



REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH

STANDARD TREATMENT GUIDELINES

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The information presented in these guidelines conforms to the current evidence-based practice. Contributors, reviewers and editors cannot be held responsible for omissions, individual responses to medicines and other consequences. The views expressed herein do not necessarily represent the views of the Clinton Health Access Initiative and other cooperating partners that supported the production of these guidelines.

FOREWORD

Achieving long term improvements in the rational use of medicines and care of the sick requires building the competences of the health care professionals. This sixth edition of the Standard Treatment Guidelines is an update of the earlier version contributing to rational and cost-effective health care designed under the aspirations and spirit of increasing efficacy of decision making and precision in prevention, diagnosis, treatment, alleviation of disease and improved quality of life for the Zambian people as cited in the National Drug Policy.

I commend PATH, Clinton Health Access Initiative (CHAI) and World Health Organisation (WHO) for financial assistance to the Zambia National Formulary Committee for developing and producing these Standard Treatment Guidelines as an educational strategy for managing the common conditions afflicting the Zambian people. As usual, the book has been improved to make it more user-friendly, pocket-size, with information on disease conditions, descriptions, investigations and on how to develop therapeutic interventions. The Committee upheld the original intent of making the document a reference material for all health care providers, particularly medical doctors, pharmacists, dentists, nurses, clinical officers and all those with primary responsibility for prescribing, dispensing and administration of medicines.

This edition is intended to be a very popular reference document to clinical students and other health care workers contracted to provide health services in Zambia. I recommend that the information herein be used to provide good quality, safe, effective and affordable health care to the Zambian people.



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MINISTRY OF HEALTH

ADDITIONS MADE TO THIS 6TH VERSION OF THE STANDARD TREATMENT GUIDELINES

The 6th version of the Standard Treatment Guidelines (STG) document has been updated with additions to enhance information delivery and align with the latest treatment guidelines for various medical conditions. This update ensures that healthcare professionals have access to the most current and effective treatment protocols.

Some key updates include:

- **Alignment with Global Standards:** Adoption of the World Health Organization's classification of antibiotics into Access, Watch, and Reserve (AWaRe) groups to promote rational use of antimicrobial agents and combat antimicrobial resistance (AMR).
- **Evidence-Based Guidance:** Standardized guidance for healthcare workers to promote equitable access to safe, effective, and affordable health services.
- **Improved Diagnosis, Treatment, and Prevention:** Enhanced quality diagnosis, treatment, and prevention of diseases, as well as streamlined procurement and supply of pharmaceuticals.

These updates and additions demonstrate the Ministry of Health's commitment to providing high-quality healthcare services and keeping up-to-date with the latest medical advancements.

- This new version is now divided into four (4) major sections and each section is colour-coded for easy visibility and guidance for every reader. The following are the colour codes for each major section:

-  **(Red)** – Emergencies and Poisons, and Anaesthesia and Critical Care
-  **(Orange)** – Common Neonatal and Paediatric Conditions
-  **(Green)** – Adult Conditions
-  **(Pink/Rose)** – Obstetric and Gynaecological Conditions

New sections that have been added to this version of the document include:

- **Emergencies and Poisons** – This section will help and guide healthcare practitioners in dealing with common medical emergencies and poisons/toxicities encountered in the emergency rooms.
- **Anaesthesia and Critical Care** - This section will offer updated information on optimal management of surgical patients throughout the pre-, intra, and postoperative phases for improved outcomes.
- **Common Neonatal Conditions** - This section aims at ensuring that all the neonates in every health care institution are offered standard, best quality of care and the best possible start in life when faced with certain common conditions in the first 28 days of life.
- **Common Paediatric Conditions** - This section aims at providing guidelines on the management of the major emergencies and common conditions in the paediatric population which contribute to childhood mortality in Zambia.
- **Covid-19 Infection** - In the recent past, the world over experienced one of the worst pandemics. This condition has been added to this document to provide guidance on the supportive and pharmacological management of Covid-19 as it has continued to plague our country.

All the sections in this document have been reviewed and updated based on the current treatment guidelines, and prevailing/common conditions to provide guidance on their management. Conditions affecting specific body systems have been arranged in a “head-to-toe” order for easy categorization, classification and follow-through for everyone reading this document.

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INTRODUCTION

This version of the Standard Treatment Guidelines was developed after wide consultations and discussions with healthcare providers at three tiers of the health delivery system – practitioners, program managers and health economists. While most of the key information has been retained, extensive revisions were carried out on all the chapters. While some of the changes to treatment strategies were motivated by the dynamic nature of the conditions and availability of more effective medicines and conformity with national disease-specific guidelines, some of them were influenced by the new treatment strategies as guided by the World Health Organization and evidence from clinical studies. The guidelines are based on a comparison between various drug therapies and on consideration of value for money and the most effective, affordable and current practices that produce health outcomes of improved quality of life and alleviation of suffering. They are also based on the essential drugs and medical supplies concepts to meet the basic health needs of the Zambians as close to the family as possible as envisioned by the National Medicine Policy.

The Essential Medicines List is linked to the Standard Treatment Guidelines as indicative of public health priorities for the pharmaceutical systems. The list is based on national clinical choices that the Government of the Republic of Zambia always makes available and accessible to its citizens. The medicines selection was based on sound and adequate information of efficacy from clinical settings, evidence of performance from different health care settings, availability in a form in which quality, stability in the Zambian weather and storage settings, bioavailability and users are assured. In addition, the total cost of treatment and methodology of administration were also considered.

The Medicines and Therapeutic Committees under the hospital and district health management teams are mandated to use these Guidelines and ZEML as management tools to improve the quality of the health care delivery and meet the public health responsibility of transparency and accountability. Individual health care professionals are encouraged to use the guidelines as a companion during health care delivery provision.

ARRANGEMENT OF INFORMATION

The guidelines are divided into chapters according to a particular system of the body or an aspect of medical care. Chapters are divided into sections providing introductory notes for health care providers. This information is intended to assist with decision making and selection of appropriate treatment.

Descriptive information about the disease or condition is outlined in the following manner:

- Description of disease or condition
- Signs and symptoms
- Investigations
- Treatment
 - o Supportive
 - o Pharmacological
- Complications
- Referral Criteria

MEDICINE SAFETY MONITORING (PHARMACOVIGILANCE)

This chapter provides guidance about pharmacovigilance practice required by all users of medicines and the actions to take to report medication safety concerns in general.

ZAMBIA ESSENTIAL MEDICINES LIST

This list contains an appropriate range of essential medicines for the various levels of health care delivery institutions in the country.

INDEXES

Indexes have been included listing the drugs in alphabetical order by approved name or INN, and the diseases and conditions dealt with in the guidelines.

PRESCRIBER CONTROL AND DRUG AVAILABILITY

No prescriber categories are provided in the text of this edition. Medicines and Therapeutics Committees are expected to:

- i. Control the prescribing practices of respective institutions.
- ii. Actively define policies for prescribing within a hospital, health centre, clinic or district.
- iii. Ensure the range of availability of drugs in any institution should be restricted according to the level of institution and the categories of staff prescribing.

Prescribers are advised to follow rational prescribing practices, outlined in these standard treatment guidelines which emphasise the public priority use of essential medicines and laboratory supplies and economic treatment regimes.

REVISION OF STANDARD TREATMENT GUIDELINES CONTENTS

The Zambia National Formulary Committee recognises the fact that the field of treatment regimens and drugs is dynamic, thus a revision of the guideline contents will be continuous. Contributions are encouraged and should be submitted for consideration to the Zambia National Formulary Committee through the Ministry of Health.



Dr Justo Banda

Chairperson, Zambia National Formulary Committee



REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH

1.0

EMERGENCIES AND POISONS

1.1 COMMON MEDICAL EMERGENCIES

1.1.1. Cardiopulmonary Resuscitation and Advanced Cardiac Life Support

1.1.1.1. Basic Life Support (BLS)

- Goals of resuscitation – to maintain cerebral perfusion until the cardiopulmonary function is restored.
- Important change: A-B-C changed to C-A-B (circulation first).
- Check responsiveness by gently shaking the patient.
- Call for help, fetch defibrillator and oxygen and airway adjuncts, resuscitation kit.
- Position the patient on a firm flat surface.
- Open the patient's airway and assess for the presence of respiration.
- Check circulation (palpate for a carotid pulse), if not present start CPR.
- Initiate chest compressions (position both hands over the lower part of the sternum and compress at the rate of 30 compressions/ 2 breaths). At the rate of 100 chest compressions/min, depth in adults 2 inches, infants 4 inches.
- Once the patient is intubated, ventilation can be at a rate of 12-15 per minute without pausing for compressions.

1.1.1.2. Advanced Cardiac Life Support (ACLS)

Advanced cardiac life support (ACLS) is an extension of BLS and usually is implemented by a team leader with the use of necessary facilities.

- IV access with IV fluid e.g. NS
- Attach defibrillator-monitor.
- Assess cardiac rhythm.
- If pulseless Ventricular tachycardia or ventricular fibrillation:
- Defibrillate
- Epinephrine 1mg IV push, repeat every 3-5 minutes
- Consider antiarrhythmic drugs
 - o Amiodarone 300mg IV push
 - OR**
 - o Lignocaine 1.0-1.5mg/kg IV push
 - OR**
 - o Magnesium sulphate 1-2g IV push
- Identify and treat reversible

Causes

- 4 “T”s: Tension pneumothorax, Thrombosis (coronary and pulmonary), Tamponade cardiac, Toxins;
- 4“H”s: Hypovolemia, Hypoxia, Hypothermia, Hypo/Hyperkalemia; Acidosis (Hydrogen ions).

If asystole:

- Continue CPR
- Epinephrine 1 mg IV push every 3-5 minutes until there is a cardiac rhythm or CPR is stopped (20 minutes of CPR or 10 cycles)
- Treat reversible causes (see above)
- Atropine is no longer recommended for asystole and PEA (Pulseless Electrical Activity).
- Termination of resuscitation: terminate resuscitation after 5 cycles of CPR and defibrillation, also if the prognosis of the underlying condition is poor.

1.1.1.3. Cardiac Tamponade



Description

This is accumulation of pericardial fluid, blood, pus or air within a pericardial space that creates an increase in intra-pericardial pressure, restricting cardiac filling and decreasing cardiac output. Cardiac tamponade is an emergency and can be fatal if not quickly diagnosed and treated promptly. The diagnosis is based on clinical suspicion and supported by evidence of haemodynamic compromise on echocardiography.



Signs and Symptoms

- Dyspnoea
- Palpitations
- Chest pain
- Abdominal pain
- Fever
- Elevated jugular venous pressure
- Distant heart sounds
- Hypotension
- Pulsus paradoxus
- Tachycardia
- Pericardial rub
- Confusion



Investigations

- ECG
- Echocardiography
- CXR
- FBC/DC
- ESR

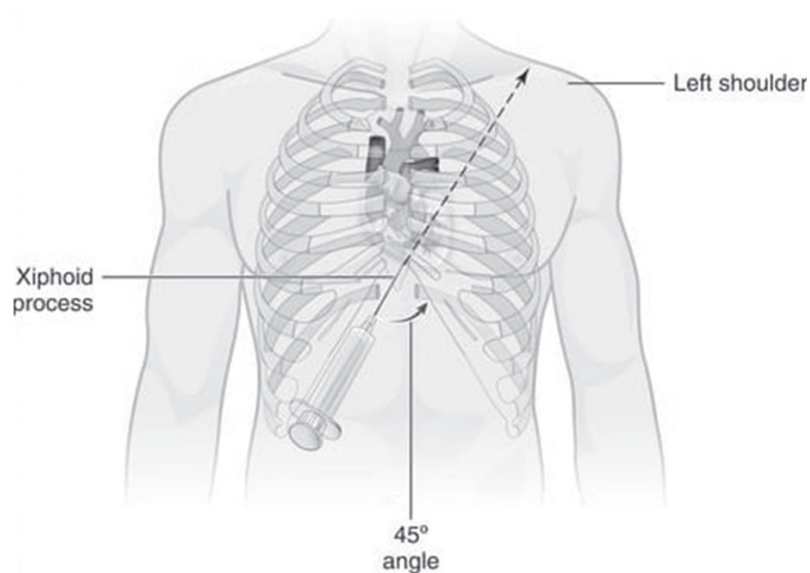


Treatment

Once a patient develops haemodynamic instability, urgent action must be taken to drain the pericardium. Warning signs of haemodynamic instability include any of the following:

- A falling systolic BP $<100\text{mmHg}$
- Pulsus paradoxus of $>10\text{mmHg}$
- An effusion that has been present for <1 month
- Echocardiogram findings of an effusion larger than 20mm
- Right ventricular collapse on echocardiogram

The cornerstone of therapy includes stabilisation with drainage, diagnosis and treatment of the cause. Drainage with echocardiographic guidance if available. A minimum of 100mL of pericardial fluid should be drained even without echo guidance in patients with tamponade before referral to National Heart Hospital.



All patients should be monitored for post pericardiocentesis decompensation.

Method of insertion

- Subxiphoid approach
- Long 18-22G needle attached to syringe
- Insertion: between xiphisternum and left costal margin
- Direct the needle towards the left shoulder at 40 degree-angle to the skin. Continue aspiration as needle approaches the right ventricle
- Once pericardial fluid is aspirated, can insert cannula into pericardial space.
- Attach a 3-way tap and remove fluid with improvement in haemodynamics

Note that

- Pericardial blood does not clot
- Intracardial blood does clot

An ECG chest lead can be attached to the needle; ST elevation or ventricular ectopics signal contact of the needle with the ventricle.

1.1.2. Shock



Description

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.

Approach to a patient with shock

- ABCDE approach
- Elevate lower limbs except in cardiogenic shock
- Optimize oxygen delivery
- Keep warm
- IV access with 2 large bore cannulas
- Insert urinary catheter

Types of shock and their management

Table 1 :Types of shock and their management

Type of shock	Description	Signs and symptoms	Investigations (Tailor to condition)	Treatment
Hypovolemic	Primary cause is loss of fluid from circulation due to hemorrhage, burns, vomiting, diarrhoea etc.	Weak thread pulse, cold and clammy skin	• FBC/DC • Electrolytes • KFT's • Group and Save/ X-match • HIV Test	• IVF bolus Normal saline or Ringers lactate 1-2L(20mL/Kg),and repeat accordingly. • Once out of shock, assess hydration status and give maintenance fluids accordingly • Blood transfusion if hemorrhage is cause • Treat underlying cause

Type of shock	Description	Signs and symptoms	Investigations (Tailor to condition)	Treatment
Cardiogenic	Caused by the failure of heart to pump effectively e.g. in myocardial infarction, heart failure	Weak thread pulse, cold, clammy skin, distended neck vein, crepitations, leg edema	- Cardiac Echo - ECG - Chest Xray - Cardiac Troponins - KFT's - FBC/DC	- Dobutamine 5-15mcg/Kg/min in 200-500mls NS - Adrenaline 0.05-2mg - Dopamine 5-15mcg/kg/min - Digoxin 0.125-0.25mg
Septic	Hypotension due vasodilation in presence of infection, not responsive to fluid resuscitation and requires vasopressor support	Warm peripheries/ fever, bounding pulse, may have focus of infection eg abscess, pneumonia, UTI	Full Septic screen FBC/DC DCT	Bolus crystalloids 20ml/Kg repeated accordingly. Adrenaline 0.05-2mcg/kg/min Target MAP >65 Early appropriate antibiotic therapy
Anaphylactic	Caused by severe allergic reaction to an allergen, or drug.	Angioedema, bronchospasm urticaria	Serum tryptase (only if diagnosis unclear with recurrent syndrome) FBC/DC	Remove allergen Antihistamine Corticosteroid Adrenaline
Neurogenic	Caused by trauma to the spinal cord, resulting in sudden decrease in peripheral vascular resistance and hypotension.	Spinal cord trauma	MRI Spine	IVF as hypovolemic Phenylephrine/norepinephrine
Obstructive	Due to obstructed circulation e.g. Pulmonary embolism, Tension pneumothorax, Cardiac Tamponade	Signs and symptoms of shock plus symptomatology of primary disease.	- Chest Xray - Cardiac Echo - ECG - CT angiography	- Tension pneumothorax- Needle decompression in 2nd intercostal space of affected side and insert ICD afterwards. - Cardiac Tamponade- Ultrasound guided pericardiocentesis - Pulmonary Embolism- Thrombolytics/ anticoagulants.

NB: In instances where certain investigations cannot be done in the emergency department, only move the patient once stable enough to do investigations.

1.1.3. Seizures



Description

A seizure can be defined as a sudden (temporary) change in the electrical and chemical activity in the brain which leads to a change a person's movement, behaviour, level of awareness, and/or feelings.

Diagnosis of convulsive status is clinical. Status epilepticus is a medical/neurologic emergency that requires emergent evaluation and treatment. It is defined by:

Presence of an unremitting generalized convulsive seizure lasting longer than five minutes

OR

Multiple seizures without an interictal return to the baseline level of consciousness.



Investigations

- Electrolytes, and metabolic panel
- Full septic screen including LP as indicated
- EEG for nonconvulsive status
- CT/MRI Brain with or without contrast as indicated



Treatment

Approach to a seizing patient

Step 1 – Immediately triage and escalate patient to a resuscitation area

- Airway + Breathing + resuscitation and stabilization
- Patient positioning – left lateral to prevent aspiration and protect from general injury
- Keep airway open with airway basic airway maneuvers and adjuncts as indicated. Do NOT insert anything in the mouth of an actively seizing such as spatulas, spoons, etc.
- Provide oxygen via any available oxygen delivery devices such as face masks or nasal prongs.

Circulation

- Insert an IV-line and collect blood for investigations, check patients' serum blood sugar; immediately correct hypoglycemia with 50% dextrose 1-2ml/kg IV stat.
- A bed side blood gas would immediately provide electrolytes, glucose and acid-base status

Support circulation with crystalloid fluid as indicated

Step 2 – Immediately stop and prevent recurrency of seizure activity as follows:

- *1st Line: Benzodiazepines* – to abort the seizures.

Table 2: 1st Line: Benzodiazepines – to abort the seizures

	Lorazepam	Diazepam	Midazolam
Adult	0.05-0.1mg/kg IV @ 2mg/min Repeat @10min; max 10mg/dose IM 2-4mg STAT	0.2mg/kg IV only (5-10 mg) @ 5mg/min; Max 30mg/8hr	10 mg IM 0.1mg/kg IV

	Lorazepam	Diazepam	Midazolam
Paediatric	0.05-0.1mg/kg IV @ 1mg/min Repeat 0.05mg/kg @10min; max 4mg /dose	0.2mg/kg IV @ 2mg/min; Max total dose 10mg PR 0.5mg/kg; repeat 0.25mg/kg in 10min (Max dose 10mg)	mg/kg IV mg/kg IM/Buccal/ Intranasal (Max total dose 10mg)

If still seizing 5 minutes after the first dose of a benzodiazepine, a second dose

- **2nd Line: Antiepileptics:** to abort and prevent recurrency of seizures.

Table 3: 2nd Line: Antiepileptics: to abort and prevent recurrency of seizures

Phenytoin	Fosphenytoin	Phenobarbital
Loading Dose: 20mg/kg IV @ < 50mg/min; max 2g (± 2nd dose 10mg/kg after 20min if still seizing)	Loading Dose: 20mg/kg IV @ 100 - 150mg/min (± 2nd dose 10mg/kg after 20min if still seizing)	Loading dose: 20m/kg IV over 20 – 30min (± 2nd dose @10mg/kg after 20min if still seizing)
Valproate	Levetiracetam	
Loading Dose: 20-30 mg/kg IV @ 3-6 mg/kg/min (± 2nd dose 10mg/kg after 20min if still seizing)	Loading 60mg/kg (max dose 4500mg) IV over 5 – 15 minutes	

If still seizing 10minutes after completion of the first loading dose of an antiepileptic, a second loading dose @50% of the first dose can be repeated before proceeding to 3rd line treatment.

