levonorgesterol Implant 75mg | **A** |
| Etonorgestrel | Etonorgestrel implant 68mg | **A** |
| **8.2.7 Thyroid, Parathyroid hormones and Antagonists** | | |
| Carbimazole | Carbimazole Tablets 5mg | **C** |
| Iodine (Lugol's solution) Solution | Iodine (Lugol's solution) Solution, Iodine 2mg + Potassium Iodide 4mg/g in water (prepare from raw material) | **B** |
| Levothyroxine | Levothyroxine Tablets (sodium salt) 0.05g | **D** |
| Iodized oil Capsules | Iodized oil Capsules with nipple 240mg/0.5ml and 480mg iodine/ml | **A** |
| Injection iodized oil | Injection | **C** |
| Propylthiouracil | Tablets 50mg | **D** |
| Radioactive Iodine | Iodine$^{131}$ | **S** |
| **9.0 Antiparkinsonism Medicines** | | |
| Benzhexol | Benzhexol Tablets (hydrochloride) 5mg | **C** |
| Biperidine | Tablets 2mg, Injection 5mg/ml | **S** |
| Bromocriptine | Tablets 2.5mg (should be moved to proper class) | **C** |
| Levodopa/Carbidopa | Tablets 100mg + 25mg | **D** |
| **10. Medicines Affecting The Blood** | | |
| **10.1 Antianaemia Medicines** | | |
| Ferrous sulphate/fumerate | Ferrous sulphate 200mg (or as fumerate) | **A** |
| Ferrous salts | Oral liquid: Equivalent to 25mg iron (as sulfate)/ml;<br>Tablet: Equivalent to 60mg iron | **A** |
| Folic acid | Folic acid Tablets 5mg | **A** |

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| Hydroxocobalamin (Vitamin $B_{12}$) | Hydroxocobalamin (Vit $B_{12}$) Injection 1mg/ml | **C** |
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| **10.2 Medicines Affecting Coagulation** | | |
| Heparin Sodium | Injection (sodium salt) 1,000 IU/ml in 5ml ampoule | **D** |
| Phytomenadione (Vit.$K_1$) | Injection 0.5 mg/ml, 2mg/ml in 2ml ampoule; Tablets 10mg | **A** |
| Enoxaparin Sodium | Injection (sodium salt) 100mg/ml | **D** |
| Dalteparin | Injection 2,500IU, 5,000IU, 10,000IU | **D** |
| Protamine sulfate | Injection 10mg/ml in 5ml ampule | **C** |
| Tranexamic acid | Injection 100mg/ml in 5ml ampoule; Syrup 500mg/5ml in 300ml bottle; Tablets 500mg | **C** |
| Etamsylate | Tablet 500mg | **C** |
| Warfarin | Tablet: 1mg; 2mg; 5mg (sodium salt) | **C** |
| **11.0 Blood Products of Human origin and Plasma Substitute** | | |
| **11.1 Plasma-derived Medicines** | | |
| **11.1.1 Human Immunoglobulins** | | |
| Anti-D immunoglobulin | | **C** |
| Anti-rabies immunoglobulin | | **A** |
| Anti-tetanus immunoglobulin | | **A** |
| **11.1.2 Blood Coagulation factors** | | |
| Factor VIII concentrate | Factor VIII concentrate 500IU | **D** |
| Factor IX concentrate | Factor IX concentrate500 IU | **D** |
| Fresh frozen plasma (FFP) | Fresh frozen plasma (FFP) Bags | **C** |
| **11.2 Plasma Substitutes** | | |
| Dextran 70 | Dextran 70 IV solution 6% in sodium chloride bottle of 500ml | **D** |
| Polygeline | Polygeline IV solution 3.5%, 500ml bottles | **D** |
| **12.0 Cardiovascular Medicines** | | |
| **12.1 Antianginal Medicines** | | |
| Glyceryl trinitrate | Tablets 500 mcg sublingual | **C** |
| Isosorbide Mononitrate | Tablets 10mg, 20mg | **C** |
| Isosorbide Dinitrate | Tablets 10mg, 20mg | **C** |

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| Nifedipine | Slow release Capsules/tablets 10mg; 20mg | **C** |
| Propranolol | Tablets 40mg | **A** |
| Labetalol | Tablets 100mg, 200mg | **C** |
| **12.2 Antiarrhythmic Medicines** | | |
| Amiodarone | Injection (hydrochloride) 30mg/ml in 10ml ampoule; Tablets (hydrochloride) 100mg | **D** |
| Verapamil | Injection 2.5mg/ml, 2ml ampoule; Tablets 40mg 80mg Injection 2.5mg/ml, 2ml ampoule | **D** |
| Enalapril | Enalapril 2.5mg, 5mg | **C** |
| Adenosine | Injection 3mg/ml in Saline | **D** |
| Lidocaine | Injection 2%; Lidocaine 20mg/ml | **B** |
| **12.3 Antihypertensive Medicines** | | |
| Bendrofluazide | Tablet 5mg | **A** |
| Atenolol | Tablet 50mg | **B** |
| Indapamide | Tablet 2.5mg | **C** |
| Captopril | Tablets 12.5mg, 25mg | **B** |
| Enalapril | Tablet 2.5mg, 5mg (as hydrogen maleate) | **C** |
| Diltiazem | Tablet 60mg | **D** |
| Losartan | Tablets 50mg | **C** |
| Perindopril | Tablets 4mg | **S** |
| Carvedilol | Tablets 6.25 | **C** |
| Metoprolol | Tablets 50mg | **C** |
| Amlodipine | Tablets 5mg, 10mg | **C** |
| Esmolol | Injection 10g/ml | **S** |
| Hydralazine | Tablets 25mg; Injection 25mg | **C** |
| **12.4 Medicines used in Heart Failure** | | |
| Candesartan | Tablet 8mg | **C** |
| Dopamine | Injection 250mg | **D** |
| Digoxin | Injection 250mg/ml in 2ml ampoule; Tablets 0.25mg | **C** |
| Dobutamine | Injection 250mg/5ml | **D** |

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| Eplerenone | Tablet 25mg, 50mg | **S** |
| Nitroprusside | Powder for injection 100mg | **D** |
| **12.5 Antithrombotic Medicines** | | |
| **12.5.1 Anti- platelet medicines** | | |
| Acetylsalicylic acid | Tablet: 75mg, 100mg | **B** |
| Clopidogrel | Tablet: 75mg; 300mg | **D** |
| **12.5.2 Thrombolytics** | | |
| Streptokinase | Powder for injection: 1.5 million IU in vial. | **C** |
| Alteplase | Powder for injection: 50mg vial | **D** |
| Tenecteplase | Powder for injection: 50mg vial. | **D** |
| | | |
| **12.6 Lipid Lowering Medicines** | | |
| Simvastatin | Tablets: 5mg; 10mg | **C** |
| Atorvastatin | Tablets 10mg | **C** |
| Rosuvastatin | Tablets: 5mg; 10mg | **S** |
| Fenofibrate | Capsule 200mg | **D** |
| Gemifibrozil | Capsules 300mg | **D** |
| **13.0 Dermatological Medicines** | | |
| **13.1 Antifungal Medicines** | | |
| Benzoic acid Compound Ointment | Benzoic acid Compound Ointment (prepare from raw materials)(whitfied's) | **A** |
| Clotrimazole | Clotrimazole Cream 1% in 20g tube | **A** |
| Miconazole | Cream (nitrate) 2% | **C** |
| Terbinafine | Cream 1%, 15 and 30g Tube | **D** |
| **13.2 Anti-infective Medicines** | | |
| Fusidic acid | Cream 2% | **C** |
| Gentian Violet | Paint | **A** |
| Mupirocin | Ointment 2% | **C** |
| Potassium permanganate | Potassium permanganate Solution 1:4000 (prepare from raw materials) | **A** |
| Povidone iodine | Solution 10% | **A** |
| Silver Sulfadiazine | Cream | **B** |

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| **13.3 Anti-inflammatory and Anti-pruritic Medicines** | | |
| Betamethasone | cream or ointment 0.1% ( as valerate) | **C** |
| Calamine | Calamine Skin ointment/lotion | **A** |
| Hydrocortisone | Hydrocortisone Cream 0.5% | **B** |
| Lindane | Lotion 1% | **C** |
| **13.4 Medicines affecting skin differentiation and proliferation** | | |
| Benzoyl peroxide | Jelly 2.5%, 5% and 10% | **A** |
| Coal tar | Solution 5% (prepare from raw materials) | **C** |
| Clobetasol propionate | Cream 0.05%-o.1% | **D** |
| Dithranol | Ointment 0.1% | **B** |
| Isotretinoin | 0.05% cream, capsules 10mg, 20mg | **D** |
| Silver nitrate Stick | Silver nitrate Stick | **C** |
| Podophylin Solution | Podophylin Solution 10-25% (prepare from raw materials) | **D** |
| Salicylic acid | Salicylic acid Topical solution 5% (prepare from raw materials) | **B** |
| Skin Protective Factor | Sun screen cream 30+ | **C** |
| **13.5 Scabicides and Pediculicides** | | |
| Benzyl benzoate Emulsion | Emulsion: 25% | **A** |
| **13.6 Miscellaneous** | | |
| Sunscreen protecting factor (SPF 30+) | Cream | **C** |
| | | |
| **14.0 Diagnostic Agents** | | |
| Rose bengal | Ophthalmic strips | **D** |
| Schirmer test | Ophthalmic strips | **D** |
| Fluorecein | Drops 2% (as Sodium); Ophthalmic strips | **B** |
| Tryphan blue | Injection 1% | **D** |
| **15.0 Diuretics** | | |
| Furosemide | Injection 10mg/ml in 2ml ampoule; Tablets 40mg | **B** |
| Hydrochlorthiazide | Tablets 25mg | **A** |
| Mannitol | Injectable solution: 10%; 20% | **C** |