Step 3 - Resuscitative Sequence Intubation (RSI) and ICU admission

If convulsive status requiring continuous infusion of hypnotic-sedatives, patient must be intubated and ventilatory support provided. (Avoid long-acting neuromuscular blockade during RSI – may mask active seizure activity)

- **3rd Line: Sedative-hypnotics** – stop and prevent seizure activity.

Table 4: 3rd Line: Sedative-hypnotics – stop and prevent seizure activity

	Midazolam	Propofol
Dose	Loading dose: 0.2 mg/kg IV Then 0.1 mg/kg/hr (0.05 – 2 mg/kg/hr)	Loading dose: 1-3 mg/kg IV Then 1-15 mg/kg/hr (doses exceeding 5mg/kg/min increase the risk for hypotension and propofol infusion syndrome PIS)
Contra-indications/ Precautions	Tachyphylaxis (After 24 – 48 hours seizure-blocking lost but sedation continues & drug accumulates)	Hypotension Propofol Infusion Syndrome (PIS). See the risk factors for PIS*



Complications

- Aspiration pneumonitis and or pneumonia
- Hypoxic brain injury
- Crush syndrome
- Shoulder dislocation – often posterior
- Other injuries



Referral Criteria

- Status epilepticus and refractory status
- Need for brain imaging
- Poorly controlled seizures despite optimal investigations and therapy
- Comorbidities

1.1.4. Anaphylaxis



Description

The two clinical diagnostic criteria for anaphylaxis are as follows:

Acute onset of an illness (minutes to several hours) with simultaneous involvement of the skin, mucosal tissue, or both (e.g., generalized hives, pruritus or flushing, swollen lips-tongue-uvula) PLUS any one of the following:

- Respiratory compromise e.g., dyspnoea, wheeze-bronchospasm, stridor, reduced PEF, hypoxemia.
- Reduced BP or associated symptoms of end-organ dysfunction e.g., hypotonia [collapse], syncope, incontinence.
- Severe gastrointestinal symptoms e.g., severe crampy abdominal pain, repetitive vomiting, especially after exposure to non-food allergens

Acute onset of either hypotension or bronchospasm or laryngeal involvement after exposure to a known or highly probable allergen for that patient (minutes to several hours), even in the absence of typical skin involvement.



Signs and Symptoms

- Difficult or noisy breathing
- Swelling of tongue
- Swelling or tightness in throat
- Difficulty talking or hoarse voice
- Wheeze or persistent cough - unlike the cough in asthma, the onset of coughing during anaphylaxis is usually sudden
- Persistent dizziness or collapse
- Pale and floppy (young children)
- Abdominal pain, vomiting - for insect stings or injected drug (medication) allergy.



Investigations

Diagnosis is primarily clinical. Tests such as histamine and tryptase levels may help long-term management but are not generally performed in the ED.



Treatment

- Remove the trigger and call for help
- Administer adrenaline 0.5mg IM for adults (0.3mg IM for children, and 0.01mg/kg for infants). Repeat after 5 – 15 minutes if hypotension and/or bronchospasm persists.
- Persistent severe symptoms may require adrenaline infusion targeted to a desired blood pressure.
- Obtain two large bore IV access and give fluid bolus @ 20ml/kg, repeat as required and initiate fluid maintenance.
- Promethazine:
 - o Adult - 25-50mg IV/PO
 - o Child 1 month–11 years: 0.5–1 mg/kg 4 times a day (max. per dose 25 mg), adjusted according to response
 - o Child 12–17 years: 25–50 mg 4 times a day, adjusted according to response

OR

- Diphenylhydramine:
 - o Adult and Child >12yrs: 25-50mg PO every 6-8 hours
 - o Child <6yrs – 6.25mg every 6 hours
 - o Child <12yrs – 12-25mg every 6 hours
- Hydrocortisone IV
 - o Adult: 200mg 3 times a day, adjusted according to response
 - o Child 1–5 months: 25 mg 3 times a day, adjusted according to response
 - o Child 6 months–5 years: Initially 50 mg 3 times a day, adjusted according to response
 - o Child 6–11 years: Initially 100 mg 3 times a day, adjusted according to response
 - o Child 12–17 years: Initially 200 mg 3 times a day, adjusted according to response
- Admit for monitoring for not less than 6 hours post recovery and not needing airway or inotropic support.
- Patients should ideally be discharged with an adrenaline auto injector and allergy counselling.



Complications

- Airway loss and or respiratory failure
- Circulatory collapse



Referral Criteria

- Threatened or actual airway loss or circulatory collapse
- Hemodynamic instability

1.1.5. Stroke or Cerebrovascular Accident (CVA)



Description

Acute CVA or stroke is a focal neurological deficit lasting longer than 24 hours that occurs due to interruption of cerebral blood flow in one part of the brain either by a blood clot (ischemic) or rupture of a blood vessel within the brain (haemorrhagic).

A transient ischaemic attack (TIA) occurs if the clot dissolves with complete neurological recovery within 24 hours.

Risk factors

- Cardiovascular: Hypertension, arrhythmias (e.g., atrial fibrillation), cardiomyopathy, ischaemic heart disease, Rheumatic heart disease
- Polycythemia (high haematocrit), vasculitis
- Diabetes mellitus
- Smoking
- Alcohol use
- Obesity
- High cholesterol, atherosclerosis
- Oestrogen-containing contraceptives
- Infections like TB, HIV, syphilis, bacterial meningitis



Signs and Symptoms

- Coma, seizures
- Sudden severe headache
- Hemiplegia, weakness (inability to move limbs) usually unilateral, mouth deviation to one side
- Inability to speak, aphasia, dysphagia
- Confusion or disorientation
- Dizziness, Vertigo and vomiting

- Sudden loss of vision
- Pinpoint pupils (pontine haemorrhage)
- Incontinence of stools and urine



Investigations

- Non-contrast CT scan brain
- Blood glucose
- Lipid profile
- RPR
- HIV test
- Urea and electrolytes, FBC, ESR
- Clotting profile
- ECG/ECHO
- Doppler or ultrasound (carotid vessels)



Treatment

- Use ABCDE resuscitation approach
- Provide oxygen if SPO2 <94%
- Glucose control-ensure euglycemia
- Blood pressure control-Note that in ischemic stroke do not treat high blood pressure in the first 24hrs.
- Antipyretics if fever is present
- Aspirin 300 mg orally stat then 150mg daily
- Protect airway from aspiration-prop up head-end of bed, insert NGT if swallowing impaired.
- Start physiotherapy, speech therapy and occupational therapy as soon as possible

For ischemic stroke

- Thrombolysis within 4.5 hrs of onset of confirmed ischemic stroke, recombinant Tissue plasminogen activator rTPA (in consultation with a specialist)
- Mechanical removing of clot: Endovascular thrombectomy within 6 hours

For haemorrhagic stroke

- Intensive blood pressure reduction to a target of ≤ 140 mmHg systolic BP. If systolic BP > 200 mmHg or mean arterial pressure is > 150 mmHg, consider aggressive reduction of BP according to emergency guideline (see hypertensive emergencies).
- Consult neurosurgeon

Long term care

- Aspirin 75mg daily.
- Statins e.g. Atorvastatin 20-80mg daily
- Treat underlying risk factors e.g. atrial fibrillation, obesity, hypertension, diabetes
- Involve the family and physiotherapist in the rehabilitation of the patient.
- Psychosocial counselling
- Nutritionist

1.1.6. Diabetic Ketoacidosis (DKA)**Description**

- A life-threatening acute, metabolic complication of diabetes.
- It develops due to relative (severe insulin resistance) or absolute insulin deficiency.
- More commonly in patients with T1DM than T2DM.
- DKA may also be the first presentation of diabetes.
- Needs to be treated in high level of care (ICU/HDU)

DKA Triggers

- Treatment non-compliance e.g. missed doses, under dosing.
- Infections commonly pneumonia and UTI
- Pancreatitis
- Cardiovascular conditions e.g. acute Myocardial infarction, stroke
- Stress e.g. Surgery, trauma, burns
- Psychological(emotional) trauma.
- Sodium glucose co-transporter-2 (SGLT-2) inhibitor cause euglycaemic DKA
- Drugs e.g. corticosteroids, thiazides, sympathomimetic agents, and pentamidine

**Signs and Symptoms**

- Polyuria (due to osmotic diuresis)
- Polydipsia (due to dehydration)
- Abdominal pain mimicking an acute abdomen
- Nausea and vomiting
- Fruity breath due to exhaled acetone
- Kussmaul breathing (deep fast breathing)
- Mental status changes



Investigations

Diagnostic Criteria of DKA

- Severe hyperglycemia (plasma glucose ≥ 13.9 mmol/L)
- Urine ketones 2+ or more
- Arterial blood gas analysis:
- A high anion gap metabolic acidosis with pH < 7.3
- Bicarbonate < 15.0 mmol/L and anion gap > 12.0 mmol/L
- High ketone levels in blood (betahydroxybutylate ≥ 3.0 mmol/L)

Investigations (Blood tests useful in managing DKA)

- Electrolytes-sodium, potassium, chloride, ionised calcium, phosphorus, and magnesium
- Full Blood Count (FBC) and differential count
- Arterial Blood Gases
- Renal function test (urea and creatinine)



Treatment

General

Treatment follows the **ABCDE** approach just like in all other emergencies

If patient is in shock, identify type of shock and treat accordingly (see section 1.1.2 on shock)

Fluid replacement

Fluid deficit in DKA is estimated about 6-8 litres of fluid in 24 hours.

The fluids of choice are Normal Saline (NS) or Ringers Lactate (RL) but NS is the fluid of choice given as follows:

- 1L NS over 1 hour
- 1L over 2 hrs.
- 1L over 4 hrs.
- Reassess fluid status before re-commencement of fluids
Target urine output 0.5ml/Kg/hr.
- If Blood Glucose is:
 - **$< 13.9 - 8$ mmol/L**, switch fluid to **5% Dextrose 4 - 8 mmol/L** give **10% Dextrose**
 - **< 4.0 mmol/L**, administer 20g—25g of 50% dextrose (**40-50ml**), diluted in the ratio of 1:1 (**to make 25% dextrose**), administered every after 25minutes until RBS $\geq 4.0-6.0$ mmol/L.
- Target Blood glucose during the DKA treatment should be 11.1-13.8mmol/L.

DKA treatment should not stop until KETONES are negative in urine (and blood pH and bicarbonate have normalized) Caution for patients with heart failure, kidney disease and chronic liver disease as they are at risk of fluid overload.

Insulin administration

- **Soluble insulin** given at dose of 0.1 unit/kg body weight hourly bolus IV or subcutaneously (approximately 6-8 IU in an adult) Maximum 10IU
- The insulin should be given when patient is hydrated and serum potassium is **> 3.5 mmol/L**.
- **Withhold insulin** when serum **potassium is <3.5 mmol/L** and correct hypokalaemia, and maintain potassium within the **normal range of 3.5-5.5mmol/L**
- Target drop of blood glucose per hour is **3-4mmol/L**. Rapid drop of blood glucose may lead to cerebral edema
- When blood glucose drops to **< 13.9 mmol/L**, administer half the initial hourly insulin dose (**0.05iu/kg/hr**)
- Hold insulin if blood glucose is less than 4.0mmol/L, and administer 50% dextrose (**40-50 ml**) every after 25 minutes, until blood glucose is **>6.0mmol/L**.

Potassium Replacement

- Patient should receive 20 mmol KCL in 500mls of NS or RL given after every 2 litres of fluid to prevent hypokalaemia which develops due to insulin therapy (if no access to ABG monitoring- Do not exceed 10-20mmol KCL dosage)
- Serum potassium assessment should be done every 1-2 hours

NB: Any patient with severe derangement of electrolytes should be referred for specialist care

Other Treatment Measures

- Patients with altered mental state and those persistently vomiting should have a nasogastric tube to protect the airway from aspiration.
- Thrombo-prophylaxis with Low Molecular Weight Heparin (LMWH) should be administered, unless there are contraindications to their use.
- ECG monitoring will be required for cardiac monitoring.

Indicators of DKA Resolution

- Negative urine ketones (Trace urine Ketones does not mean DKA has resolved, but that it is resolving; therefore, the DKA treatment must continue)
- Arterial Blood gases: Blood pH ≥ 7.35 , Serum bicarbonate ≥ 15 mmol/L
- Serum beta-hydroxybutyrate < 0.3 mmol/L

Insulin Therapy after DKA Resolution

- After the DKA has resolved and the patient can feed orally, mealtime (bolus) and basal insulin can be commenced.
- If the patient is nauseated or vomiting, intravenous insulin infusion and fluid therapy should continue.
- When starting regular (short-acting) mealtime (bolus) insulin, insulin infusion should stop 30-60 minutes after the commencement of the subcutaneous insulin.
- This insulin overlap will prevent insulin treatment interruption as the short-acting subcutaneous insulin takes at least 30 minutes to set in.



Complications

- Thromboembolic phenomenon, e.g. CVA
- Transient acute kidney injury
- Pulmonary oedema.
- Cerebral oedema

1.1.7. Hyperosmolar Hyperglycaemic State (HHS)



Description

Medical emergency with high mortality more common in elderly T2DM characterised by:

- Hypovolemia (severe dehydration)
- Blood glucose is very high $>30\text{mmol/L}$
- High osmolality (serum osmolality $>320\text{mOsm/Kg}$) as calculated from the formula $(2 \times \text{Na}^+) + \text{glucose} + \text{urea}$
- No significant Ketones in urine
- No significant acidosis ($\text{pH} > 7.3$)
- Bicarbonate $>15\text{mmol/L}$

Precipitating factors of HHS are similar to those of DKA.



Treatment

Fluid replacement

Estimate fluid loss approximately 12litres. 50% of this deficit should be replaced in first 12hrs and the remaining over 12hrs.

Normal Saline is fluid of choice as follows:

- 1-1.5L in first 1 hour
- 1L over 2 hrs.
- 1L over 4hrs hours until hydration status has improved

Hydration status should be monitored closely and is indicated by urine output of $>0.5\text{ml/kg/hr}$.

Further fluid replacement guided by results of electrolytes and clinical condition of the patient.

Insulin therapy

- Soluble insulin to be initiated once hydration has improved at rate 0.1iu/kg/hour IV or subcutaneously.
- Potassium replacement similar to DKA protocol
- Treat precipitating factor
- Other supportive treatment e.g. thrombo-prophylaxis as in DKA above

1.1.8. Asthma Attacks

Refer to Adult Respiratory Tract Conditions under **Section 5.7.2.1.**

1.1.9. Choking

Refer to Paediatric Respiratory Conditions – Stridor/Inhalation of Foreign Body (**Section 4.3.2.3.**)

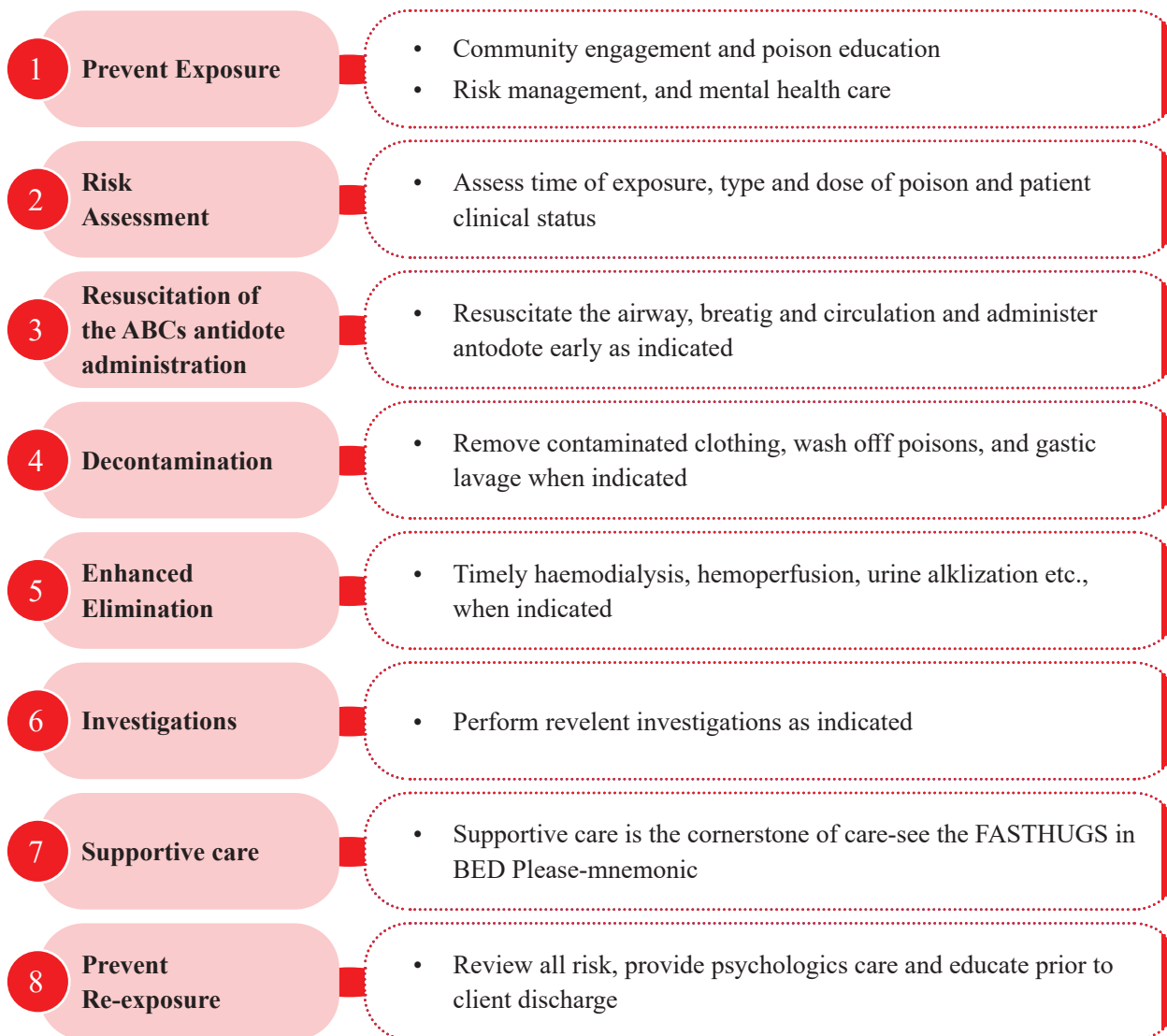
1.2 COMMON POISONS**1.2.1. Approach to poisoned patient****Description**

A poison is a substance capable of causing organ injury and or death. To poison implies to injure with a substance, while overdose implies toxic exposure to a substance. Poisoning connotes clinical symptomology. Not all patients presenting to the ED with a legitimate history of exposure to poison are poisoned. Therefore, the diagnosis and treatment of poisoning in the ED is often based on a 'toxidrome approach' rather than the actual lab confirmed 'chemical diagnosis' which is often delayed.

Table 5: Common Poisons and Antidotes

Toxin	Antidote
Organophosphates & carbamates	Atropine, oximes
Paraquat	Non
Isoniazid (INH)	Vitamin B6
Paracetamol	N-acetylcysteine (NAC)
Carbon monoxide (CO)	Oxygen
Benzodiazepines	Flumazenil
Opiates & Opioids	Naloxone
Tricyclic antidepressants (TCA)	Sodium bicarbonate
Toxic alcohols	Fomepizole, Ethanol
Envenomation	Mono- and poly-valent antivenoms

Figure 1: Approach to a Poisoned Patient



1.2.2. Organophosphates & Carbamates



Description

Organophosphates and carbamates are organic compounds used in pesticides. Organophosphates contain phosphorus and phosphorylation of acetylcholinesterase is irreversible, while carbamates bind to acetylcholinesterase reversibly. Exposure to these compounds is either intentional or accidental. Other means may include warfare, terrorism and homicidal.