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| Spironolactone | Tablets 12.5mg, 25mg | **C** |
| Glycerol syrup | 50% solution | **C** |
| Torsemide | Tablets 2.5mg, 5mg | **S** |
| **16.0 Gastro-Intestinal Medicines** | | |
| **16.1 Antiulcer Medicines** | | |
| Magnesium trisilicate Tablets | Tablets (250mg magnesium trisilicate + 120mg dried aluminium hydroxide) | **A** |
| Omeprazole | Tablets 20mg | **A** |
| Esomeprazole | Tablets 20mg | **S** |
| Ranitidine | Injection 50mg/2ml; | **D** |
| Cimetidine | Injection 300mg | **D** |
| Pantoprazole | Tablets 20mg | **D** |
| Lansoprazole | Tablets 20mg | **C** |
| **16.2 Drugs affecting intestinal secretion and Antispasmodics** | | |
| Ursodeoxycholic acid | Tablets/capsule 300mg | **D** |
| Cholestyramine | Cholestyramine Powder 4g per Sachet | **D** |
| Hyoscine butylbromide Tablets | Hyoscine butylbromide Tablets 10mg | **A** |
| Hyoscine butylbromide Injection | Hyoscine butylbromide Injection 20mg/ml; 1ml ampoule | **C** |
| **16.3 Anti-emetics** | | |
| Promethazine Tablets | Promethazine Tablets (hydrochloride/theoclate) 10mg, 25mg | **A** |
| Promethazine Injection | Promethazine Injection (hydrochloride) 25mg/ml in 2ml ampoule | **A** |
| Promethazine Elixir | Promethazine Elixir (hydrochloride) 5mg/5ml | **A** |
| Metoclopramide Tablets | Metoclopramide Tablets 10mg | **C** |
| Metoclopramide Injection | Metoclopramide Injection 5mg/2ml | **C** |
| Domperidone | Tablets 10mg | **D** |
| Ondansetron | Tablets 8mg, Injection 2mg/ml | **S** |
| **16.4 Cathartics** | | |
| Bisacodyl | Tablets 5mg | **A** |

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| Lactulose | Solution 3.1 - 3.7g/5ml, 200ml bottle | **C** |
| L-Ornithine L-Aspartate | granules | **S** |
| **16.5 Anti-Haemorrhoids** | | |
| Local anaesthetic + astringent and anti-inflammatory suppositories/ointment/cream | Local anaesthetic + astringent and anti inlfamatory Suppositories/ointment (Bismuth oxide 25mg + Bismuth sbgallate 59mg + Peru balsam 49mg+Zinc oxide 296mg) Equivalent to Anusol Suppositories/ointment/cream | **B** |
| Local anaesthetic + astringent and anti inti-inflammatory Suppositories/ointment | Local anaesthetic + astringent and anti inlfamatory Suppositories (Cinchocaine hydrochloride 5mg + Hydrocortisone 5mg) Equivalent to Proctosedyl suppositories/ointment | **B** |
| Local anaesthetic + astringent and inti-inflammatory Suppositories/ Cream/ointment containing Benzyl benzoate | Local anaesthetic + astringent and anti inlfamatory Suppositories/cream containing (benzyl benzoate 33mg+bismuth oxide 24mg+bismuth subgallate 59mg+hydrocortisone acetate 5mg+Peru balsam 49mg+promacaine HCl 27mg+Zinc oxide 296mg) equivalent to Anugesic | **C** |
| **16.6 Medicines used in Diarrhoea** | | |
| Oral Rehydration Salts (ORS) | Oral Rehydration Salts (ORS) low osmolality Sachet to make 1 litre of solution containing Sodium chloride 2.6g, Sodium citrate 2.9g, Potassium chloride 1.5g and Glucose 20.5g) replacement solution | **A** |
| Loperamide Tablets/capsules | Loperamide Tablets/capsules (hydrochloride) 2mg | **B** |
| Zinc Tablets | Zinc Tablets dispersible (equivalent to 20mg elemental zinc) | **A** |
| **17.0 Hormones And Antidiabetic Agents And Related Medicines** | | |
| **17.1 Adrenal Hormones and Synthetic Substitutes** | | |
| Dexamethasone | Tablets 0.5mg, 4mg | **D** |

| | | |
|---|---|---|
| Dexamethasone | Injection (as sodium phosphate) 4 mg/ml in 1 ml ampoule | **B** |
| Hydrocortisone | Powder for injection (as sodium succinate) | **A** |
| Prednisolone | Injection 100mg in vial | **B** |
| Prednisolone | Tablet 5mg | **B** |
| Triamcinolone | Cream 1%, | **S** |
| **18.0 Immunologicals** | | |
| **18.1 Sera and Immunoglobulins** | | |
| Anti-venom immunoglobulin | Snake venom polyvalent Antiserum injection (\|Central African type) in vial | **A** |
| Diphtheria antitoxin | Injection: 10,000 IU; 20,000 IU vial | **A** |
| Tetanus Immunoglobulin | Tetanus Immunoglobulin (human) - ATS Injection 1,500 IU in vial; ATS Injection 10,000 I.U in vial; ATS Injection 500,000 I.U in vial | **A** |
| Antirabies immune globulin | Injection 400IU/ml; 10,000IU/5ml | **A** |
| **18.2 Vaccines** | | |
| **18.2.1 For Immunization** | | |
| BCG Vaccine | Bacillus Calmette Guerin) Injection 20 doses vial | **A** |
| DPT-HepB-Hib Vaccine | Diphtheria-Pertussis-Tetanus-Hepatitis B-Haemophilus Influenza type B) Injection 10 doses vial | **A** |
| Human Papilloma Vaccine (HPV) | Human Papilloma Vaccine (HPV) – 0.5ml per dose | **A** |
| Inactivated Polio Vaccine (IPV) | Inactivated Polio Vaccine (IPV) | **A** |
| Measles-Rubella Vaccine | Measles-Rubella Vaccine Injection 10 doses in vial | **A** |
| Oral Poliomyelitis Vaccine (OPV) | Oral Poliomyelitis Vaccine (Live attenuated) Oral solution 20 doses in vial | **A** |
| Pneumococcal Conjugate Vaccine (PCV13) | Pneumococcal Conjugate Vaccine (PCV13) -4 doses vial | **A** |
| Rota Vaccine | Rota Vaccine Oral solution | **A** |
| Tetanus (toxoid) Vaccine | Tetanus (toxoid) Vaccine Injection 20 doses in 10ml vial | **A** |
| Hepatitis B | Hepatitis B Injection | **B** |

| | | |
|---|---|---|
| **18.2.2 For Specific Groups for Individuals** | | |
| Meningitis vaccine | Injection | **C** |
| Human Diploid Cell Rabies Freeze dried rabies vaccine | Human Diploid Cell Rabies Freeze dried rabies vaccine | **B** |
| Yellow Fever Vaccine | Injection 10 doses in vial (with diluent) | **C** |
| | | |
| **19.0 Muscle Relaxants (Peripherally-Acting) And Cholinesterase Inhibitors** | | |
| Neostigmine | Injection: 500microgram in 1ml ampoule; 2.5 (metilsulfate) in 1ml ampoule | **C** |
| Suxamethonium | Injection: 50mg (chloride/ml in 2ml ampoule | **C** |
| | | |
| **20.0 Ophthamological Preparations** | | |
| **20.1 Anti infective Agents** | | |
| Acyclovir ointment | Acyclovir Eye ointment 3% | **C** |
| Ciprofloxacin | Drops 0.3% | **C** |
| Chloramphenicol | Drops 0.5%, 1%; Eye ointment 1% | **A** |
| Chlorohexidine | Drops 0.2% | **D** |
| Dexamethasone+Chloramphenicol | Drops 0.1%, 0.5% | **C** |
| Dexamethasone +Gentamicin | Drops 0.1, 0.3% | **C** |
| Econazole | Drops 5% | **D** |
| Natamycin | Drops 5% | **C** |
| Ofloxacin | Drops 0.3% | **D** |
| Oxytetracycline ointment | Eye ointment 3% | **A** |
| | | |
| **20.2 Anti-allergy, Artificial tears and Anti-inflammatory Agents** | | |
| Dexamethasone eye drops | Drops 0.1% | **D** |
| Prednisolone eye drops | Drops 0.5%, 1% | **D** |
| Triamcinolone Acetatonide | Injection 40mg/mL | **D** |
| Methylprednisolone acetate | Injection 40mg/mL | **D** |
| Hydroxypropylmethylcellulose | Drops 0.70% | **C** |
| Oxymetazoline | Drops 0.025% | **C** |