Common sources

- Insecticides, herbicides, fungicides, & fertilisers
- Shampoos against head lice

- Livestock dipping agents
- Nerve agents



Signs and Symptoms

- *Cholinergic toxidrome*: DUMBBBELS: diarrhoea, urination, miosis, bronchorrhea, bradycardia, bronchospasms, emesis, lacrimation, and salivation.
- *Nicotinic toxidrome*: Mydriasis, tachycardia, hypertension, muscle fasciculations, weakness or paralysis, anxiety, seizures or coma.



Investigations

- Blood and Urine toxicology analysis
- Serum or red-cell cholinesterase activity
- Other supportive investigations as indicated



Treatment

- **Airway and Breathing**
 - Basic airway manoeuvres
 - Provide and escalate oxygen therapy as needed
 - Suction PRN.
- **Circulation**
 - Insert 2 large bore IV accesses, obtain blood samples for investigations
 - Provide resuscitative and maintenance crystalloid fluid as indicated.
- **Disability, Decontamination and Drugs**
 - GCS
 - RBS
 - Manage seizures if present (refer to section on seizures)
 - Pralidoxime 30 mg/kg, to be given over 20 minutes, followed by 8 mg/kg/hour; maximum 12 g per day.
 - Atropinisation – atropine 1-2mg of atropine IV doubling every 5 minutes until the atropinisation endpoint of clearing of the crackles. Confirm the presence of bronchorrhea by listening for crackles in the chest. Sum up the total amount of atropine it took to reach atropinisation end point (total atropinisation dose). Immediately start maintenance atropine IV infusion which is 20% of the total atropinisation dose. The patient may need more than 20% of atropinisation dose. Continue monitoring the patient closely for resurgence of cholinergic signs and symptoms or atropine toxicity. The maintenance atropine is typically continued for 24 hours if there are no signs of toxicity.

Signs of Atropine Toxicity

Confusion, extreme tachycardia, blindness, fever, loss of bowel sounds, and urine retention.

**Complications**

- Aspiration pneumonitis and or pneumonia
- Hypoxic organ injury
- Shock
- Organophosphate induced delayed polyneuropathy (OPIDP)
- Chronic organophosphate-induced neuropsychiatry disorder (COPIND)

**Referral Criteria**

All acute poisoning and or asymptomatic legitimate exposures should ideally be referred for 24-hour in-patient observation and care.

1.2.3. Snake Bites (Envenomation)**First Aid**

- DO NOT handle the snake without a snake pole
- DO NOT apply tourniquet
- Get to hospital as soon as possible
- Immobilise limb and patient
- Remove rings and tight clothing
- If available, apply pressure bandage with Smart bandage (pressure 50-70 mmHg) Not for cobra or adders (cytotoxic)
- Ice may help relieve pain
- Eye exposure: irrigate thoroughly (>20minutes) with clean water or specific eye irrigation fluid if available
- Provide analgesia

Approach

- Secure airway if indicated
- IV access, resuscitative and maintenance fluid
- Consider inotropic support if shock
- Note site(s) and time of the bite(s) and first aid administered e.g., incidence or compressive bandage
- Note snake type where possible

- Note current symptoms: pain, cramps, numbness, perioral anaesthesia, dyspnoea, bleeding
- Note medical history: Allergy, previous bites, tetanus immunisation status

Examination

- Bite site and first-aid measures. If tourniquet, may consider removal until antivenom given. Bites to neck, face, trunk are rapidly fatal
- Cardiovascular collapse: consider ANAPHYLAXIS if hypotensive
- Limbs: Compartment syndrome may occur



Treatment

- Consider antivenom early
- Tetanus prophylaxis (treat if not vaccinated with IG and offer tetanus vaccination)
- Venom ophthalmia
- Can lead to intense conjunctivitis and corneal erosion. Irrigate with neutral (water) solution.
- Consider local anaesthetic drops for blepharospasm
- Fluorescein stain:
- No erosion: antibiotic, eye pad, follow up 48 hours
- Erosion: antibiotic, mydriatic, daily slit-lamp exam until cleared
- Consult ophthalmology

1.2.3.1. Cytotoxic

- Adders: night, puff, and gaboon
- Spitting Cobras: Mozambique, black-neck, zebra, and ncidenc



Signs and Symptoms

- Pain and swelling progressing proximally (hours to days)
- Regional lymphadenopathy



Treatment

General: analgesia, IV fluids, elevate limb to level of heart.

Antivenom Indication

- Swelling > 15cm/hour, crossing major joint, whole limb in 8 hours
- Evidence of bleeding/coagulopathy

- Unexplained dyspnoea or airway swelling
- Dose:
 - o 50mL polyvalent
 - o Gaboon -200mL

High risk of anaphylaxis from anti-venom. Monitor patient very closely and be ready to resuscitate



Complications

- Anaphylactic reaction from the anti-venom
- Local: haematoma, cellulitis, abscess, necrosis: 90% (cobras), 25% (ncidenc), puff adder (10%)
- Regional: Compartment syndrome, nerve entrapment, DVT
- Systemic: hypovolaemia due to fluid loss
- Bleeding (thrombocytopaenia -puff adder, consumption coagulopathy -gaboona adder)
- Cardiotoxicity (hyponatraemia -gaboona)

1.2.3.2. Neurotoxic

- Green and black mamba
- Non-spitting cobras: forest, cape, snouted



Signs and Symptoms

Mambas

- *Minutes*: Paraesthesia -perioral $\pm$ hands and feet $\pm$ generalised. Metallic taste, salivation, diaphoresis
- *Later*: Progressive weakness: inability to swallow $\rightarrow$ respiratory failure (60-70% within 2 hours)

Cobras

- Initial bite swelling $\pm$ necrosis or abscess
- Respiratory weakness after 2-4 hours (50%)



Treatment

- General: ABCs – intubate and ventilate as indicated
- Indication for antivenom: Paraesthesia, diaphoresis/salivation/metallic taste, dyspnoea
- Dose: 80mL polyvalent, repeat in 1 hour if necessary

1.2.3.3. Hemotoxic

- Boomslang: activates F II and X, causing consumption coagulopathy
- Gaboon adder (converts fibrinogen to fibrin, disaggregates platelets)
- Puff adder (thrombocytopenia)



Signs and Symptoms

- Bleeding
- Bruising
- Petechiae



Treatment

- Blood products
- Antivenom indication:
 - o Active bleeding
 - o Lab evidence of coagulopathy
 - o Clotting time > 20minutes
- Antivenom Doses:
 - o Boomslang 10-20mL monovalent, repeat after 6 hours if needed
 - o Puffadder 50mL polyvalent
 - o Gaboon adder 200mL polyvalent

1.2.4. Isoniazid Toxicity



Description

INH overdose causes depletion of Vitamin B6 by inhibition of the enzyme pyridoxine phosphokinase which converts B6 to P5P. INH also binds P5P forming an inactive hydrazone. Thus, without P5P, there is depletion of GABA leading to CNS excitation and life-threatening seizures. The lactic acidosis is a result of the seizures and the impaired conversion of lactate to pyruvate.

The INH is rapidly absorbed from the gastrointestinal tract with peak levels observed within 2 hours of ingestion with a corresponding rapid onset of symptoms/seizures especially in rapid acetylators. In acute exposures, at doses >20mg/kg symptoms are likely, >40mg/kg seizures, metabolic acidosis, and coma likely, while doses >130mg/kg are often lethal.



Signs and Symptoms

- CNS: Dysarthria, ataxia and hyperreflexia, altered mental status, seizures (often generalised tonic clonic – usually spontaneously resolve and rapidly recur), coma
- GIT: Nausea and vomiting tachycardia, mydriasis,
- Others: dizziness, blurred vision, photophobia, lactic acidosis



Investigations

- Serum glucose
- ECG
- Point of care blood gas for electrolytes and acid base status
- Others as indicated



Treatment

- Follow the approach for resuscitation of ABCs as provided for under **Section 1.1.2.**
- Symptomatic clients should immediately receive vitamin B6 in a 1:1 ratio to the dose of INH ingested. i.e., 1g of B6 for 1g of INH. Typical range for most symptomatic adults' ranges from 3-5g of B6 given IV or orally via NGT.



Complications

- Hepatic failure
- Status epilepticus and complications thereof, coma, peripheral neuropathy, optic neuritis, encephalopathy, and death

1.2.5. Paracetamol Toxicity



Description

Main toxicity is hepatic and occurs 24 – 72 hours after ingestion. Toxic ingestion is 140mg/kg or 10g in adults (20 tablets of 500mg presentation), but in alcoholics lower doses may be toxic.



Signs and Symptoms

- *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.



Investigations

- Serum paracetamol levels at least 4 hours after ingestion and recheck at 8-12 hours unless undetectable at 4 hours.
- Serum and Urine Toxicology
- Liver function Tests
- Renal Function tests
- Clotting profile
- ABG's



Treatment

- **N-acetylcysteine (IV):** Adults 150mg/kg in 200mls of 5% Dextrose over 20 minutes, then, 50mg/kg in 500mls of 5% dextrose over 4 hours, then 100mg/kg in 1 liter of 5% dextrose over 6 hours. In severe poisoning a further 100mg/kg may be given over the next 24 hours
- **Children <20kg:** N-Acetylcysteine (IV) 150mg/kg in 3ml/kg of 5% glucose, over 15 minutes, followed by 50mg/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.
- Activated charcoal PO 1g/kg, up to 50gm if less than 1.5hours from time of ingestion.
- Supportive therapy as needed.



Complications

- Liver Failure
- Kidney Failure
- Lactic Acidosis

1.2.6. Salicylates (Aspirin)



Description

Toxic dose 150mg/kg with 300mg -500mg/kg being very toxic.



Signs and Symptoms

- Tinnitus (Ringing in the ears)
- Nausea
- Vomiting
- Hyperventilation/tachypnoea
- Fever
- Hypoglycemia
- Agitation
- Confusion
- Seizures
- Coma



Investigations

- ABG's/VBG's
- Electrolytes
- Kidney Function Tests
- Serum Salicylate
- Serum and urine Toxicology



Treatment

- Gastric lavage may be beneficial if done within an hour from time of ingestion.
- Give activated charcoal within one hour of ingestion if available at 1g/kg.
- Urine Alkalinization with 8.4% Sodium Bicarbonate 1 to 2 mEq/kg 2 amps + 40mEq KCL in 1 liter of 5% dextrose at 100-250mls/h +, titrated to maintain urinary PH > 7.5
- IVF (normal saline) to maintain BP, according to assessment.
- Intubate patients who are unable to protect airway

- Consider Hemodialysis for severe poisoning with metabolic acidosis or salicylate level $>700\text{mg/l}$ (5.1 mmol/l)



Complications

- Metabolic Acidosis
- Cerebral Edema

1.2.7. Carbon Monoxide (CO)



Description

Main toxicity is CNS. Diagnosis is clinical, with history of exposure to furnace, car exhaust, having slept in a poorly ventilated house/room where brazier was being used as source of warmth.

NB: Saturations on pulse oximetry will generally be normal even in severe carbon monoxide poisoning.



Signs and Symptoms

- Throbbing frontal headache
- Confusion
- Seizures
- Coma
- Nausea
- Hypotension



Investigations

- ABG's
- Carboxyhemoglobin levels



Treatment

- Administer 100% oxygen with a tight-fitting mask, intubate in comatose patients.
- IVF to correct hypotension and acid base disturbances.



Complications

- Metabolic Acidosis
- Arrhythmias
- Rhabdomyolysis
- In severe cases, long term neurologic sequelae; impairments in memory, concentration, speech

1.2.8. Opiate and Opioids Poisoning



Description

Opioids include drugs such as morphine, codeine, heroin, oxycodone and some fully synthetic opioids such as pethidine and methadone.



Signs and Symptoms

- Sedation
- Pinpoint pupils
- Hypotension
- Bradycardia
- Respiratory depression
- Apnoea
- Convulsions
- Non-cardiogenic pulmonary oedema



Investigations

- Toxicology screen
- FBC
- Metabolic panel
- ABG's
- ECG



Treatment

- Airway control and adequate oxygenation (Intubate patients who cannot support their airway)
- Naloxone: 0.4 to 2 mg, may be repeated up to 10mg, in adults and 0.1 mg/kg in children <20kg or under 5 years. In suspected habituated opioid users administered 0.1-0.4mg in aliquots slowly every 1 to 2 minutes to ensure a more controlled reversal of the opiate effects



Complications

- Acute lung injury
- Aspiration pneumonia
- Complications in IV users e.g. infections like abscesses and endocarditis.

1.2.9. Toxic Alcohol: Ethylene Glycol Toxicity



Description

Ethylene glycol is major ingredient in radiator fluid products (motor vehicle radiator coolant).



Signs and Symptoms

- Altered mentation and CNS depression
- Intoxication similar to ethanol
- Tachypnea and hyperventilation (due to severe metabolic acidosis)
- Acute kidney injury



Investigations

- Serum ethylene glycol levels
- Arterial blood gas analysis
- Serum osmolality
- Urea, creatinine and electrolytes
- Serum calcium and magnesium level



Treatment

- ABCDE approach
- Fluids to enhance renal clearance 250-500ml/hr crystalloids
- Sodium Bicarbonate
- Administer antidote: Fomepizole load 15mg/kg infusion over 30 minutes then 10mg/kg 12 hourly for 4 doses
- Then increase to 15mg/kg every 12hrs until ethylene glycol levels are below 20mg/dL

OR

- Ethanol: Loading 600mg/kg IV (7.6mL/kg of 10% ethanol solution). Maintenance: 1.5mL/kg/hr 10% ethanol
- Hemodialysis
- Pyridoxine 100mg IV q6hrs for 2 days
- Thiamine Adult: 200–300 mg daily in divided doses.

1.2.10. Weed Killer (Paraquat)

Refer to Paediatric Emergencies: **Section 4.1.10**



REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH

2.0

ANAESTHESIA AND CRITICAL CARE

2.1

ADULT MULTISPECIALTY ANAESTHESIA

2.1.1. Fundamental Principles of Anaesthesia Practice:

1. Standards of Anaesthesia Care
 - a. Pre-anaesthesia evaluation
2. Appropriate Staffing – trained anaesthetists
 - a. Level 1 Diploma/Bsc -Physician supervised
 - b. Level 2 Diploma/BSC/Physician – Physician supervised
 - c. Level 3 Diploma/Bsc/Physician
3. Oxygen Sources
4. Recovery Room/Post-Anaesthesia Care Unit
5. Referral Protocol for Critically Ill Patients
6. Standards of Critical Care
 - a. Level 1 HDU
 - b. Level 2 HDU level 2 ICU
 - c. Level 3 HDU level 3 ICU

Anaesthesia workstation

1. Anaesthetic machine must be in good working condition.
 - a. TEC series 5 and 7 plenum
2. Suitable breathing systems with appropriate measures to ensure the sterility and accessories for paediatric.
3. A manual bag valve-self inflating resuscitation bag.
4. Suction Machine including a manual one.
5. A stethoscope precordial stethoscope for use during paediatric anaesthesia should be readily available
6. Appropriate airway equipment:
 - a. Face masks, oropharyngeal airways, nasopharyngeal airways and (LMAs)
 - b. Two laryngoscopes with all range of blades per theatre
 - c. Endotracheal tube cuff inflating syringe
 - d. Magill's forceps and throat pack
 - e. Adhesive tape or tapes for securing the airway-tubes
 - f. Adult/paediatric stylets
 - g. Intubating bougies
 - h. K-Y Jelly or other appropriate sterile, water-based lubricant
 - i. Pillows or shoulder roll
 - j. Scissors

7. A cardiac defibrillator with capacity for synchronized cardioversion
8. WHO Surgical Checklist
9. Guidelines for management of rare emergencies associated with anaesthesia:

Anaphylaxis, malignant hyperthermia, peri arrest arrhythmias, local anaesthetic systemic toxicity must be available. Protocols must be laminated and attached to the anaesthetic machine.

Minimum Standard anaesthesia monitoring during sedation, anaesthesia and Recovery

1. Appropriate supervision – An appropriately trained anaesthetist **MUST** be available throughout the conduct of regional, anaesthesia and during conduct of sedation.
2. Minimum monitoring for General Anaesthesia
 - a. ECG, NIBP, SPO2, capnography, temperature
 - b. Inspired gas analysis age adjusted MAC VALUES
 - c. Additional Monitoring if available
3. Neuromuscular monitoring TOF
4. BIS/ENTROPY for TIVA or TCI level 3 care
5. Capillary blood sugar monitoring – diabetes mellitus
6. Minimum monitoring during regional anaesthesia
 - a. ECG, NIBP, SPO2 before during and 30 min after the procedure
7. Monitoring During Transfer
 - a. SPO2
 - b. NIBP
 - c. ECG
8. Monitoring during Sedation
 - a. ECG, SPO2, NIBP and capnography.
9. Alarm limits – **MUST** be set for all equipment for monitoring to patient specific values before use.
10. Anaesthesia Record during the procedure – information provided by monitoring devices **MUST** be charted every 5 min.
11. Clinical monitoring – anaesthetist is strongly advised to use clinical monitoring including precordial stethoscope.

Oxygen Sources

- Critical areas within the hospital, operating theatres and Intensive Care Units (ICUs) should never be supplied with oxygen at or below a concentration of 90% at any time.
- Back-up oxygen cylinders must always be available at points of care even when piped oxygen is in use.
- Oxygen plants such as commercial oxygen sources should produce oxygen at a concentration of above 99%. If using an oxygen concentrator, supplied oxygen should not be less than 90%.

Recovery Room/Post-Anaesthesia Care Unit (PACU)

- The PACU should be located close to the operating theatre to allow for quick access to anaesthetic providers and surgeons should an emergency arise necessitating returning into theatre.

- mask ventilator, suction, an oxygen source, power outlets and adequate lighting.
- Equipment and drugs for airway management, including a difficult airway cart or trolley.

Referral

- ICU should exist within the hospital in case of anaesthesia-related emergencies that may occur intraoperatively or during emergence. If ICU does not exist there has to be a clear referral protocol to the nearest referral centre, including communication protocol.

Preoperative Testing

1. Full hemogram – ALL patients, ASA I patients, may be safely anaesthetized for **minor** surgery without any blood tests and for Some Life-threatening Emergencies – E.g Airway Foreign body.
2. Urea, Creatinine and Electrolytes –
 - a. ALL patients for intermediate or major surgical procedures
 - b. Patients on medication that are likely to cause electrolyte derangements e.g., diuretics, laxatives, potassium supplements, salbutamol
 - c. Cardiac, renal or liver failure.
 - d. Severely or critically ill patients
 - e. Trauma patients
3. Coagulation profile
 - a. Patients on anticoagulants
 - b. Patient with chronic liver disease or liver failure
 - c. Patients with severe sepsis
 - d. Patients with major haemorrhage
 - e. Patient with known or suspected coagulopathy
4. 12-lead Electrocardiogram (ECG)
 - a. Diabetic patients
 - b. Hypertensive patients
 - c. Patient with cardiac disease or previous myocardial infarction
 - d. Patients with renal failure
 - e. Patients over the age of 50 years if symptomatic for cardiac disease
5. Echocardiography (ECHO)
 - a. Patients with cardiac disease
 - b. Patients with unexplained breathlessness or poor exercise tolerance
 - c. Patient with a cardiac murmur
 - d. Patient with an abnormal ECG
 - e. Patient with unexplained chest pain
6. Chest X-Ray
 - a. Patients with acute or chronic pulmonary disease
 - b. Patients with cardiac disease
 - c. Patients with unexplained chest pain or breathlessness.