| | | |
|---|---|---|
| Sodium cromoglycate drops | Sodium cromoglycate 2%, 4% eye drops | **C** |
| | | |
| **20.3 Local and Topical Ocular Anaesthetic Agents** | | |
| Tetracaine | Drops 0.5% | **C** |
| | | |
| **20.4 Miotics and antiglaucoma** | | |
| Timolol | Drops 0.25%, 0.5% | **C** |
| Pilocarpine hydrochloride | Drops 2 or 4% | **C** |
| Prostamide bimatroprost | Drops 0.03% | **D** |
| Latanoprost | Drops 0.005% | **D** |
| Betaxolol | Drops 0.25% -0.5% | **D** |
| Brimonidine | Drops 0.15 – 0.2% | **D** |
| Acetazolamide | Oral tablets 250mg | **C** |
| | | |
| **20.5 Mydriatics** | | |
| Tropicamide with Cyclopentolate | Drops 0.5%, 1% | **C** |
| Tropicamide with Phenylephrine | Drops 0.8% / 5% | **C** |
| Cyclopentolate | Drops 0.5%, 1% | **C** |
| Atropine | Drops 0.5%, 1%; Ointment 1% | **B** |
| 21.6 Anti-vascular endothelial growth factor (VEGF) preparations | | |
| Bevacizumab | Intravitreal injection 1.25mg | **S** |
| Ranibizumab | Intravitreal injection 0.05 mg | **S** |
| | | |
| **20.6 Other Ocular Preparations** | | |
| Multivitamins with carotenoids | Tablets | **C** |
| Silicon Oil | 1000 CS, 1500 CS, 5000 CS | **S** |
| Mitomycin C | 5mg/vial, 10 mg/vial | **D** |
| 5 –Fluoro Uracil | 1% eye drops | **D** |
| Ganciclovir | Injection 2mg | **S** |
| | | |

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|---|---|---|
| **21.0 Oxytocics and Antioxytocics** | | |
| **21.1 Oxytocics** | | |
| Ergometrine Injection | Injection (maleate) 0.5mg/ml (hydrogen maleate) in 1ml ampoule | **C** |
| Misoprostol | Tablet 200mcg (rectal, sublingual) | **A** |
| Oxytocin Injection | Injection 10 IU in 1ml ampoule | **A** |
| | | |
| **21.2 Antioxytocics (tocolytics)** | | |
| Nifedipine | Immediate – release capsule: 10mg, 20mg | **C** |
| Methyldopa | Tablets 250mg | **B** |
| | | |
| **22.0 Peritorial Dialysis Solution** | | |
| Intraperitoneal dialysis solution (of appropriate composition) | Parenteral solution | **S** |
| | | |
| **23.0 Psychotherapeutic and Related Medicines** | | |
| **23.1 Medicines used in Psychotic Disorders** | | |
| Benzhexol | Tablets 5mg | **C** |
| Chlorpromazine | Injection (hydrochloride) 25mg/ml in 2ml ampoule; Tablets (hydrochloride) 25mg, 100mg | **A** |
| Fluphenazine | Injection 25mg/ml (decanoate) in 1ml ampoule | **C** |
| Flupenthixol | Injection 20mg/ml | **S** |
| Haloperidol | Injection 5mg/ml in 1ml ampoule; Tablets 1.5mg | **B** |
| Lorazepam | Tablets 1mg, 2mg | **C** |
| Olanzapine | Tablets 5mg; 10mg | **S** |
| Procyclidine | Tablet: 5mg | **S** |
| Risperidone | Tablets 1mg/2mg | **S** |
| | | |

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|---|---|---|
| **23.2 Medicines Used in Mood Disorders** | | |
| **23.2.1 Medicines used in Depressive disorders** | | |
| Amitriptyline | Tablets (hydrochloride) 25mg | **A** |
| Imipramine | Tablet 25 mg | **A** |
| Citalopram | Tablet 20mg | **D** |
| Clonazepam | Tablet 0.5mg, 2mg | **D** |
| Fluoxetine | Capsule 20mg | **S** |
| Fluvoxamine | Tablets 25mg | **S** |
| Oxybutynin | Tablet 5mg | **S** |
| **23.2.2 Medicines in bipolar disorders** | | |
| Carbamazepine tablets | Tablets 100mg, 200mg | **A** |
| Lithium | Tablets 400mg | **S** |
| Sodium Valproate | Tablets 200mg, 500mg | **C** |
| | | |
| **23.3 Medicines Used for anxiety Disorders** | | |
| Diazepam | Tablets 5mg | **C** |
| | | |
| **23.4 Medicines Used for disorders due to psychoactive substance use** | | |
| Methadone | Oral liquid: 5mg/5ml; 10mg/5ml | **D** |
| Buprenophine | Tablets | **S** |
| Naltrexone | Tablets 50mg | **S** |
| | | |
| **24.0 Medicines acting on Respiratory Tract** | | |
| **24.1 Anti-asthmatics** | | |
| Beclomethasone Inhalation | Inhalation (dipropionate) 0.05mg per dose (aerosol inhaler) | **C** |
| Budesonide inhaler | Inhalation 100mcg, 200mcg | **B** |
| Salmeterol | Inhalation 100mcg, 200mcg | **C** |
| Cromoglycate Nasal spray | Nasal spray (di-sodium salt) 2% (sprayer with pump) | **A** |
| Ipratropium Bromide Aerosol | Inhalation (aerosol): 20 microgram/metered dose; Nebulizer 250-500mcg | **C** |
| | | |