NB: Further tests may be requested based on patients' condition or the advice of the physician, paediatrician, intensivist or anaesthetists.

El – Ganzouri Risk Index Egri for Difficult Airway

- Predicts risk of difficult airway
- Used in patients undergoing general anaesthesia and regional anaesthesia

Table 6: El – Ganzouri Risk Index Egri for Difficult Airway

Parameter	Finding	Score
Mouth opening	$\geq 4\text{cm}$	0
	$< 4\text{cm}$	+1
Thyromental distance	$>6.5\text{cm}$	0
	6-6.5cm	+1
	$<6\text{cm}$	+2
Modified Mallampati classification	I (soft palate, fauces, uvula, and pillars seen)	0
	II (soft palate, fauces and uvula seen)	+1
	III (soft palate and base of uvula seen)	+2
Neck movement	>90	0
	80-90	+1
	<80	+2
Ability to prognath (Ability to advance lower jaw forward)	Yes	0
	No	+1
Weight	$< 90\text{kg}$	0
	90 -110kg	+1
History of difficult intubation	None	0
	Questionable	+1
	Definite	+2

SARI EL-Ganzouri Risk index (EGRI) ranges from 0 to 12 – Higher score indicates a more difficult airway

Guide

1. EGRI < 4 – Intubate Under GA – Direct Laryngoscopy DL or Video Laryngoscope VL
2. EGRI 4 – 7 – Intubate Under GA IF EXPERTISE AND EQUIPMENT AVAILABLE.
 - VL
 - FOB
3. EGRI > 7 – Strongly advised to be done under awake FOB or Retrograde intubation.

2.1.2. Conduct of Anaesthesia

Rapid sequence intubation/induction non-obstetrics

Steps

1. PLAN
 - Review indication for RSI/Surgery

- Is RSI the best option
 - Assess airway and document – use scoring system
 - Have primary and backup plan available and discuss with team
2. POSITION – Get optimal position – sniffing position, use a pillow, ramp if necessary
 3. PREOXYGENATE with 100% oxygen – Mask, nasal cannula, or HFNC
 4. PREPARE
 - Prepare meds emergency drugs, induction, suxamethonium or rocuronium
 - Ensure good IV access best option 2 lines.
 - Standard monitoring -NIBP, ECG, SPO2, CAPNOGRAPHY strongly advised.
 - Pulse oximeter and IV Access on one side.
 - Suction functional and tested.
 - BVM, nasal and oral pharyngeal airways, laryngoscopes with different blades -difficult airway CART
 5. INDUCE AND PARALYZE
 - Fentanyl 1-3microgam/kg IV if indicated
 - Atropine 0.02mg/kg (minimum dose 0.1mg/kg recommended) if indicated.
 - Lidocaine 1.5 to 2mg/kg IV over 30 to 60 seconds if indicated
 - Defasculating agent – optional
 - Induce unconsciousness- agents, thiopentone 3-5mg/kg IV, propofol 2mg/kg, ketamine 1-2mg/kg, etomidate 0.2-0.3mg/kg IV
 - Paralyze – succinylcholine 1 – 2mg/kg or Rocuronium 0.6-1.2mg/kg IV push always flush
 - Apply cricoid pressure as appropriate
 - Wait for minimum of 30 seconds – assess for apnea, jaw relaxation – patient
 - Placement – Perform endotracheal intubation. If unable to intubate within 20 seconds, stop attempt and gently ventilate while keeping cricoid pressure for 30-60 seconds
 - Confirmation - chest rise, misting, auscultate, ETCO2 – confirmatory.

2.1.3. Complications During Anaesthesia

2.1.3.1. Laryngospasms

Sustained closure of the vocal cords resulting in partial or complete closure of the airway

Risk factors

Anaesthesia factors – inadequate depth of anaesthesia, airway irritation secretions, drugs -Thiopentone, inexperience

Patient factors – asthma, URTI, tobacco, obesity

Surgical risk factors – shared airway

Recognition

- Airway obstruction in an anaesthetized patient

- Failure of basic airway maneuvers and adjuncts fail to relieve obstruction
- Inspiratory stridor – complete airway closure
- Tracheal tug
- Paradoxical respiratory effort
- Desaturation
- Bradycardia



Treatment

- Call for help if necessary
- Remove triggering agent
- Clear larynx suction
- Apply CPAP with 100% O₂
- Propofol 0.5mg/kg increments
- Sux 0.1-2mg/kg if no IV access give IM, intralingual or intraosseous. IM dose 4mg/kg

Prevention

- Prevention – appropriate technique and depth of anaesthesia.
- Pharmacological prevention
 - o MgS IV 15MG/KG
 - o Lignocaine 1.5-2mg/kg IV

2.1.3.2. Bronchospasms during Anaesthesia

Causes of Wheezing during anaesthesia

- Obstruction of ETT – carina/endobronchial intubation
- Bronchospasm
- Pulmonary edema 100% oxygen
- Ventilate by hands
- Aspiration of gastric contents
- Pulmonary embolism
- Tension pneumothorax
- Foreign body
- Recognition of Bronchospasms
- Prolonged expiration
- Expiratory wheeze – auscultate over chest or heard in the circuit
- Reduced breathe sounds
- Silent chest
- High Peak airway pressure with IPPV
- Reduced tidal volume



Treatment

ANAESTHESIA

Supportive

- On suspecting bronchospasms
 - Switch to 100% oxygen
 - Ventilate by hand
 - Stop stimulation
 - Consider allergy – anaphylaxis
 - Difficult ventilation/falling SPO2 call for help
- Immediate management – prevent hypoxia and severe bronchospasms
 - Deepen anaesthesia
 - If ventilation through ETT is difficult or impossible check tube position and exclude blocked or misplaced
 - Eliminate breathing circuit with BVM
 - If non intubated consider laryngospasms and consider aspiration

Pharmacological

- First line – Sulbutamol
 - Metered dose inhaler 6-8 puffs repeat as necessary
 - Nebulized 5mg 1ml 0.5% repeat as necessary
 - Intravenous 250mcg slow IV, then 5mcg/min up to 20mcg/min
- Second line
 - Ipratropium bromide 0.5mg nebulized 6 hourly
 - MgSO₄ 50mg/kg IV over 20min max 2g
 - Hydrocortisone 200mg IV 6 hourly
 - Ketamine bolus 10-20mg, infusion 1-3mg/kg/hour
 - IN EXTREMES – epinephrine nebulizes with 5mls 1:1000, intravenous 10mcg (0.1ml 1:10000), to 100mcg (1ml 1:10000) titrate to response

Consider Transfer to HDU/ICU

Secondary management

- Optimize mechanical ventilation
- consider anaphylaxis
- If no improvement – consider pulmonary edema, pulmonary embolism, pneumothorax
- Consider abandoning surgery
- Request and review CXR
- Consider transfer to ICU.

2.1.3.3. Anaphylaxis

Etiology – Allergic and Genetic

Agents – Iv induction agents, Muscle relaxants, Opioids, Colloids, Antibiotics, Radiocontrast, Latex



Signs and Symptoms

- Skin – pruritus, burning, edema, urticarial, erythema,
- Respiratory – shortness of breath if awake, wheeze, cough, laryngospasms, bronchospasms, pulmonary edema
- Cardiovascular – feeling faint if awake, syncope, tachycardia hypotension, absent peripheral pulses, arrhythmias, cardiovascular collapse.



Treatment

Initial

- Stop the agent
- Maintain airway and give 100% oxygen
- Elevate feet
- Give adrenaline 0.5mg – 1ml Or 0.5ml – 1ml of 1:1000 in hypotension titrate every 10 min till hypotension resolves OR
- 50mcg to 100mcg IV over 1 minute 0.5ml – 1ml of 1:10000
- Start IV fluids crystalloids or colloids

Secondary

- Antihistamines chlorphenamine 10-20mg IV infusion
- Hydrocortisone 100mg-300mg IV
- Adrenaline infusion 4-8mcg/kg/min or 0.05-0.1mcg/kg/min
- Consider sodium bicarbonate 0.5-1mmol/kg IV
- Airway evaluation
- bronchodilators

2.2 OBSTETRIC ANAESTHESIA

Perioperative Obstetric Anaesthesia – Peripartum and analgesic procedures performed during labor and vaginal delivery, cesarean delivery, removal of placenta and postpartum tubal ligation.

Target Anesthetic management of pregnant patients during labour, non-operative delivery, operative delivery and postpartum care.

2.2.1. General Pre-evaluation Guidelines

Pre-anesthetic Evaluation

- Maternal health
- Anesthetic history
- Relevant obstetric history
- A baseline blood pressure measurement
- Airways assessment EGRI
- Heart and lung examination
- If neuraxial anaesthesia planned the back should be examined.

Intrapartum Platelet Count:

- Pre-eclampsia
- Suspected HELLP syndrome
- Disorders associated with coagulopathy

Recommendations

- If the platelet count is ordered a level of 70,000 or above is accepted for neuraxial block.
- A routine platelet count in health pregnant women is might not be necessary especially in emergencies.

Blood type and Cross Match (X-Match)

- An intrapartum blood sample should be sent to the blood bank for all parturients for vaginal and operative delivery.
- The following conditions MUST have blood cross matched:
 - o Anticipated hemorrhage, maternal history.
 - o Placenta previa, placenta accrete,
 - o Previous uterine surgery.
- In an emergency, availability of blood in theatre should not be a must but every effort should be made to ensure that blood is available for every high-risk patient for hemorrhage.

Peri-anesthetic recording of the Fetal Heart Rate is mandatory

Aspiration Prevention

- Oral clear fluids of modest amount maybe allowed for uncomplicated labor patients.
- The uncomplicated patients undergoing elective cesarean delivery may have modest amounts of clear liquids up to 2 hours before induction of anaesthesia.
- Examples of clear liquids – water, clear tea, black coffee. The volume ingested is less important than the presence of particulate matter in the liquid ingested.
- Oral fluid restriction – morbidly obese patients, diabetic patients, anticipated difficult airway, patients at increased risk of operative delivery – non-reassuring fetal heart rate.

Solids

- Solid foods should be avoided in laboring women. The patients undergoing elective cesarean delivery or postpartum tubal ligation MUST undergo a fasting period for solids of 6-8 hours depending on the type of food ingested.

Drugs

- Antacids
- Esomeprazole 20 mg PO/IV **OR** Omeprazole 20 – 40 mg PO
- H2 Antagonist
- Cimetidine 400 mg **OR** Famotidine 40 mg
- Metoclopramide 10 mg PO/IV

2.2.2. Removal of Retained Placenta

- There is no preferred anesthetic technique for removal of retained placenta.
- If the patient has an epidural catheter for labour analgesia and is hemodynamically stable, epidural anaesthesia is preferred.
- Hemodynamic status should be assessed before administering neuraxial anaesthesia.
- Aspiration prophylaxis should be administered accordingly.
- Sedation and analgesia should be titrated carefully due to the potential risks of respiratory depression and pulmonary aspiration during immediate postpartum period.
- In case of major maternal hemorrhage, general anaesthesia with endotracheal intubation with a cuffed endotracheal tube is preferred.

2.2.3. Anaesthetic Choices for Cesarean Delivery

2.2.3.1. Spinal Anaesthesia

Practical conduct of Spinal Anaesthesia

- Pre-anesthetic evaluation – As per obstetric Anaesthesia guidelines.
 - o Hypovolemia – Resuscitate before spinal anaesthesia.
 - o Remember contraindications

- Aspiration prophylaxis
- IV 16/18G access 2 lines
- Preload 1000ml to 1500ml crystalloid Ringers lactate preferred, 0.9% normal saline could be used.
- Urinary Catheter
- Equipment for general anaesthesia
- Essential drugs
 - o Ephedrine – 3mg/ml or Adrenaline – 10 mcg/ml or Phenylephrine 50 mcg/ml
 - o Atropine draw and ready to be given
 - o Suxamethonium and induction agent MUST be available.
- Standard routine monitoring
 - o NIBP before read at 1–3-minute intervals
 - o Continuous ECG and pulse oximetry
- Position -sitting or lateral. Clean and drape. Sterile
 - o Use 24/25G
 - o Dose – 1.8ml (9mg) with 0.2ml (10microrams) fentanyl 25mcg –total volume 2ml.
 - Or 2ml 0.5% hyperbaric bupivacaine with no additive
- Supine with left lateral tilt 15 degrees or a wedge under the right buttock.
- Test level of spinal – alcohol or pin prick.
- Monitoring after a spinal – NIBP, SPO2, ECG
 - o Measure NIBP every minute for at least 10minutes or until delivery of the baby, then 2.5 minutes till completion of the case.
- Management of Hypotension SBP < 100mmHg
 - o Maintain normotension or Systolic BP of at least 100mmHg
 - o Give Crystalloids RL
 - o Ephedrine 3-6mg increments or infusion add an ampule to 500ml RL OR adrenaline 10-50mcg repeat as necessary – monitor effects of adrenaline. Or Phenylephrine 100-200mcg IV last 15 minutes repeat as required.
 - o Maintain Heart rate of at least 80/minute if the BP is in the lower normal– use atropine to achieve this.
 - o Actively monitor signs of low cardiac output – nausea and vomiting, dizziness, pale rugged tongue, loss of consciousness
 - o Monitor level of spinal, watch out for high spinal – check protocol for management of high spinal anaesthesia.
- Failed spinal anaesthesia
 - o If NO effects after 20minutes, spinal anaesthesia may be repeated.
 - o If partial block decides
 - o Conversion to General Anaesthesia
 - o Local anaesthesia/ketamine supplementation
 - o Delay surgery for spinal later.
 - o If repeat spinal has no effect convert to general anaesthesia.
- Actively monitor blood loss

- After Delivery
 - o Rule out a second twin
 - o Oxytocin 2.5 IU dilute to 1 IU/ml IV slowly over at least 1 minute.
- Recovery
 - o Administer oxygen +/- via face mask
 - o Monitor NIBP and SPO2
 - o Make sure the patient is not bleeding
 - o Make sure the patient is pain free
 - o Infuse 20 U oxytocin in one liter of clear fluid over 8 hours 125ml /hour
- Discharge form Recovery
 - o Score the adrete score
 - o When height of spinal has decreased by 2 segments and vital signs are normal adrete score of at least 12/14

Complications of Spinal Anaesthesia

1. High Spinal



Description

Spread of local anesthetic affecting spinal nerves above T4.



Signs and Symptoms

- Progressive dyspnea,
- Weak hand grip
- Cannot touch nose
- Ineffective cough
- Cannot speak
- Respiratory – SPO2 < 90%, Hypoventilation, Apnea
- Cardiovascular – hypotension, bradycardia



Treatment

- Call for help
- ABC Approach
- Intubate – RSI and ventilate.
- Hemodynamic management

- Rapid IV fluids crystalloids RL or normal saline 1000ml run or colloid 500ml
- If Bradycardia
 - Atropine 0.6mg IV repeat if necessary.
 - Ephedrine 10-20mg IV
- Phenylephrine 50 mcg-100mcg IV
- OR Adrenaline 50mcg-100mcg iv

Prevention

- Level of block appropriate
- Use hyperbaric solutions – manipulate bed to limit spread.
- Avoid barbotage
- Do not inject during contraction
- Oxford wedge limit cephalic spread
- Reduce dose in morbidly obese patients

2. Total Spinal



Description

Intracranial spread of local anesthetic leading to loss of consciousness.



Signs and Symptoms

- ALL signs of high check above
- Exaggerated respiratory and cardiovascular compromise leading to collapse.
- Unconsciousness



Treatment

- Call for help
- ABC
- Intubate and ventilation
- ICU care
- Sedate until the local anesthetic has won out
 - Hemodynamic support
- Continued vasopressor and inotropic support
- Transfer to HDU/ICU if available. Refer to high facilitate if critical care services are not available
- Prevention – as in High Spinal

3. Unintended intravenous injection of local Anesthetic in pregnancy



Signs and Symptoms

- CNS
 - Dizziness
 - Restlessness
 - Tinnitus
 - Perioral paresthesia
 - Difficulty speaking
 - Seizures
 - Loss of consciousness.
- Cardiovascular –
 - Progress from increased blood pressure
 - Bradycardia
 - Ventricular tachycardia
 - Fibrillation



Treatment

- Call for help
- Position patient with left uterine displacement
- Prepare for emergency delivery if not delivered. Deliver within 4 minutes if not resuscitated.
- Give 100% oxygen
- Use positive pressure ventilation – intubate to facilitate ventilation and prevent aspiration.
- Stop seizures with midazolam or diazepam
- Monitor maternal vital signs and fetal heart rate
- Support maternal blood pressure with fluids and vasopressors
- Initiate advanced cardiopulmonary life support if needed with maternal modification for pregnancy
- Avoid vasopressin, calcium channel blockers, bet blockers and local anesthetics
- Administer adrenaline doses at less than 1mcg/kg
- Administer 20% intralipid emulsion
 - Bolus 1.5ml/kg over 1 minute – nciden. 100ml
 - Continuous infusion 0.25mg/kg/min for at least 10 minutes
 - Repeat bolus once or twice for persistent cardiovascular collapse.
 - Double the infusion if the BP remains low
 - Recommended maximum dose 10ml/kg over 30 minutes.

2.2.3.2 General Anaesthesia

General Anaesthesia in emergency obstetrics – Fetal Distress

Category 1

Anaesthetic considerations

- How quickly should the baby be delivered? Ask surgeon type of ASPHYXIA.
- Fetal asphyxia – time for a spinal is possible
- Fetal anoxia (cord compression, fetal bradycardia, uterine rupture) – lethal in less than 10 min GA appropriate
- Check FHR in OR before proceeding
- Difficult airway possibility if GA is the first choice –GA used ONLY when Necessary.
- Consider Intrauterine fetal Resuscitation – treat hypotension – (ephedrine, phenylephrine, adrenaline); reduce uterine activity (stop oxytocin, terbutaline, NTG)

Pre-induction checklist

- Take AMPLE history
- Airway assessment
- Aspiration prophylaxis – sodium citrate 30ml 0.3M
- IV access 18G
- Left uterine displacement
- Regional Anaesthesia Preferred – spinal Anaesthesia if time allows – rapid sequence spinal – ATTEMPT Spinal ONCE.
- O2 high flow
- Stop oxytocin
- IVF 1000ML crystalloids
- Vasopressor if blood pressure is low
- Tocolysis – terbutaline 250mcg subcutaneous NTG spray 400mcg twice

Conduct of General Anaesthesia

1. Patient prepped and draped before induction
2. RSI with cricoid
 - Preoxygenate 4 breathes
 - Induction – Thiopentone 5-7mg/kg IV, or Propofol 2mg/kg or ketamine 2mg/kg as appropriate
 - Paralyze Sux 1-1.5mg/kg iv
 - ETT put and verified and secured INSTRUCT surgeon to cut
 - o Opioids after cord is cut
 - o Maintain anaesthesia as appropriate.
 - o Antibiotic prophylaxis
 - o Post-op analgesia

2.2.4. Anaesthesia for Obstetric Emergencies

2.2.4.1. Severe Pre-Eclampsia

General anaesthesia for Caesarean section in severe pre-eclamptic patients is indicated in

- Coagulopathy, Pulmonary edema, Severe fetal distress, Placenta abruption
- Risks facial,
- Difficult airway – laryngeal and tongue edema
- Difficult airway
- Fatal hypertensive crisis response to laryngoscopy and extubation CVA, pulmonary edema, HF
- MgSO₄ potentiates neuromuscular blocking agents
- Non-depolarising muscle relaxants

Anaesthetic Technique

General management see above, in addition:

- Have a low threshold for direct arterial blood pressure monitoring (prior to induction if time allows) in patients with severe PET requiring a Caesarean section under GA
- Aim to have 2 anaesthetists present for these complex cases (Consultant if appropriate)
- Induction of Anaesthesia: Use a modified rapid sequence induction technique with an opioids

Blunting pressor response: Options

- Labetalol, esmolol.
- Fentanyl 2.5 µg/kg or up to 200 µg iv Alfentanil 10 µg/kg iv
- Or IV lignocaine 1-2mg/kg
 - o Inform the Neonatologists that you will be giving i.v opioids to the mother on induction
 - o Remember to control the pressure response at emergence of anaesthesia
 - o Dilute/slow administration of Oxytocin. Avoid Ergometrine
 - o Arrange post-operative care in Obstetric HDU (or ICU if indicated and available)

Procedure

- Administer aspiration prophylaxis refer to aspiration prophylaxis
- Additional IV lines
- NIBP, SPO₂, connect capnography, ECG, TEMPERATURE, OU
 - o Additionally, A line, CVP if available LEVEL 3
- Smaller ETT 6;6.5;7.0 mm
- Laryngoscopes different blades
- Difficult airway CART – Bougies, stylet, LMA, Video laryngoscope, needle cricothyroidotomy set
- Optimal position –Ramp up, LUD
- Preoxygenate 3-5minutes
- Propofol 2m/kg IV or Thiopentone 5-7mg/kg

- Suxamethonium 1- 1.5mg/kg
- Cricoid pressure, ETT.
- Arrange HDU or ICU Care

2.2.4.2 Eclampsia

Description of Eclampsia – Occurrence of one or more generalized convulsions and/or coma in the setting of pre-eclampsia and in the absence of other neurologic conditions before, during or after labor.