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| **24.2 Antitussive** | | |
| Cough syrup | Syrup/Lintus | **A** |
| | | |
| **25.0 Solutions, Correcting Water Electrolyte and Acid-Base Disturbances** | | |
| Dextrose 5%; | Dextrose 5%; 500ml, 1000ml | **A** |
| Dextrose 10%; | Dextrose 10%; 500ml | **C** |
| Dextrose 25%, | Dextrose 25%, 50ml, 100ml | **C** |
| Dextrose 50%, | Dextrose 50%; 50ml, 100ml | **C** |
| Sodium lactate compound (Ringer's solution) | Sodium lactate compound (Ringer's solution) 500ml, 1000ml. Each litre provides approximately $Na^{+}$ 131 mmol, $K^{+}$ 5mmol, $Ca^{++}$2mmol, C1-111mmol and $HCO_3$-(lactate) 29mmol | **A** |
| Sodium Chloride solution | 0.9% Sodium Chloride 500ml, 1000ml | **A** |
| Sodium chloride+Dextrose | Sodium chloride+Dextrose 0.9%+5%; 500ml, 1000ml | **B** |
| Potassium chloride Solution | Potassium chloride Solution 7.4% 10ml Vial | **C** |
| Water for injection | 5ml, 10ml vial | **A** |
| **26.0 Vitamins/Minerals** | | |
| Retinol (Vitamin A) Capsules | Retinol (Vitamin A) Gelatin Capsules (with nipple to allow administration drop by drop) 50,000IU, 100,000IU 200, 000IU | **A** |
| Ascorbic acid (Vitamin C) Tablets | Ascorbic acid (Vitamin C) Tablets 100mg and 500mg | **A** |
| Calcium gluconate | Tablets 500mg | **C** |
| Calcium gluconate | Injection 100mg/ml in 10ml ampoule | **C** |
| Ergocalciferol (vitamin D) | Capsules 1.25mg (50, 000IU); Oral solution 0.25mg/ml (10,000IU/ml) | **C** |
| Nicotinamide (Vitamin $B_3$) | Tablets 50mg | **C** |
| Pyridoxine (Vitamin $B_6$) | Tablets (hydrochloride) 25mg | **C** |
| Thiamine (Vitamin $B_1$) | Tablets (hydrochloride) 100mg | **C** |
| Thiamine (Vitamin $B_1$) | Injection (hydrochloride) 1000mg/ml in 1ml ampoule | **C** |

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|---|---|---|
| Vitamin B complex | Vitamin B complex Tablets BP (contains per Tablet: nicotinamide 15mg, riboflavin 1mg, thiamine 1mg) | **A** |
| Vitamin B complex | Syrup (contains nicotinamide 15mg, riboflavin 1mg, thiamine 1mg/5ml) | **A** |
| Vitamin B complex | Injection BP in 10ml vial (contains nicotinamide 200mg, pantothenol 30mg, pyridoxine 20mg, riboflavine 20mg, thiamine 50mg per 1 ml) | **B** |
| Vitamin E | Tablet/capsule alpha tocopherol acetate 500 mg/5 mL | **D** |
| Vitamin K 10mg | Tablets 10mg | **D** |
| Potassium chloride | Tablets (slow release) 600mg | **C** |
| **27.0 Medicines Used in Ear & Nose Diseases** | | |
| **27.1 Ear Drops** | | |
| Ciprofloxacin | Ear drops | **C** |
| Chloramphenicol | Ear drops 5% in 10ml | **A** |
| Dexamethasone + Neomycin | Ear drops | **C** |
| | | |
| **27.2 Oral Antiseptics** | | |
| Chlorhexidine gluconate Solution | Chlorhexidine gluconate Solution 0.1%;prepare from concentrated solution; gel | **B** |
| Potassium permanganate Solution | Potassium permanganate Solution 1:4000; prepare from powder/crystals | **A** |
| | | |
| **27.3 Nasal Preparations** | | |
| Beclomethasone Spray | Spray 0.05% (50mcg/dose) | **C** |
| Ephedrine Nasal drops | Nasal drops 0.5% and 1% | **B** |
| Normal saline | Nasal drop 0.9% | **A** |
| | | |
| **28.0 Disinfectants and Antiseptics** | | |
| Hydrogen peroxide Solution | Hydrogen peroxide Solution 3% | **A** |
| Hydrogen peroxide Solution | Hydrogen peroxide Solution 6% | **A** |
| Chlorhexidine + Cetrimide Solution | Chlorhexidine + Cetrimide | **A** |