Anaesthesia role

- Control and prevent convulsions
- Control blood pressure
- Establish an airway – prevent aspiration

The ABCs of Eclamptic seizure control

Airway

- Turn patient to the left side apply jaw thrust
- Attempt BVM ventilation
- Insert soft nasopharyngeal airway

Breathing

- Continuous bag mask ventilation FiO₂ 1.0
- Apply Pulse oximeter and monitor SPO₂

Circulation

- Secure IV access
- Check BP at frequent intervals
- ECG monitoring

Drugs

Magnesium Sulphate

- Total loading dose Magnesium Sulphate 4g (20mls of 20%) IV over 20min followed by 5g (10mls of 50%) IM in each buttock
- Add 1ml of 2% lignocaine to IM injection.
- 2g IV over 10 min for recurrent seizures.
- Maintenance dose 5g of 50% MgSO₄ IM every 4 hours in alternate buttocks.

Antihypertensives

- Check treatment of hypertension in pregnancy under Section 6.5.2

Anesthetic Management

- Airway assessment and prepare for difficult Airway
- Difficult airway cart.

- Assessment of seizures control and neurologic function
- Maintenance of fluid balance – restrict intake to 75-100ml/hr minimize cerebral edema
- Blood pressure control target SBP < 160 and DBP < 110 mmHg
- Continuous SPO2
- Continuous Foetal Heart Rate monitoring
- Laboratory similar to pre-eclampsia
- Seizure – Goal: prevent hypoxia, trauma, and additional seizures.
- Rapid Sequence Induction (RSI)
- Induction choice – Thiopentone/Propofol
- LUD/full lateral, O2, airway, +/- ETT (If intubation: control BP to avoid cerebral hemorrhage) as in pre-eclampsia
- Blunt Laryngoscopy pressor response as in pre-eclampsia

2.2.4.3 HELLP Syndrome

Description of HELLP – Hemolysis, Elevated liver enzymes, low platelets.

- Risks as in severe pre-eclampsia and eclampsia.
- Manage Hypertension and seizure as above,
- Evaluate for delivery – vaginal delivery is preferred.
- If active bleeding, consider platelet transfusion
- Prepare for delivery, likely GA if C-Section (Control hypertension, seizures) prevent pressor response as above.

2.2.4.4 Antepartum Haemorrhage

a. Placenta previa

Painless vaginal bleeding in the second and third trimester.



Investigations

Ultrasound

Risks

- Catastrophic bleeding
- Preterm delivery

Assessments

- Frequent maternal vital signs evaluation
- Frequent fetal evaluation FHR
- Frequent Hb and platelet

Anesthetic management

- All patients with placenta previa must be evaluated by an anesthetist on arrival focus
 - o Airway evaluation
 - o Intravascular volume assessment
 - o History of previous cesarean section
- Volume resuscitation must start with ringers' lactate for women who are bleeding
- Blood type and screen – after a bleeding episode
- TED – sequential compression stocking
- Double set up examination
- Examination in the operating room
- Obstetric, nursing and anaesthesia team ready
- Anaesthesia prep
 - o Apply monitor – BP, ECG, SPO2
 - o Insert two large bore cannulas
 - o Administration of sodium citrate 30ml 0.3M
 - o Suction and airway prep
 - o Resuscitation drugs
 - o Induction drugs
 - o Sterile and woman draped

Cesarean Section

Choice of anaesthesia depends on

- Urgency of delivery
- Severity of maternal hypovolemia
- Obstetric history – prior caesarean delivery

Consider the following risks of bleeding:

- Injury to the anterior placenta by the surgeon
- Poor contraction of the lower segment
- Placenta accreta – increased risk with previous caesarean section

Regional indicated in the following women

- No active bleeding
- No intravascular volume deficit

Placenta previa and active preoperative bleeding:

- Emergency category I patient
- Evaluate – airway assessment and vol status, resuscitate and prepare for delivery
- 2 large bore 18G/16G CANNULA
- Order blood urgently

- Blood administration equipment – rapid infusers, invasive monitor if available.
- In severe bleeding cases – get Rh negative O
- Rapid sequence induction with Ketamine 0.5-1mg/kg and Etomidate 0.3mg/kg preferred.
- Anaesthesia determined by hemodynamic stability

b. Placenta 64nciden

Abnormally adherent placenta to the myometrium. Presents significant risk of massive postoperative bleeding.

Diagnosis/Risks – placenta previa and/or previous caesarean delivery. Multiple CS increases the risk

Anesthetic management

Preoperative – anticipate significant bleeding

- 2 large bore 16/18G cannulas
- Blood products MUST be in theatre. Prepare for massive blood transfusion
- Invasive monitoring CVP and IBP level 3 care
- Cell server post op
- Preoperative interventional radiography may reduce bleeding if available level 3 care
- Intraoperative
- Choice of anaesthesia is controversial
- GA is preferred because risk of hemorrhage and caesarean hysterectomy
- Regional may be considered if difficult airway is anticipated

c. Abruptio Placenta

Premature separation of a normally situated placenta after 20 weeks of gestation.

This can present with:

- Significant bleeding which is usually concealed.
- Maternal hypotension, uterine irritability, abdominal pain, fetal distress, fetal demise.
- Clotting abnormalities – DIC.

Treatment – definitive is delivery

Anaesthetic Management

Factors for choice of anaesthesia

- Severity of abruptio
- Urgency of delivery

Regional anaesthesia considered under the following

- Hypotension absent
- Clotting indices acceptable
- No evidence of fetal distress

Emergency Cesarean Section is the reasonable choice in the following circumstances

- Severe hemorrhage with hypotension/shock
- Fetal distress
- Coagulopathy present
- Anaesthesia as in bleeding placenta previa.
 - o Blood and blood product – bleeding and DIC.
 - o Aggressive fluid resuscitation
 - o CVP/IAP level 3 care.
 - o Senior anesthetist
 - o RSI protocol in obstetrics
 - o Ketamine or etomidate if hypotensive
 - o Infusion of uterotonics – high risk of uterine atony

d. Uterine Rupture

Conditions associated with Uterine rupture

- Obstetric – previous uterine surgery, induction of labor dose oxytocin induction, prostaglandin induction, grand multiparous
- Trauma – blunt, forceps delivery, excessive fundal pressure.

It can present in the following types

- Uterine scar dehiscence
- Uterine rupture

Signs and Symptoms

- Abdominal pain
- Abnormal FHR pattern
- Vaginal bleeding
- Cessation of labor
- Hypotension
- Loss of fetal movements

Anaesthetic Management

- Evaluation and resuscitation
- Aggressive fluid resuscitation
- General anaesthesia – ketamine or etomidate better choices
- RSI protocol
- Sodium citrate
- Blood transfusion may be necessary.

Terminologies

- Term infant – 37 – 42 weeks of gestational age
- Preterm infant – less than 37 weeks gestational age
- Post term infant – more than 42 weeks gestational age
- Newborn – First 24 hours
- Neonate – up to 28 Days
- Infant up to 1 year

Remember Risks in Preterm Infants

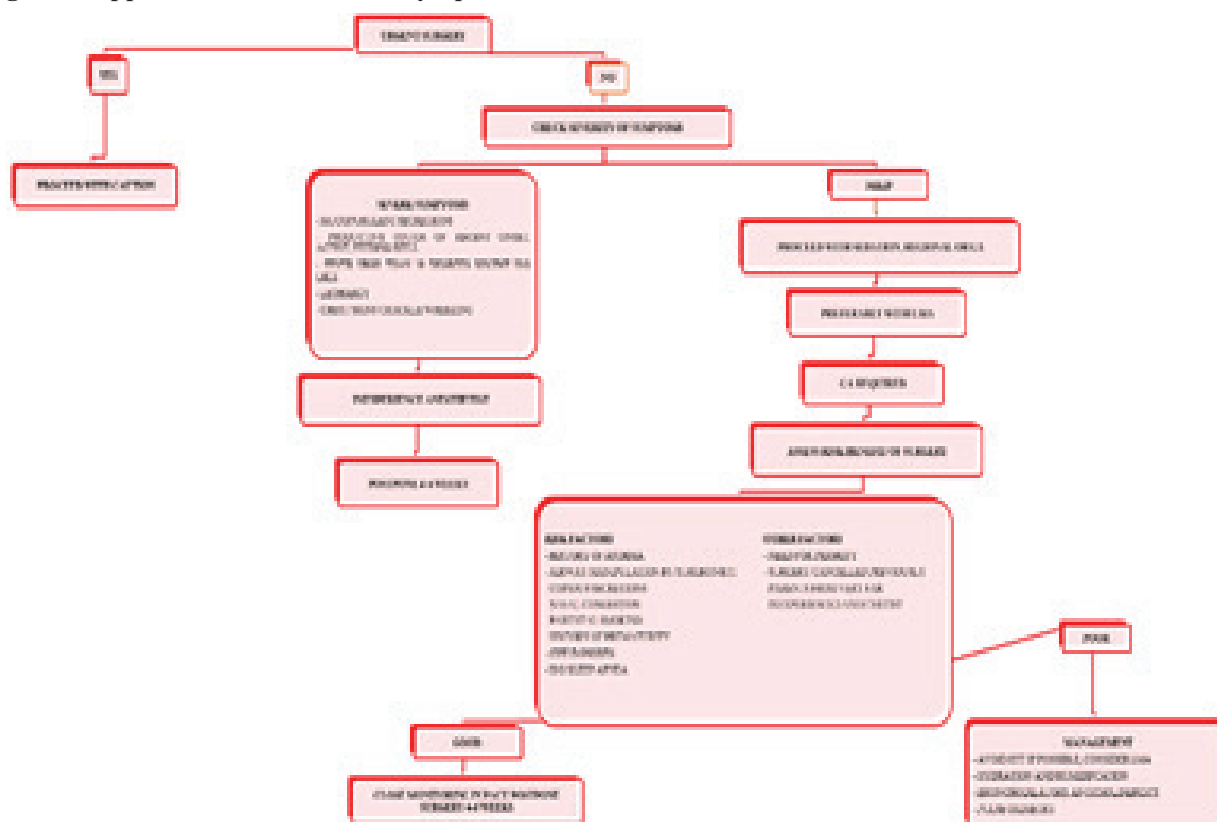
- Hyaline membrane disease
- Hypoglycemia
- Hypocalcemia
- Hypomagnesemia
- Thrombocytopenia
- Hypobilirubinemia
- Polycythemia
- Viral infection
- Hypoithermia
- Sepsis

2.3.1 Prepare the child for Anaesthesia

- Paediatric fasting guidelines
 - o Clear fluids allow 2 hours
 - o Breast milk 4 hours
 - o Artificial milk 6 hour
 - o Solids 6-8 hours
- Assess primary and secondary smoking
- Psychological preparation of children for surgery – age appropriate; parents or gurdians included
- Assess age-appropriate child development and behavior
- Consider parental presence in theatre based on assessment and discuss with parents/guardian.
- Present illness refers to annex
- Past medical history
 - o Herbal medications

- FHG as appropriate
- Urea and electrolytes
- Coagulation tests – Platelet count, INR PT and ApTT
- Pregnancy test – indicated amongst teenagers – disclosure guidelines to be followed.

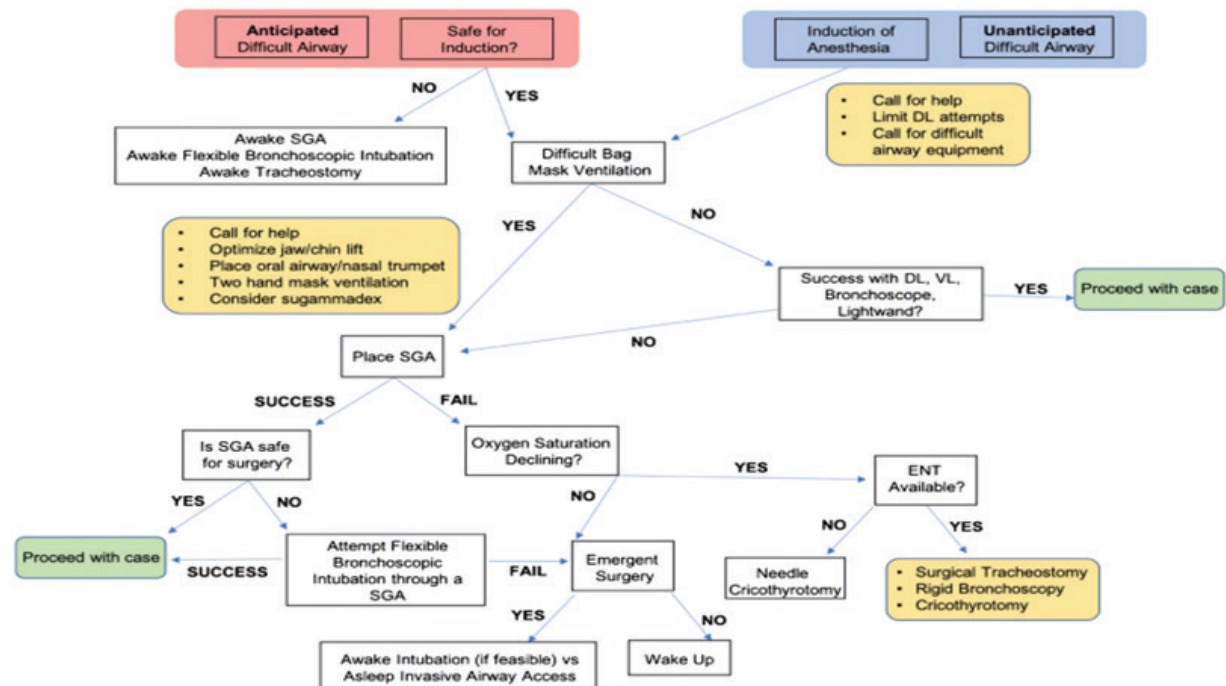
Figure 2: Approach to a Child with Symptoms of URTI



Recognition

- Congenital – craniofacial anomalies – Pierre Robbins sequence, Treacher Collins, laryngeal web and malacia
- Structural – aspirated foreign bodies, trauma, tracheal stenosis, post intubation edema, necrotizing joint ankylosis. Post burn contractures
- Inflammation – croup, epiglottitis, laryngeal papilloma, retropharyngeal abscess, necrotizing abscess.

Figure 3: Recognition and Management of the Difficult Paediatric Airway



Adopted from *springer nature*

Premedication:

Objectives – Reduce anxiety, ease separation, block autonomic vagal response, amnesia, aspiration prophylaxis, and provide analgesia.

Sedatives

- Midazolam 0.25-0.75mg/kg oral, 0.2mg/kg nasal, 0.5 – 1mg/kg rectal, 0.1 – 0.15mg/kg IM
- Diazepam 0.1-0.35mg/kg oral; 1mg/kg rectal
- Lorazepam 0.025-0.05mg/kg oral

Analgesics

- Ketamine – oral 6mg/kg, nasally 3mg/kg, low dose IM 3-4mg/kg, high dose IM 8-10mg/kg
- Opioids
 - o Fentanyl 1-3mcg/kg
 - o Morphine 0.05 – 0.1mg/kg

Anticholinergics

- Atropine 10-20mcg/kg
- Glycopyrrolate

2.3.2 Theatre Preparation

Pre-Induction Checklist:

- Complete standard machine check
- Ensure backup ventilation and O2 available S Suction:

- Confirm suction is available and working M Monitors:
- Standard: Pulse Ox, BP, EKG, Capnography, Temp
- Consider adjuncts: palpate pulse, auscultation, etc.
- Confirm appropriate plan and backup
- Prepare mask, ETT/LMA, laryngoscope/blades, bougie, tape/tie
- Optimize intubation positioning (sniffing, ramp) I IV:
- Confirm adequate number & flow of IV's D Drugs:
- Availability of standard & emergency meds

2.3.3 Practical conduct of Anaesthesia

Induction

Consider Parental presence in theatre in the following:

- Children more than 4 years
- Children whose parents are not anxious
- Children with history of anxiousness

Techniques of induction

1. Inhalational induction

- Steal induction if the child is sleeping
- Agent options – halothane or sevoflurane
- Halothane – increase 1% every after 3-4 breathes until child is asleep. Caution More than 3% is dangerous.
- Sevoflurane – uncooperative children 8% is used.
- Use clear masks
- Cupped hand is sometimes used – caution theatre pollution.

2. Intravenous induction

- Preferred for children with full stomach, trauma, older children, known patient with h/o malignant hyperthermia.
- Drugs used
 - i. Thiopentone 2-4 mg/kg
 - ii. Propofol 2-4mg/kg
 - iii. Ketamine 1-2mg/kg

3. Intramuscular route

- Indicated in children with severe developmental delay and those with congenital heart disease.
- Ketamine 6-8mg/kg

4. Complications at Induction

Look out for the following:

- Airway obstruction – mitigation -Jaw thrust, oral airway or nasal airway

- Laryngospasms – treatment – 100% oxygen, tight mask, CPAP. If this fails deepen anaesthesia – Propofol, thiopentone. Paralyze if ALL above fails
- Bronchospasms – prevent allow plane of anaesthesia. If it occurs deepen anaesthesia. Inhaled bronchodilators, IV ketamine or magnesium sulphate – check treatment of intraoperative bronchospasms
- Hypovolemia – prior to induction
 - i. Risk patients – trauma, bowel obstruction, bowel perforation, bleeding tonsils
 - ii. Correct fluid deficit rapidly, consider ketamine for induction
 - iii. Ensure good IV access
- Full stomach
 - i. If NG Tube is in situ suction on it
 - ii. If no NG tube insert while awake perform suction on it
 - iii. Perform rapid sequence induction with cricoid pressure.
- Maintenance of anaesthesia

Airway maintenance options

- Spontaneous ventilation – Options
 - i. A facemask reserved for children over 6-month, simple low risk of aspiration, 3-4 cmH₂O CPAP must be applied. Risk Aspiration
 - ii. Oropharyngeal airway
 - iii. Laryngeal mask airway LMA –
- Controlled ventilation
 - i. Endotracheal tube – see section on intubation
 - ii. Secures and minimizes aspiration

Maintenance of General Anaesthesia

Goals – maintain adequate anaesthesia and good operating conditions, maintain physiological homeostasis and circulating blood volume.

- Inhaled anaesthetics
 - i. Halothane
 - ii. Isoflurane
 - iii. Sevoflurane
- Parenteral agents
 - o Narcotics – fentanyl 2-3mcg/kg, morphine 0.1 – 0.2mg/kg
 - o TIVA/TCI CHECK GUIDELINES level 3 practice.

Neuromuscular Blockade

- Caution uses in neonates
 - o Immaturity of the neuromuscular system
 - o Longer elimination half life
 - o Fewer fatigue resistance muscle – prone to respiratory failure
 - o Atelectasis.
 - o Hypothermia is common and prolongs their action

Intraoperative Fluids

- Use isotonic fluids – Ringer lactate preferred
- Use micro drip in neonates and infants
- Calculate and administer the following – check section on perioperative fluid management
 - o Maintenance fluids 4/2/1 (as below)
 - o Deficit
 - o On going losses
 - o Third space loss

Metabolic management

- Identify and treat hypoglycemia
- Hypocalcemia
- Hyperglycemia
- Hyperkalemia

Temperature management in children

- Minimize heat loss by the following
 - o Use warming mattresses – if not available wrap in warm cotton wool or plastic
 - o Humidification of inspired gases use HME
 - o Warm skin preparation solutions
 - o Use fluid warmers if not available warm fluids in a bucket
- Measure Core and peripheral temperatures – sites Axilla, skin, esophagus and tympanic
- Monitor temperature continuously
- Maintain at 36-37°C.

2.3.4 Fluid management in paediatric patient

Table 7: Clinical assessment of degree of dehydration

Symptom/Sign	Mild	Moderate	Severe
Weight loss	< 5%	5-10%	>10%
General condition	Alert/restless	Thirsty/lethargy	Cold and sweaty
Pulse	Normal rate/vol	Rapid/weak	Rapid/feeble
RR	Normal	Rapid	Rapid/deep
SBP	Normal	Normal/low	Unrecordable
Anterior fontanelle	Normal/sunken	Sunken	Very sunken
Eyes	Normal/sunken	Sunken/dry	Grossly sunken
Skin turgor	Normal	Decreased	Markedly sunken
Mucus membranes	Moist	Dry	Very dry
Urine out put	Adequate 0.5-1ml/kg/hr	Less/dark	Oliguria/anuria
Capillary refill, time	Normal <2sec	<2sec	>3sec
Estimated deficit	30-50ml/kg	60-80ml/kg	>100ml/kg

Fluid maintenance calculation

The 4/2/1 rule

- 0-10kg – 4ml/kg/hour
- 10-20kg – 2ml/kg/hour
- >20kg – 1ml/kg/hour

Investigations that confirm type of dehydration

- Serum osmolarity
- Serum sodium
- Acid base status pH and base excess
- Serum potassium
- Urine output and specific gravity

Dehydration type and diagnosis

- Hyponatremic dehydration – serum osmolarity < 270mosmol/l, serum sodium < 130mmol/l
- Isonatremic dehydration – serum osmolarity 270-300momol/l, serum sodium 130-150mmol/l
- Hypernatremic dehydration – serum osmolarity >310mosmol/l, serum sodium >150mmol/l

Correction of Fluid Deficit

Emergency Phase

- Isotonic crystalloids Ringer or normal saline 20-30ml/kg 10-20 minutes – Priority restores circulation and renal perfusion – evaluate after bolus you may repeat.

Repletion phase I

- 25-50ml/kg – half the deficit over 6-8hours

Repletion phase II

- Remainder of deficit over 24 hours.

Perioperative fluid management

Stable elective procedure

Preferred fluid Ringer's lactate. Use normal if indicated.

- Calculate maintenance using the 4/2/1 rule.
- Calculate fluid deficit to compensate for starvation by multiplying the maintenance fluid calculated above by the number of hours of starvation. Replace 50% of the deficit in first hour, the 25% in each of the 2hours.
- Replace on going losses
 - Blood loss
 - o 1 part blood loss to 1.5/2 parts crystalloids or 1to 1 if colloid is used.
 - o Calculate MABL to guide transfusion
- Replace Third space loss as guided in the table below.

Table 8: Fluid Replacement in Surgical Trauma

Surgical Trauma	Type of surgery	Fluid replacement
Minimal	Inguinal Hernia	1-3ml/kg/hour
Moderate	Ureter implantation	3-5ml/kg/hour
Severe	Scoliosis, bowel obstruction, thoracotomy	6-10ml/kg/hour

NB: Fluids management in special conditions – check in relevant references.

2.3.5 Guidelines for Blood and Blood Product Transfusion in Paediatrics

RBC transfusion in infants, children and adolescents

RBCs may be transfused either citrated whole blood or packed RBCs

Infants within first 4 months of life:

- Hb < 13g/dl and severe pulmonary disease
- Hb < 10g/dl and moderate pulmonary disease
- Hb < 13g/dl and severe cyanotic Heart Disease
- Hb < 10g/dl and moderate Cyanotic Heart disease
- Hb < 8g/dl and symptomatic anemia

Children and Adolescents

- Acute blood loss > 25% blood volume
- Hh < 8g/dl in perioperative period
- Hb < 13g/dl when associated with severe cardiopulmonary disease
- Hb < 8g/dl and symptomatic anemia

Calculating Maximum Allowable Blood Loss (MABL):

MABL = Estimated Total blood vol EBV (starting Hct – target Hct)/ starting Hct

Guidelines for Platelet Transfusion

Infants within first 4 months of life

- Platelet < 50,000/m³ and bleeding
- Platelet < 50, 000/m³ and invasive procedure
- Platelet less than 20, 000/m³ and marrow failure with additional bleeding risk
- Platelet count normal with quantitative platelet defect and bleeding or invasive procedure.

Fresh Frozen Plasma Transfusion

Indications in neonates

- Reconstitution of RBC concentrates to simulate whole blood for use in massive transfusion

- Hemorrhage secondary to vitamin K deficiency
- DIC with bleeding
- Bleeding in congenital coagulation factor deficiency when more specific treatment is unavailable.

Indications in children and adolescents

- Severe clotting factor deficiencies and bleeding and invasive procedures.
- Emergency reversal of warfarin
- In anticoagulant protein (AT III, protein C and S) replacement
- Plasma exchange replacement fluid in thrombocytopenic purpura.

Initial transfusion dose 15ml/kg

2.3.6 Anesthetic management for a child with Intestinal Obstruction (IO)

Causes of acute IO

Neonatal

- Duodenal, jejunal, Ileal atresia.
- Anorectal malformation – imperforate anus

Infancy

- Intussusception
- Hirschsprungs disease
- Incarcerated hernia

Older Children

- Adhesions
- Hernia



Signs and Symptoms

- Vomiting
- Dehydration
- Electrolyte imbalance
- Abdominal distension with possible respiratory distress
- Infection
- Obstruction, hemorrhage, infarction



Investigations

- FBC
- Urea and electrolytes
- X-match clinical judgment – you need not to wait for blood
- Others – depend on the primary cause for the obstruction and clinical state of the patient.

Preoperative Evaluation and optimization

- Take a concise history as appropriate – parents or guardians
- Assess fluid deficit based on symptoms and signs – see table on fluid management
- Perform aggressive fluid resuscitation Ringer's lactate as first choice
- Body temperature and temperature gradient
- Calculate fluid deficit and resuscitate aggressively as you prepare for theatre.
- Prepare blood as appropriate
- Ensure NG tube

Anesthetic Management

- Full stomach rules **MUST** apply
- Intravenous induction – IV access, run fluids fast as per guidelines above RL
- Rapid sequence induction
 - o Preoxygenation 3-5 minutes if child is cooperative, or 4-6 vital capacity crying breathes
 - o Administer IV Atropine if not tachycardia is not severe. Glycopyrrolate is an alternative in presence of tachycardia
 - o Ketamine 1-2mg/kg IV lower doses maybe used in severe circulatory failure. Other options Thiopentone and propofol
 - o Cricoid pressure
 - o Succinylcholine 1-1.5mg/kg IV – Allow drugs to achieve their full effect
 - o Perform laryngoscopy and intubate with cuffed ETT.
- Inhalational induction may be used in the following
 - o Well hydrated
 - o Low colonic obstruction
 - o No distension
 - o No vomiting
- Choice of the agent – sevoflurane or halothane
- Avoid nitrous oxide
- use controlled ventilation – increased abdominal pressure – use appropriate muscle relaxants
 - o Pancuronium
 - o Atracurium
 - o Cisatracurium

- Fluids balance management ensure that the following fluids are managed
 - o Deficit calculated give and assessment done for response
 - o Maintenance fluids
 - o Third space losses
 - o If febrile additional fluid given
 - o If Significant blood loss is anticipated. MABL **MUST** be calculated before surgery – prevent blood loss below the target hematocrit
 - o Extubate when the following are achieved
 - Fully awake
 - Adequate spontaneous ventilation
 - Not hypotensive
 - Muscle relaxant completely reversed
 - o Consider postoperative ventilation
 - Severe sepsis or septic shock
 - Large incisions with Significant blood loss and massive transfusion
 - Hypothermic
 - Unstable cardiovascular system

2.3.7 Anaesthesia for a paediatric patient with Asthma

Preoperative intervention

- Consult paediatrician
- Optimize routine medication the patient is on and include inhaled corticosteroids
- Avoid secondary tobacco exposure
- Ensure no acute infections
- short course oral steroids
- inhaled beta adrenergic – albuterol and ipratropium bromide on the day of the surgery

Induction and Intraoperative Management

- Intravenous induction preferred
 - o Ketamine 2mg/kg; propofol 2mg/kg
 - o Avoid Thiopentone
- Airway choice LMA better than ETT if surgery allows
- Prevent intraoperative bronchospasms
 - o Glycopyrrolate, lidocaine, dexamethasone after induction
- Maintenance of anaesthesia – sevoflurane or halothane –avoid Isoflurane and Desflurane
- Neuromuscular blocking agents vecuronium, cisatracurium, Pancuronium avoid Atracurium



REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH

3.0

COMMON NEONATAL CONDITIONS

3.1 ESSENTIAL NEWBORN CARE



Description

Essential newborn care involves immediate care at the time of birth, and essential care during the entire newborn period. Essential newborn care includes:

- Immediate care at birth (delayed cord clamping, thorough drying, assessment of breathing, skin-to-skin contact, early initiation of breastfeeding)
- Thermal care and protection
- Initiation of breathing and resuscitation when needed
- Support for breast milk feeding with early initiation and exclusive breastfeeding
- Cord care
- Eye care
- Management of preterm birth and the low birth-weight newborn
- Immunization
- Nurturing care
- Clean delivery practices and infection prevention
- Assessment of health problems
- Recognition and response to danger signs
- Management of newborn illness
- Appropriate, timely and safe referral when needed
- Counselling on the care of every newborn.

Ensure documentation of examination findings including vital signs in the delivery room and postnatal ward.

Table 9: Normal Vital Signs in Neonates

Vital Sign	Normal range
Respiratory rate	40-60 breaths per minute
Heart rate	100-160 beats per minute
Temperature	36.5-37.5°C
Oxygen saturations	90-95%
Capillary refill time	< 3 seconds

Care provided during the perinatal and neonatal periods is critical to ensuring the health of mother and baby. Essential Newborn Care strategies have a great impact on neonatal mortality rates and, in turn, on infant mortality rates.

Every healthcare provider assigned to a delivery or maternity unit should provide the following basic care to the newborn immediately after birth:

- Initiation of breathing – It is important to ensure that the newborn is breathing. Do not perform suctioning of the mouth and nose in newborns who start breathing on their own after birth.
- Temperature control for newborns with no complications – dry the baby immediately and keep in skin-to-skin contact with the mother during the first hour postpartum in order to prevent hypothermia and promote breastfeeding. Deliver newborn onto the mother's abdomen.
- Delayed cord clamping – Clamp and cut the cord within 1-3 minutes after birth.
- Early initiation and exclusive breastfeeding Initiate breastfeeding within the first hour for all newborns, including low birth weight babies. Babies who are able to breastfeed should be put to the breast as soon as possible after birth, when they are clinically stable, and the mother and baby are ready. Babies who are unable to breastfeed soon after birth, should be fed breast milk by cup or nasogastric tube, as appropriate.
- Eye care – apply tetracycline eye ointment to both eyes within 90 minutes of birth. If the ointment is not available, then wipe both eyes with a clean moist swab.
- Immunization – give BCG, OPV^o at birth and any subsequent immunizations as per the national immunization schedule.
- Birth weight – Weigh the baby within 90 minutes of birth. Use scales designed for weighing babies. Birth weight identifies babies who may need special care and may be necessary for calculating drug doses.

Table 10: Childhood Immunization Schedule

Vaccine up to 2 years age	Age for vaccination
BCG	At birth If no scar after 12 weeks, repeat dose
Polio OPV0	Birth – 13 days
Polio OPV1, OPV2, OPV3	6 weeks, 10 weeks, 14 weeks
DPT-HepB-Hib-1, DPT-HepB-Hib-2, DPT-HepB-Hib 3	6 weeks, 10 weeks, 14 weeks
PCV1, PCV2, PCV3	6 weeks, 10 weeks, 14 weeks
Rota 1, Rota 2	6 weeks, 10 weeks
Measles-Rubella 1, Measles-Rubella 2	9 months and 18 months
Polio (IPV)	IPV at 14 weeks with OPV3
OPV4 if OPV0 was missed	At 9 months

****Preterm babies must be vaccinated according to this schedule and not according to their weights**

Postnatal Care (PNC)

Provide postnatal care for the mother and newborn within the first 24 hours after birth, on day 3 (48-72 hours after birth), on day 7 and at 6 weeks after birth. Conduct postnatal home visits within the first week, after the mother and newborn are discharged from the health facility. Provide counselling on exclusive breastfeeding and check for general danger signs.

- Immediate postnatal care – Provide PNC for the mother and newborn within the first 24 hours after birth.
- Exclusive Breastfeeding – Counsel and provide support to mothers for exclusive breastfeeding. Cord care – Ensure that the cord is kept clean and dry for all babies born in health facilities and at home.

- Apply chlorhexidine (4%) to the umbilical cord stump daily during the first week of life for all newborns.
- Keeping the baby warm – Delay bathing the newborn for 24 hours after birth. If this is not possible due to cultural practices, delay bathing babies for at least 6 hours after birth. The baby should be clothed appropriately, according to the prevailing surrounding temperature.
- The mother and baby should not be separated.

Danger Signs in the Newborn

The newborn should be treated or referred for further evaluation if any of the following signs are present regardless of whether the newborn is in the health facility, or the mother and newborn are at home:

Table 11: Danger signs in the Newborn

System	Danger sign
General	Hypothermia (temperature < 36.5) Fever (temperature > 36.5) Cyanosis Oxygen saturation < 90% Pallor Jaundice
Central Nervous System	Irritability Excessive crying Full anterior fontanelle Reduced activity No spontaneous movement/lethargy Hyperactivity Delayed milestones Seizures/Convulsions Abnormal tone
Cardiovascular system	Capillary refill time >3 seconds Tachycardia (heart rate >160) Bradycardia (heart rate <100)
Respiratory system	Apnoea Fast breathing (more than 60 breaths per minute) Severe chest in-drawing Respiratory distress
Gastro-intestinal system	Stopped feeding well or not sucking well Vomiting Diarrhoea Abdominal distension Failure to pass meconium or stool Hypoglycaemia Hyperglycaemia
Genito-urinary system	Failure to pass urine Reduced urine output Abnormal genitals
Haematology	Bleeding
MSS	Rash

3.2 FLUIDS AND FEEDS

3.2.1. Fluids and Electrolytes



Description

Term infants lose 7-10% of their body weight while preterm infants may lose up to 15% as a result of transdermal water loss. It is important to monitor the infant's weight daily and maintain blood glucose between 2.6 – 7.0mmol/L.

Fluid requirement for babies on day 1 of life

Total fluids per/kg/day

- On day 1 and day 2 give 10% dextrose except in preterm infants < 1000g give 5% dextrose
- From day 3 give ringers lactate in 10% dextrose or ¼ strength darrows in 10% dextrose.

Table 12: Total fluids per/kg/day

Weight	Fluid Volume ml/kg/day
< 1000g	90ml/kg/day
1000-1199g	80ml/kg/day
1200-1499g	70ml/kg/day
>1500g	60ml/kg/day

- Increase total fluid intake daily in increments of 20ml

Table 13: Guide on Increase of Total Daily Fluid Intake

Birth Weight (Kg)	Day 1	Day 2	Day 3	Day 4	Day 5
<1.0	90	110	130	150	150
1.0->1.2	80	100	120	130	150
1.2 -1.5	70	90	110	130	150
1.5-2.5	60	80	100	120	150
>2.5	60	80	100	120	150

3.2.2. Enteral Feeds

- Breast milk feeding must be encouraged for all infants.
- In the absence of mother's own milk, pasteurized donor breast milk is preferable to preterm formula for preterm infants

- Fluid and enteral feed prescriptions should be individualized for sick infants and infants with risk factors or feed intolerance.

≥ 1 500 G or ≥ 32 Weeks

- Start on bolus feeds 2 -3 hourly at 60ml/kg on day 1
- Increase to 75, 100, 125, 150ml/kg/d from D2-D5 as feeds are tolerated

< 1 500 G or 32 Weeks

- Start with bolus tube feeds (expressed breast milk (EBM))
- Orogastric tubes are preferable to nasogastric tube
- Start milk on D1 at 12-24 ml/kg/d
- Increase feeds daily by 24 ml/kg/day
- Stop supplemental IV fluids when an enteral intake of 150 ml/kg/day is achieved (consider individual baby tolerance)
- Increase enteral volume incrementally to 180-200 ml/kg/day

Preterm infants with feeding intolerance

- Consider continuous feeds via a syringe pump if prolonged significant feeding intolerance – discuss with senior clinician.
- Syringes should be changed every 4 hours for all feeds given via a syringe pump
- Continue until a rate of 10ml/hr or weight of 1 200 g is achieved before challenging with 2-hourly bolus feeds
- Add supplements and breast milk fortifier according to guideline below
- The feeding tube must be changed weekly, and the administration set three times a week

3.2.3. Supplements for Preterm Infants

Preterm infants on full feeds or feeds at 150ml/kg should be given iron and multivitamin supplements for 6 months.

NB: Most iron syrup formulations contain 50mg/5ml of Elemental Iron. Recommended dose in Neonates is 6mg/kg/day.

1500g – 2500g

- Multivitamin syrup 0.6ml PO daily
- Iron syrup or drops 0.6ml PO from day 28 of life

< 1500g

- Multivitamin syrup 0.3ml PO daily 48 hours after establishing full feeds
- Iron syrup or drops 0.2ml PO from day 28 of life
- Add human milk fortifier to breastmilk 24 hours after establishing full feeds

3.2.4. Breastfeeding



Description

Human milk is recommended as the exclusive feed for all term infants for the first 6 months of life. Human milk is also recommended for preterm infants but may need fortification. All mothers should be encouraged and supported to breastfeed. Commence breast feeding counselling early in pregnancy and at the time of birth mothers should be assisted with nursing their baby.