| | | |
|---|---|---|
| | Solution concentrated containing chhlorhexidine digluconate 1.5%+ 15% cetrimide in 1litre and 5 litre | |
| Chloroxylenol Solution | Chloroxylenol Solution 4.9% BP in litre and 5 litre | **A** |
| Cresol saponated Solution | Cresol Solution 3% BP in litre and 5 litre | **A** |
| Formaldehyde solution | Formaldehyde solution 36 - 37% stabilised in 1 litre | **C** |
| Glutaraldehyde Activated solution | Glutaraldehyde Activated solution 2% in 1 litre, 5 litres for scopes sterilization) | **C** |
| Methylated spirit | 70% in 1 litre,p 5 litre | **A** |
| Sodium Dichloroisocyanurate Tablets | Tablets, 1.67g (equal to 1g available chlorine) | **A** |
| Povidone-Iodine Solution | Povidone-Iodine Solution 10% | **A** |
| Potassium permanganate Solution | Potassium permanganate Solution 1: 4000 | **A** |
| | | |
| **29.0 Miscellaneous** | | |
| Fluoride | Toothgel | **C** |
| Sildenafil | Tabets 50mg | **S** |

# ANNEXES

## ANNEX 1: MEMBERS OF THE NATIONAL MEDICINES AND THERAPEUTIC COMMITTEE APPROVED THE STG/NEMLIT

| | |
|---|---|
| Prof. Muhammed Bakari Kambi | Chief Medical Officer and Chairperson of the NMTC |
| Dr. Henry Irunde | Chief Pharmacist and Secretary of the NMTC |
| Dr Rommuald Mbwasi | Senior Lecturer St John's University of Tanzania (Member) |
| Dr. Azma Simba | Epidemiologist- MoHCDGEC (Member) |
| Dr. Baraka Nzobo | Dental Surgeon, Morogoro Regional Referral Hospital (Member) |
| Mr. Sylivester Maige | Clinical Pharmacologist, Medical Stores Department (Member) |
| Dr. Dorin Mloka | Microbiologist, Muhimbili University of Health and Allied Sciences (Member) |
| Ms. Regina Joseph Richard | Senior Pharmacist, President's Office- Regional Administration and Local Government (Member) |
| Dr. Delfina Mkenda | Gynecologist, Mbeya Zonal Referral Hospital (Member) |
| Mr. Emmanuel C. Mwera | Clinical Pharmacist, Nzega District Council- Tabora |
| Dr. Mayani Alfred | Oncologist, Ocean Road Cancer Institute (Member) |
| Dr. Edna Majaliwa | Pediatrician, Muhimbili National Hospital (Member) |
| Mary Masanja | Principal Pharmacist, Tanzania Food and Drug Authority (Member) |
| Dominick Mfoi | Senior Pharmacist, Pharmacy Council |
| Dr. Hamisi Msengi | Assistant Director- Hospital Services – MoHCDGEC (Member) |
| Mrs.Salome Mwinjuma | Senior Nursing Officer, Directorate of Nursing and Midwifery Services – MoHCDGEC (Member) |
| Mrs. Siana G. Mapunjo | Principal Pharmacist, Pharmaceutical Services Unit-MoHCDGEC (Secretariat) |
| Mr. George W. Mlavwasi | Principal Pharmacist, Pharmaceutical Services Unit-MoHCDGEC (Secretariat) |

| | |
|---|---|
| Mr. Noel Mhadu | Senior Pharmacist, Pharmaceutical Services Unit-MoHCDGEC (Secretariat) |
| Mr. Jilabi Masige | Principal Pharmacist, Directorate of Curative Services - MoHCDGEC (Secretariat) |