Advantages of breastfeeding for the baby

- Promotes mother infant bonding
- Readily available feed at the right temperature
- Breast milk has ideal nutritional composition
- Contains immune factors (e.g. secretory IgA)
- Breast fed babies have less feed intolerance
- Reduces incidence of necrotizing enterocolitis in preterm infants
- Reduces gastroenteritis and respiratory infections
- May reduce incidence and severity of eczema and asthma

Advantages of breastfeeding for the mother

- Enhances mother-infant bonding
- Enhances uterine contraction postpartum reducing postpartum haemorrhage
- More rapid postpartum weight loss
- Decreased risk of breast and ovarian cancer

Steps to successful breastfeeding

- Place the baby on the breast immediately or soon after birth
- Provide quiet supportive environment with comfortable positioning
- Feeding on demand is preferable to fixed schedule for term babies. This stimulates milk production and reduces breast fullness and discomfort for the mother. Baby may be put to the breast 8-12 or more times in 24 hours.
- Put baby to both breasts
- Emptying the breast adequately avoids engorgement
- Initial milk is colostrum, its low in volume, high in protein and immunoglobulin content. Takes 24-72 hours for mature breast milk to come in
- Warm mothers that babies initially lose weight (up to 7-10% of their birth weight). They should be back to their birth weight by day 10-14
- Do not give supplementary water or formula unless medically indicated
- Allow mothers and their infants to stay together (rooming in) 24 hours per day

Challenges of breastfeeding

- Can not tell how much milk the baby has taken. Therefore, monitor baby's weight and urine output
- Dehydration may occur due to inadequate milk supply or poor feeding technique
- Jaundice associated with breastfeeding. It is exacerbated by inadequate breastfeeding. Continue breastfeeding even if baby requires phototherapy.
- Vitamin K deficiency – breast milk has low levels and may predispose baby to haemorrhagic disease of the newborn. Prophylactic vitamin K is required for every newborn
- Maternal feeling of inadequacy if unsuccessful
- Breast engorgement, cracked nipples – may be helped by manual expression or breast
- Mastitis – requires maternal treatment and disrupt feeding

Contraindications to breastfeeding

- Maternal HIV – exclusive breast feeding is advised unless formula feeds can be given safely based on AFASS criteria. For prevention of mother to child transmission refer to HIV guidelines in Paediatrics section.
- Maternal PTB – breast feeding relatively contraindicated in maternal active infection. Isoniazid prophylaxis is advised for the baby. Mother should breastfeed with a mask.
- Inborn errors of metabolism
- For mothers on Chemotherapy, consult oncologist on safety of breastfeeding.



Criteria for Referral

- Failed breastfeeding
- Baby with oral malformation

3.3 PREMATURITY



Description

Birth before 37 completed weeks of gestation. Preterm birth can occur following spontaneous labour with intact membranes, preterm premature rupture of membranes, or delivery for maternal/fetal condition via induction or caesarean section.

Table 14: Classification of preterm infants by size and gestation

By weight	By gestation
• Low Birth Weight (LBW) 1500g – 2499g • Very Low Birth Weight (VLBW) 1000g – 1499g • Extremely Low Birth Weight (ELBW) < 1000g	• Late Preterm 34 -36 weeks • Moderate Preterm 32 -34 weeks • Very Preterm 28 – 32 weeks • Extreme Preterm 24 – 28 weeks



Signs and Symptoms

- Small size
- Large head relative to the rest of the body
- Little fat under the skin
- Thin shiny pink skin
- Veins visible beneath the skin
- Few creases on the soles of the feet
- Scanty hair
- Soft ears with little cartilage
- Underdeveloped breast tissue
- Genitalia
 - o **Boys:** Small scrotum with few rugae, testes may be undescended in very and extreme preterm newborns
 - o **Girls:** Labia majora not yet covering labia minora
- Rapid breathing (with subcostal, intercostal or sternal recessions) with brief pauses (periodic breathing) or apnoeic spells (pauses lasting 20 seconds or longer)
- Lanugo hair (thin, soft body hair)
- Closed eyes with no eyebrows or eyelashes if very premature
- Weak, poorly coordinated sucking and swallowing reflexes
- Reduced activity and muscle tone



Investigations

By physical examination and determination of the gestation age

- By Dates
- By early scan in 1st trimester
- By examination: by use of foot length and Ballard score

Table 15:Foot length

Gestation age (weeks)	Foot Length (mm)
<24	<44
24	44.1-45.9
25	46-48.9
26	49-51.9
27	52-53.9
28	54-55.9
29	56-58.9
30	59-60.9

Gestation age (weeks)	Foot Length (mm)
31	61-63.9
32	64-65.9
33	66-68.9
34	69-70.9
35	71-72.9
36	73-75.9
37	76-77.9
38	78-80.9
39	81-82.9
40	83-84.9
>41	>85

Ballard score

Figure 4: Ballard score

NEUROMUSCULAR MATURITY SIGN	SCORE							RECORD SCORE HERE
	-1	0	1	2	3	4	5	
POSTURE								
SQUARE WINDOW (Wrist)								
ARM RECOIL								
POPLITEAL ANGLE								
SCARF SIGN								
HEEL TO EAR								
TOTAL NEUROMUSCULAR MATURITY SCORE								

PHYSICAL MATURITY								
PHYSICAL MATURITY SIGN	SCORE							RECORD SCORE HERE
	-1	0	1	2	3	4	5	
SKIN	sticky friable transparent	gelatinous red translucent	smooth pink visible veins	superficial peeling &/or rash, few veins	cracking pale areas rare veins	parchment deep cracking no vessels	leathery cracked wrinkled	
LANUGO	none	sparse	abundant	thinning	bald areas	mostly bald		
PLANTAR SURFACE	heel-toe 40-50 mm: -1 < 40 mm: -2	>50 mm no crease	faint red marks	anterior transverse crease only	creases ant. 2/3	creases over entire sole		
BREAST	imperceptible	barely perceptible	flat areola no bud	stippled areola 1-2 mm bud	raised areola 3-4 mm bud	full areola 5-10 mm bud		
EYE / EAR	lids fused loosely: -1 tightly: -2	lids open pinna flat stays folded	sl. curved pinna; soft; slow recoil	well-curved pinna; soft but ready recoil	formed & firm instant recoil	thick cartilage ear stiff		
GENITALS (Male)	scrotum flat, smooth	scrotum empty faint rugae	testes in upper canal rare rugae	testes descending few rugae	testes down good rugae	testes pendulous deep rugae		
GENITALS (Female)	clitoris prominent & labia flat	prominent clitoris & small labia minora	prominent clitoris & enlarging minora	majora & minora equally prominent	majora large minora small	majora cover clitoris & minora		
TOTAL PHYSICAL MATURITY SCORE								

Maturity Rating	
SCORE	WEEKS
-10	20
-5	22
0	24
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

Gestational Age (weeks)	
By dates	By ultrasound

Reference
Ballard JL, Khoury JC, Wedig K, et al: New Ballard Score, expanded to include extremely premature infants. J Pediatr 1991; 119:417-423. Reprinted by permission of Dr Ballard and Mosby—Year Book, Inc.



Treatment

Treatment objectives

- To assist and stabilize the premature baby during transition from intrauterine to extrauterine life at birth
- To minimize complications associated with preterm birth
- To ensure optimal growth
- Treat conditions associated with Prematurity (refer to guidelines below)

Thermal protection

- Maintain a set environmental temperature of 25°C
- All infants should be received into a clean, dry pre-warmed towel
- Infants less than 30 weeks gestation age or 1200g birth weight should be placed into a plastic bag up to neck. Cover the head but not the face. **DO NOT DRY THESE INFANTS**
- Continue to resuscitate with the infant in the plastic bag. Cut holes in bag for limb or umbilical vascular access if needed
- Weigh the infant inside plastic bag
- Keep infant in bag during transfer to neonatal unit
- Remove plastic bag once stabilized in the NICU in an incubator
- Use KMC for the stable preterm infant (Refer to National KMC Guidelines)
- Document temperature on arrival in NICU and after 1 hour

Fluid Requirements

Give 10% dextrose in the first 24 – 48 hours, 5% dextrose is suitable for ELBW infant because it has a low solute load which can easily be handled by the immature kidneys. After 48 hours change to either ¼ strength Darrow's solution in 10% dextrose or 10% Neonatalyte.

Initiate fluids as stated in Fluids and Feeds section 3.2.1; Table 12



Complications

- CNS – Intraventricular haemorrhage, Periventricular necrosis
- RS – Respiratory Distress Syndrome, Apnoea of Prematurity, Bronchopulmonary dysplasia
- CVS – Patent Ductus Arteriosus, persistent pulmonary hypertension
- GIT – Necrotizing Enterocolitis, Feed intolerance, jaundice
- GUT – Diuresis in preterm infants with RDS, poor conservation of sodium and water
- Skin – thin delicate skin
- Haematology – Anaemia of prematurity
- Eyes – Retinopathy of prematurity

- Hypothermia
- Hypoglycaemia



Referral Criteria

- Preterm infants < 35 weeks
- Preterm infants requiring CPAP
- Preterm infants requiring surfactant
- Preterm infants with any of the complications listed above
- All preterm infants less than 1.5 kg should be referred to a hospital with a level 2 neonatal unit or neonatal intensive care unit (level 3 or 4 NICU)

Preterm labour <34 weeks GA, aim for in-utero transfer with delivery at a hospital with a level 2 neonatal unit or higher.

3.4 RESPIRATORY DISTRESS SYNDROME



Description

Respiratory distress syndrome (RDS) also called hyaline membrane disease or surfactant deficiency lung disease. It is the commonest Respiratory disorder affecting Preterm infants. RDS is a problem often seen in premature babies less than 35 weeks. The condition makes it hard for the baby to breathe. Appear within minutes of birth, however, may not be seen for several hours.

RDS occurs in infants whose lungs have not yet fully developed due to a lack of surfactant which helps the lungs fill with air and keeps the air sacs from deflating.



Signs and Symptoms

Respiratory distress within 4 hours of birth. Signs in the Preterm infant are:

- Tachypnoea (respiratory rate > 60 breaths per minute)
- Chest retractions (sternal and intercoastal recessions)
- Nasal flaring
- Expiration grunt
- Cyanosis



Investigations

Diagnosis is based on characteristic clinical course as outline above and the following chest x-ray findings:

- Diffuse uniform granular or ground glass appearance of the lungs
- Air bronchogram
- Indistinct heart border

Assessment of severity of respiratory distress

Figure 5: Assessment of severity of respiratory distress

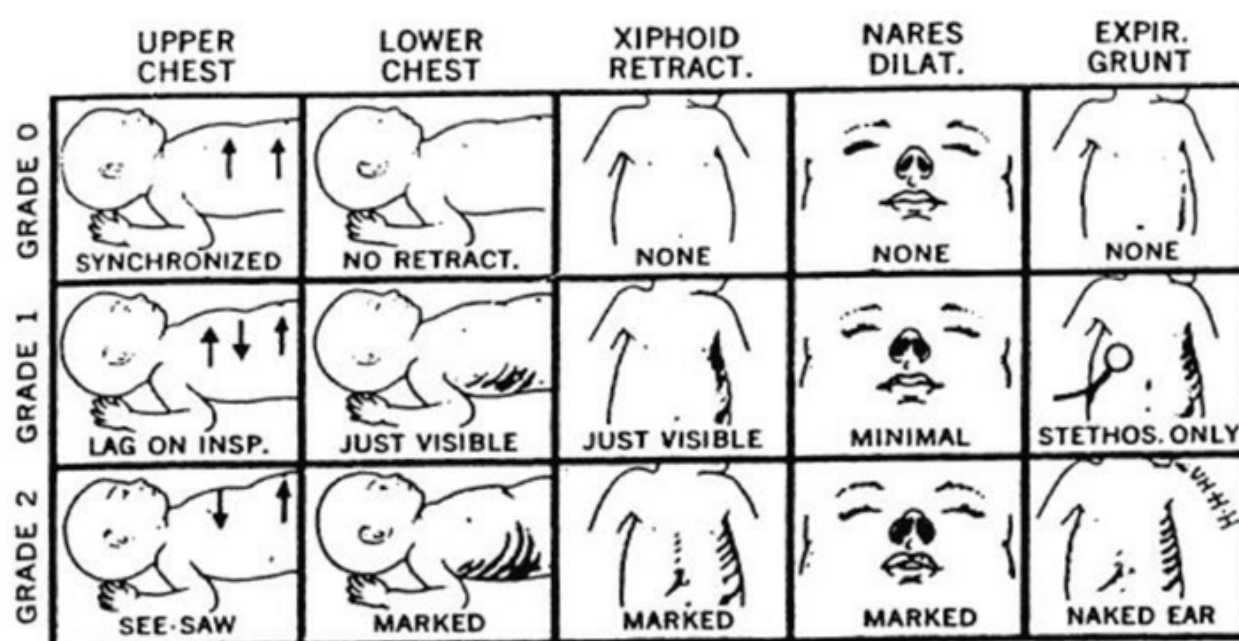


Table 16: Silverman Anderson Score

Silverman score	Interpretation	Intervention
Score 0-3	Mild respiratory distress	Nasal prong oxygen
Score 4-6	Moderate respiratory distress	CPAP + surfactant
Score 7-9	Impending respiratory failure	Escalate CPAP + surfactant
Score 10	Severe respiratory distress	Mechanical ventilation + surfactant



Treatment

The objectives are to reduce the work of breathing, improve oxygenation and minimize lung injury.

- Oxygen therapy – Give warm, moist oxygen and monitor carefully to avoid side effects from too much oxygen
- Prevention of alveolar collapse with CPAP, HFNC

- Intubate and ventilate for preterm infants who are not coping on CPAP or remain apnoeic
- Surfactant therapy – prophylactic or rescue

Prevention

- Administration of antenatal corticosteroids to the mother: Dexamethasone or Betamethasone.



Complications

- Pulmonary haemorrhage
- Pulmonary air leaks
- Intraventricular haemorrhage
- Patent Ductus Arteriosus
- Persistent Pulmonary Hypertension



Referral Criteria

- Preterm infants requiring respiratory support such as CPAP or mechanical ventilation
- Preterm infants requiring surfactant
- Refer if oxygen is not available at the facility

3.5

APNOEA OF PREMATUREITY



Description

Apnoea is absence of breathing for more than 20 seconds and may result in cyanosis, bradycardia and/or desaturation. Apnoea of Prematurity is caused by immaturity of the respiratory centre. Apnoea occurs in >50% of neonates <30 weeks and its occurrence reduce with advancing gestational age. At 60 days post conceptual age the risk of apnoea in neonates is the same as in the term babies.

Apnoea of prematurity is a diagnosis of exclusion because it is associated with other diagnoses including:

Infection

- Septicaemia
- Necrotising Enterocolitis
- Meningitis

Respiratory

- Inadequate respiratory support
- Upper airway obstruction
- Surfactant deficiency

Central Nervous System

- Intracranial Haemorrhage
- Seizure
- Congenital brain malformations

Cardiovascular System

- Patent ductus arteriosus

Gastro-intestinal System

- Gastro-oesophageal reflux

Other

- Hypothermia or hyperthermia
- Metabolic abnormalities, especially hypoglycaemia
- Haematological: anaemia
- Inherited metabolic disorders e.g. non-ketotic hyperglycinaemia

Types of Apnoea

- **Central:** occurs when inspiratory efforts are absent
- **Obstructive:** where inspiratory effort persists in the presence of airway obstruction
- **Mixed type:** has components of both central and obstructive apnoea.

**Signs and Symptoms**

- Lack of breathing
- No chest wall movement
- Skin mottling
- Bradycardia
- Desaturation

**Investigations**

Any neonate with apnoea should be evaluated thoroughly!

- FBC
- CRP

- Blood culture
- RBS
- Serum electrolytes
- Cranial ultrasounds scan
- By observation – Most apnoeic episodes are brief and self-limiting. If persistent 20 seconds or longer
- By apnoea monitor – Apnoea study to monitor breathing effort, heart rate, and oxygenation



Treatment

Establish cause and start treatment for suspected cause.

- Check the airway
- Gentle tactile stimulation if not arousable start bag mask ventilation
- Commence nasal CPAP
- Methylxanthines – **Caffeine Citrate and Aminophylline**
 - o Caffeine Citrate (PO/IV) load with 20mg/kg then start maintenance at 5-10mg/kg/dose once a day.
 - o Aminophylline: load with 6mg/kg given slowly over 20min then start maintenance at 2.5mg/kg twice daily starting 24hours after loading dose
 - o Aminophylline or Caffeine are given prophylactically to all preterm neonates <33weeks gestational age or <1500g birth weight
- Mechanical ventilation if failure to re-establish breathing



Complications

- Respiratory failure
- Death



Referral Criteria

- If episodes are frequent >3 episodes requiring bag and mask ventilation, then mechanical ventilation is needed. Refer the neonate.
- If apnoea or bradycardia increasing in frequency or severity

3.6

NECROTIZING ENTEROCOLITIS



Description

Necrotizing Enterocolitis (NEC) is the most serious abdominal condition affecting Preterm infants. The incidence increases with decreasing gestational age. There is inflammation of the bowel wall which may progress to necrosis and perforation. The greatest risk factor for NEC is prematurity. NEC is a multifactorial disease primarily associated with intestinal immaturity. The triad of intestinal ischaemia (injury), enteral nutrition (metabolic substrate) and bacterial translocation or dysbiosis.

NEC can occur in the first few days of life in term patients, but more commonly from the second week onward in preterm infants. Onset can be insidious but patients with a rapid onset deteriorate quickly



Signs and Symptoms

Onset is at 1-2 weeks

- Bilious aspirates or vomiting
- Feeding intolerance
- Blood in stool
- Abdominal distension
- Absent bowel sounds
- Discoloured abdominal wall
- Features of Sepsis – temperature instability, lethargy, Jaundice, tachypnoea, apnoea, bradycardia or tachycardia, hypoperfusion and shock.

Modified Bell's staging for NEC

Stage 1. Suspected NEC: clinically ill.

Abdominal X-ray: normal to mild distension of bowel loops

Stage 2. Definite NEC: mild or moderate systemic illness, absent bowel sounds, abdominal tenderness, metabolic acidosis, low platelets.

Abdominal X-ray: pneumatosis intestinalis or portal venous gas.

Stage 3. Advanced NEC: severely ill, marked distension, signs of peritonitis, hypotension metabolic and respiratory acidosis, DIC.

Abdominal X-ray: pneumatosis intestinalis, portal venous gas or pneumoperitoneum



Investigations

- FBC
- CRP
- Blood culture
- U&E
- ABG
- INR/PIT
- Radiological abnormalities on abdominal x-ray – dilated loops of bowel, thickened intestinal wall, intramural gas (pneumatics interstitialis), air in portal venous system, bowel perforation



Treatment

- Resuscitate and support breathing
- Maintain intravascular volume and correct acidosis
- Keep nil by mouth and start parenteral nutrition
- Broad spectrum antibiotics according to local guidelines
- Naso/orogastric tube for decompression
- Monitor gastric output and replace
- Treat coagulopathy
- Surgical intervention if there's bowel perforation

Prevention

- Breastmilk and breastfeeding
- Avoid hyperosmolar feeds
- Avoid rapid increase in feed volume
- Probiotics



Complications

- Fluid depletion
- Electrolyte imbalance
- Bowel perforation
- Septic shock
- Short bowel syndrome post bowel resection



Referral Criteria

- Stage 2 and stage 3 NEC
- Signs of shock
- Advanced NEC or intestinal perforation requiring surgical intervention

3.7 PATENT DUCTUS ARTERIOSUS



Description

The ductus arteriosus (DA) connects the Pulmonary artery and descending aorta in utero. In the foetus the DA allows 90% of the right cardiac output to bypass the lungs helping deliver oxygenated blood from the placenta to the brain and other vital organs. DA closure takes place in two phases: functional closure at around 24-48 hours of life and anatomical closure around 2 to 3 weeks of life.