**ANNEX II: LIST OF EXPERTS CONTRIBUTED TO THE REVIEW OF STG/NEMLIT**

**LEAD REVIWERS FOR EACH CHAPTER**

| SN | LEAD REVIEWERS | CHAPTERS |
|---|---|---|
| 1 | Dr. Robert Mvungi (Consultant Cardiologist)- Jakaya Kikwete Cardiac Institute | Cardiovascular Disease Conditions |
| 2 | Prof. Andrew. Swai (Consultant Physician)- Tanzania Diabetes Association | Metabolic & Endocrine Disease Conditions |
| 3 | Dr. Bernadetha R. Shilio- Directorate of Curative Services (Ophthalmologist) | Eye Disease Conditions |
| 4 | Dr. Daudi Mavura , KCMC (Dermatologist) | Skin Diseases & Allergic Reactions |
| 5 | Dr. John Rwegasha, Muhimbili National Hospital (Gastroenterologists) | Gastro-Intestinal Disease Conditions |
| 6 | Dr. Alex Masao, Muhimbili National Hospital (Physician) | Respiratory Disease Conditions |
| 7 | Dr. Henry Swai, Muhimbili National Hospital (ENT Specialist) | ENT Disease Conditions |
| 8 | Dr. Paul Mariale, Muhimbili Orthopedics Institute (Orthopedics) | Musculoskeletal Disorders |
| 9 | Dr. Njiu Kim, Muhimbili National Hospital (Urologist) | Kidney & Urological Disorders |
| 10 | Dr. Nanzoki Mvungi, Ocean Road Cancer Institute (Oncologist) | Malignant Disease Conditions |
| 11 | Dr. Edwin R. Lugazia, Muhimbili National Hospital (Consultant- Anesthetics) | Anesthesia |
| 12 | Dr. Rogath Kishimba, Epidemiology Section- MoHCDGEC (Epidemiologist) | Notifiable Diseases |
| 13 | Adeline Mnuo, Tanzania Food and Nutrition Centre | Nutrition Disorders |
| 14 | Dr. Meda Elineema, Muhimbili National Hospital (Hematologist) | Hematological Disease Conditions |
| 15 | Dr. Innocent R. Mwombeki Mirembe Psychatric Hospital- Dodoma (Psychiatrist) | Mental Health Conditions |
| 16 | DR. Shaaban Kimaro, Muhimbili Orthopedics Institute (Neurologist) | Trauma & Injuries |
| 17 | Dr. Baraka Nzobo, Morogoro Regional Referral Hospital (Dental Surgeon) | Oral Disease and Dental Conditions |

| | | |
|---|---|---|
| **18** | Dr. Kidanto H.L, Assistant RCHS (Gynecology) | Obstetrical, Gynecological Disease Conditions & Contraception |
| **19** | Dr. Amina Mgunya, Muhimbili National Hospital (Physcian) | Nervous System Disease Conditions |
| **20** | Dr. Sixbert Mkude, National Malaria Control Programme | Malaria |
| **21** | Dr. Aneth Rwebembera, National AIDS Control Program | HIV/AIDS |
| **22** | Dr. Gissenge J.I Lija, National AIDS Control Programme (Head, HIV prevention unit) | Sexual Transmitted Diseases |
| **23** | Dr. Eden Mpangile, T/B Leprosy Coordinator (Pwani Region) | Tuberculosis and Leprosy |
| **24** | Dr. Edna Majaliwa, Muhimbili National Hospital (Pediatrician) | Poison |

**OTHER EXPERTS CONTRIBUTED TO THE REVIEW OF STG/NEMLIT**

| | |
|---|---|
| Kaushik Ramaiya | General Secretary, Tanzania Diabetes Association |
| Emannuel Yohanna | Clinical Pharmacist- IVD MoHCDGEC |
| Dr. Jessica Mbwambo, | Consultant Psychiatrist, MUHAS |
| Dr. Reymond Mwenesano | Consultant Gastroenterologists, MNH |
| Mr. Fabrizio Molten | National Malaria Control Programme & Swiss TPH |
| Ms. Rose Aron | Principal Pharmacist, Tanzania Food and Drug Authority |
| Mr. Cosmas Marwa | Senior Pharmacist, National Health Insurance |
| Mrs. Grace Mushi | Nutritionist, MoHCDGEC |
| Dr. Msafiri Kabulwa | Dental Surgeon, MoHCDGEC |
| Ms. Fiona Chilunda | Advisor, Health System Strengthening Project-Dodoma |
| Dr. Richard Machange | Medical Doctor, Mawenzi Hospital |
| Mr. Said Mayanja | District Pharmacist, Kondoa- Dodoma |
| Mrs. Aneth Wilbroad | Pharmacist- PSU, MoHCDGEC |
| Mrs. Siana Mapunjo | Principal Pharmacist- PSU, MoHCDGEC **(Secretariat)** |
| Mr. George Mlavwasi | Principal Pharmacist- PSU, MoHCDGEC **(Secretariat)** |
| Mr. Reuben William | Senior Pharmacist- PSU, MoHCDGEC **(Secretariat)** |
| Mrs. Anita Masenge | Senior Pharmacist – PSU, MoHCDGEC **(Secretariat)** |