However, in preterm infants there may be a delay in anatomical closure. This leads to shunting of blood from the higher systemic to the lower resistance pulmonary vascular bed. Eventually the duct will close spontaneously but sometimes intervention is required to achieve this.



Signs and Symptoms

- Systolic or Pansystolic murmur
- Gallop rhythm
- Loud second heart sound
- Tachypnoea
- Increased oxygen requirements
- Increased CO₂ retention
- Ventilator dependence
- Apnoea and bradycardia
- Bounding pulses
- Hepatomegally
- Feed intolerance
- Low urine output
- Increased risk of BPD, NEC and IVH



Investigations

- Chest X-ray
- Echocardiography with colour doppler



Treatment

Treat symptomatic PDA or haemodynamically significant PDA confirmed with ECHO. If baby is in respiratory distress, support with nasal CPAP or high flow oxygen

Medical

- Fluid restriction to 80% of maintenance with a maximum of 120ml/kg/day
- Permissive hypercapnoea, elevated PEEP and avoidance of excessive oxygen
- Diuretics – hydrochlorothiazide 1-3 mg/kg per dose twice daily (combined with spironolactone for its potassium sparing effect at 1-3 mg/kg per dose once daily). Avoid loop diuretics such as furosemide
- Prostaglandin synthase inhibitors (discuss their use with a senior)
 - o Ibuprofen 3-day course: 10mg/kg/OD on day 1 followed by 5mg/kg/OD on days 2 and 3 at 24 hourly intervals

OR

- o Paracetamol – IV 20mg/kg loading dose then 10mg/kg 6 hourly for 3 days. Oral 15 mg/kg 6 hourly for 3 days. Repeat ECHO. A further 3-day course may be given if indicated

Surgical

If medical treatment fails ligation of the DA through surgical intervention.



Complications

- Increased use of oxygen
- Heart failure
- Necrotizing enterocolitis
- Pulmonary hypertension
- Pulmonary oedema
- Bronchopulmonary dysplasia
- Delayed growth
- Longer stay in the hospital



Referral Criteria

- Heart failure
- Failed medical closure of PDA
- Need for surgical closure

3.8 HYPOXIC ISCHAEMIC ENCEPHALOPATHY



Description

Neonatal encephalopathy is a clinical description of disordered neurological function in the new-born. In hypoxic-ischaemic encephalopathy there is a significant event immediately before or during labour.

Sentinel event

- Umbilical cord prolapse
- Separation of placenta in placenta praevia or placenta abruptio
- Uterine rupture

Background information

- History of non-reassuring cardiotocography (CTG)
- Foetal heart rate abnormalities during labour
- Low Apgar score
- Acidotic umbilical arterial or venous gas
- Need for prolonged resuscitation



Signs and Symptoms

Acute neonatal encephalopathy

- Altered state of consciousness (irritability, unresponsiveness to stimulation)
- Abnormal tone (hypo/hypertonia)
- Abnormal posturing, decerebrate rigidity, extensor response to painful stimulus)
- Seizures
- Weak or absent reflexes (suck, grasp, moro, swallow)
- Hypo/hyperventilation

There are three stages of encephalopathy namely:

- Stage 1 – Mild: Irritability, increased tone, poor sucking, exaggerated moro reflex
- Stage 2 – Moderate: Lethargy, decreased tone and primitive reflexes, seizures
- Stage 3 – Stupor or coma, flaccid tone, seizures

Table 17: Thompson HIE Score

	0	1	2	3	Score
Tone	Normal	Hypertonic	Hypotonia	Flaccid	
Level of consciousness	Normal	Hyperalert	Lethargic	Comatose	
Seizures	None	Infrequent < 3 per day	Frequent > 2 per day		
Posture	Normal	Fisting Cycling	Strong distal flexion	Decerebrate	
Moro	Normal	Partial	Absent		
Grasp	Normal	Poor	Absent		
Suck	Normal	Poor	Absent or bites		
Respirations	Normal	Hyperventilation	Transient apnoea	Prolonged apnoea req IPPV	
Anterior fontanelle	Normal				
Total HIE score					

HIE I – Thompson score 1-10

HIE II – Thompson score 11-14

HIE III – Thompson score 15-22



Investigations

- Arterial blood gases
- Full blood count
- CRP at 36 to 48 hours
- Blood culture
- Coagulation screen – check INR/PTT/Fibrinogen and platelets in bleeding infants.
- Renal function tests – urea and creatinine at 24 hours, day 3 and day 7
- Electrolytes – Sodium, Potassium, Calcium, Magnesium at 24 hours
- Liver function tests
- EEG, aEEG
- MRI, CT brain
- Myocardial enzymes
- Echocardiography – to assess cardiac function and inform fluid and inotrope management



Treatment

- Manage airway, breathing and circulation
- Check blood glucose
- Document the Thompson HIE score daily for 10 days
- Keep nil orally for 24 hours
- Restrict fluids to 40ml/kg/day for 24 hours. Commence IV fluids: Potassium free Neonatolyte or 0.2-0.45% Sodium Chloride with 10% Dextrose or 10% Dextrose
- Avoid fluid boluses unless hypovolaemia is suspected
- Apply aEEG as soon as possible if available
- If history suggests sepsis commence antibiotics
- Avoid overheating and maintain normothermia (Temp 36.5-37.5)
- Give anticonvulsants in neonates having seizures (refer to neonatal seizure section on neonatal seizures) – Phenobarbitone, Levetiracetam, Midazolam
- Give inotropes for hypotension and poor cardiac function (central access via UVC or other central line is preferable).

Dobutamine	For peripheral infusion 6mg/kg in 50ml D5W @ 1ml/hr = 2 ug/kg/min 9mg/kg in 50ml D5W @ 1ml/hr = 3 ug/kg/min
	For central line infusion 12mg/kg in 20ml D5W @ 1ml/hr = 10 ug/kg/min
Dopamine	For peripheral infusion 6mg/kg in 50ml D5W @ 1ml/hr = 2 ug/kg/min 9mg/kg in 50ml D5W @ 1ml/hr = 3 ug/kg/min
	For central line infusion 12mg/kg in 20ml D5W @ 1ml/hr = 10 ug/kg/min

- Correct any electrolyte imbalance
- Blood products – transfuse if significant anaemia and treat active bleeding with Fresh Frozen Plasma.
- Therapeutic Hypothermia within 6 hours of life at tertiary if available.
- Feeds – introduce breastmilk slowly after 24 hours. Give 24ml/kg/day at 3 hourly intervals. If abdominal examination is normal increase feeds daily at a rate of 24ml/kg per day until full feeds. Beware of necrotizing enterocolitis.

Prevention – early identification of high-risk pregnancies and active monitoring of labour



Complications

- Renal failure
- Disseminated intravascular coagulation (DIC)
- Pulmonary haemorrhage
- Persistent pulmonary hypertension of the newborn
- Myocardial ischaemia and hypotension
- Hepatic failure
- Necrotising enterocolitis
- Hypoglycaemia
- Fluid retention

3.9 NEONATAL SEIZURES

NEONATAL



Description

An abnormal synchronous electrical discharge of a group of neurons



Signs and Symptoms

- Subtle: eye deviation, staring gaze, eye twitching, eyelid fluttering, buccal-lingual movement, lip smacking, repetitive yawning, pedalling of arms/legs,
- Focal: tonic or clonic
- Generalized: multifocal rhythmic jerking, generalized posturing or myoclonic



Investigations

- History: pregnancy, birth, family, clinical course
- Confirm seizure
- Measure serum glucose, magnesium, calcium, sodium
- CSF analysis
- Cranial ultrasound
- MRI or CT brain
- Screen for inborn errors of metabolism



Treatment

- Ensure adequate ventilation and perfusion
- Treat electrolyte
- Treat glucose abnormalities (RBS < 2.6 give 3 – 5 mls/kg 10% Dextrose and start maintenance 10% Dextrose infusion)
- Treat sepsis if suspected and do CSF analysis
- Commence CFM or aEEG monitoring
- Treat seizures as outlined below. Firstline is Phenobarbitone, second line Midazolam, third line Levetiracetam

Table 18: Pharmacological Treatment of Neonatal Seizures

Phenobarbitone	20mg/kg IV, repeat dose once if seizures persist then continue with maintenance dose of 3-5mg/kg IV Loading dose can be given orally using NG tube if IV is not available.
Midazolam	0.05mg/kg over 10 minutes IV followed by 0.15mg/kg/hr if seizures persist. If no response increase dose by 0.05mg/kg/hr every 15 minutes to maximum dose of 0.25mg/kg/hr. Wean Midazolam after seizure-free for 24 hours by 0.05mg/kg/hr
Levetiracetam	10mg/kg IV load then 5-15mg/kg/dose 12 hourly
Pyridoxine	50mg/kg IV/PO

Avoid routine administration of Calcium Gluconate for Refractory Seizures, unless in confirmed hypocalcaemia



Complications

- Cerebral palsy
- Epilepsy
- Feeding difficulties
- Learning difficulties



Referral Criteria

- Lack of anticonvulsants at referring facility
- Frequent seizures or seizures refractory to administration of anticonvulsants
- Reduced level of consciousness

3.10 PERSISTENT PULMONARY HYPERTENSION



Description

The failure of the normal physiological decline in pulmonary vascular resistance that occurs after birth, with resulting hypoxia due to shunting of blood flow across foetal shunts (PDA, PFO).



Signs and Symptoms

- Presents within 24 hours with respiratory distress and cyanosis
- Labile hypoxaemia
- Clinical difference of $> 5-10\%$ between pre and post ductal saturations
- Prominent precordial impulse
- Systolic murmur or tricuspid regurgitation



Investigations

- Arterial blood gas
- Full blood count and blood culture
- ECHO – confirm raised pulmonary artery pressures and exclude structural cyanotic heart defects



Treatment

Supportive

- Transfer baby to the neonatal intensive care unit
- Minimal handling, nurse in a quiet environment
- Maintain normal temperature
- Maintain normal biochemistry and fluid balance
- Correct metabolic and haematologic derangements (maintain Hb $>12\text{g/dL}$)
- Start antibiotics empirically – stop early if the septic markers and blood culture are negative
- Sedate the baby and give analgesia – use fentanyl if at tertiary level
- Nutrition – introduce feeds with caution and progress slowly

Table 19: Respiratory support

LFNC or CPAP	Oxygen is a potent vasodilator. Start low oxygen early Start with FiO ₂ of 1.0 and reduce as patient improves. Maintain Preductal SPO ₂ 90-97%
Mechanical Ventilation	Start with conventional ventilation (with tidal volumes of 5-6ml/kg) Use sedation for babies with high ventilatory and oxygen requirements High frequency oscillatory ventilation can be used at tertiary level Monitor the oxygenation index
AVOID	Hyperoxia or hypoxia Hypocarbica or hypercarbia Hyperventilation

Pharmacological**Table 20: Pharmacological Treatment of Persistent Pulmonary Hypertension**

Nitric oxide	Start at 20ppm Successful response: SPO ₂ rises by 10% to normal levels (90-94%) within 30 minutes If no response within 30 minutes stop iNO
Sildenafil	Dose range – 0.5 -2 mg/kg/dose per oral 6 hourly. Start at 0.5mg/kg 6 hourly. Double the dose if no at 30 minutes. Success of treatment noted with rise in oxygen saturation by 10%
Inotropes	Dobutamine 2-20 µg/kg/min. Avoid doses > 15µg/kg/min 12mg/kg in 20ml 5% dextrose at 1ml/hour = 10 µg/kg/min infuse using a central line, insert an umbilical vein catheter For peripheral infusion 6mg/kg in 50ml 5% dextrose at 1ml/hr = 2µg/kg/min or 9mg/kg in 50ml 5% dextrose at 1ml/hr = 3µg/kg/min Dopamine 2-20 µg/kg/min. Avoid doses > 15µg/kg/min 12mg/kg in 20ml 5% dextrose at 1ml/hour = 10 µg/kg/min infuse using a central line, insert an umbilical vein catheter For peripheral infusion 6mg/kg in 50ml 5% dextrose at 1ml/hr = 2µg/kg/min or 9mg/kg in 50ml 5% dextrose at 1ml/hr = 3µg/kg/min

**Complications**

- Right sided heart failure
- Severe hypoxaemia
- Respiratory failure

**Referral Criteria**

- Labile hypoxaemia
- Differential Oxygen Saturations of more than 5 to 10%

3.11 NEONATAL INFECTIONS

3.11.1. Neonatal Sepsis



Description

Neonates are particularly susceptible to bacterial sepsis. The highest incidence being in the very low birth weight infants.

Early-onset sepsis

- < 72 hours after birth
- Results from vertical exposure to bacteria before and during birth

Late-onset sepsis

- > 72 hours after birth
- Mostly from organisms acquired by nosocomial transmission
- May also be caused by community acquired organisms

Risk factors

Early-onset sepsis

- Preterm infant
- Prolonged rupture of membranes > 18 hours
- Maternal fever in labour (>38 C)
- Chorioamnionitis
- Maternal colonization with Group B Streptococcus

Late-onset sepsis

- Preterm infant
- Indwelling catheters or tracheal tube
- Prolonged antibiotics
- Damage to skin



Signs and Symptoms

- Usually, non-specific
- Altered behaviour or responsiveness

- Apnoea and bradycardia
- Respiratory distress – increase in oxygen requirement/respiratory support
- Poor feeding, poor suck, vomiting, abdominal distension
- Hypoglycaemia or hyperglycaemia
- Fever, hypothermia, or temperature instability
- Cyanosis or poor colour
- Poor perfusion (CRT>3sec; mottling)
- Hypotension
- Tachycardia
- Circulatory collapse or shock
- Irritability, inactivity, lethargy
- Seizures
- Hypotonia
- Jaundice
- Rash
- Meningitis
- Tense or bulging fontanelle
- Head retraction (Opisthotonus)



Investigations

- Full Blood count
- C-reactive protein
- Blood culture
- Lumbar puncture – if blood culture positive or clinical features of meningitis
- CXR – if indicated
- Tracheal aspirate
- Coagulation screen
- Blood gas
- Placental tissue culture and histopathology

Interpretation of laboratory investigations

Features suggestive of sepsis

- Neutropenia or neutrophilia
- Increased ratio of immature(bands): total neutrophils
- Thrombocytopenia
- Positive blood culture
- Raised CRP (>10 mg/L)



Treatment

- Supportive care
- Start antibiotics – antibiotic choice depends on local incidence, practice and antibiogram

Duration of Antibiotics

- Blood culture negative, CRP remains normal and no clinical signs of infection – Stop antibiotics at 36-48 hours
- Blood culture negative but CRP raised – treat as infected
- Blood culture positive – treat until clinical improvement and CRP has returned to normal (7-10 days)
- Meningitis – 14-21 days

Antibiotic policy for suspected sepsis

Antibiotics policy is determined by considering the organism known to have caused infection in the neonatal unit/nursery in the last 6 months. This policy should be regularly reviewed and revised as necessary. A disciplined and consistent approach to antibiotic usage is necessary to provide optimal broad-spectrum cover in suspected sepsis and to limit the emergence of resistant organisms in areas of high usage.

Proposed antibiotics

- Decide according to unit cultures and sensitivities
- Early onset sepsis (< 72hrs of age): Benzyl Penicillin and Gentamicin
 - o Benzyl Penicillin IV 50, 000 U/kg/dose twice a day, increased if necessary to 50, 000 U/kg/dose every 8 hours

AND

- o Gentamicin IV 5 mg/kg every 24 hours.
- Late onset sepsis (> 72hrs of age):
 - o First line: Benzyl Penicillin IV 50, 000 U/kg/dose twice a day, increased if necessary to 50, 000 U/kg/dose every 8 hours

OR

Cloxacillin IV 50 mg/kg every 12 hours

PLUS

Gentamicin IV 5 mg/kg every 24 hours.

- o Second line Antibiotics: Cefotaxime IV 25mg/kg every 12 hours

PLUS

Cloxacillin IV 50 mg/kg every 12 hours

OR

Ciprofloxacin IV 15 mg/kg loading dose then 7.5 mg/kg 1 hourly.

- o Third line: Should be guided by blood culture report

Once started, the duration of treatment should be tailored to clinical circumstances. If cultures come back normal, laboratory indices are normal and the patient no longer shows signs of sepsis, stop antibiotics after 36 – 48 hours.

In the absence of proven sepsis there is no place for “a course” of prophylactic antibiotics.

Criteria for Commencing Antibiotics in a Baby with Risk of Having an Early Onset Infection

1. Absolute indication for empiric antibiotic treatment

- Maternal invasive bacterial infection requiring antibiotics (eg: septicaemia) – suspected or confirmed (NB: Not prophylaxis)
- Confirmed or suspected infection in twin
- Respiratory distress starting more than 4 hrs after birth
- Mechanical ventilation in a term baby
- Seizures
- Signs of shock
- Home delivery

2. Start antibiotics if two or more are present of:

Antenatal

- Preterm birth following spontaneous labour <37 weeks or Prelabour ROM
- ROM ≥ 18 hours
- Maternal fever $\geq 38^{\circ}\text{C}$ or chorioamnionitis

Postnatal

- Altered behaviour/tone/responsiveness
- Feeding difficulties (e.g. Poor feeding in a term baby) or intolerance
- Respiratory distress
- Apnoea
- Abnormal heart rate (bradycardia or tachycardia)
- Altered glucose homeostasis (hypo/hyperglycaemia)
- Metabolic acidosis
- Temperature abnormality $>38^{\circ}$ or $<36^{\circ}$ not explained by environmental factors

If only one risk factor is present, consider observation for 24 hrs

3.11.2. Congenital Infections

3.11.2.1. Syphilis



Description

Most common congenital infection in our setting. Two thirds of affected infants have no clinical signs of congenital syphilis



Signs and Symptoms

- Persistent snuffles
- Erythematous rash, which may be macular or popular and affects the palms and soles
- Osteoporosis and periostitis on x-ray



Investigations

- TPHA
- RPR/VDRL



Treatment

Symptomatic baby	10-day course Benzyl Penicillin IV 50, 000 U/kg/dose twice a day
Asymptomatic baby + partially or untreated mother	Single dose Benzathine Penicillin (IM) 50, 000 U/kg

3.11.2.2. Ophthalmia Neonatorum



Description

Ophthalmia Neonatorum is inflammation of the conjunctiva in the neonatal period due to infection with *Neisseria gonorrhoeae*.

Non-gonococcal conjunctivitis is due to *Chlamydia trachomatis*, *Staphylococcus aureus* and *Streptococcus pneumoniae*.



Signs and Symptoms

- Purulent, copious eye discharge usually in both eyes
- Itching and redness are also present
- The neonate may also present with septicaemia with fever, rash and joint swelling.



Investigations

This is confirmed by taking an eye swab for culturing for Gonorrhoea.



Treatment

Refer to the Table 129 under adult genito-urinary conditions.

Note: The use of antibiotic eye ointments in gonococcal conjunctivitis is of no documented benefit. Systemic treatment is recommended for all symptomatic cases. The baby's mother and partner(s) should receive syndromic treatment for Gonorrhea and Chlamydia. Breastfeeding mothers should be given Gentamicin and not Ciprofloxacin for gonorrhoea but for Chlamydia give Erythromycin.

3.12 ENDOCRINE – HYPOGLYCAEMIA



Description

Hypoglycaemia in neonates occurs when serum glucose level is less than 2.6 mmol/L (45mg/dL). Normal newborn infants require 4-5mg/kg/min (0.22-0.28 mmol/kg/min) of glucose in order to maintain glucose homeostasis. A diagnosis of hypoglycaemia is an emergency, immediately initiate active evaluation and treatment.

Risk factors for hypoglycaemia in Neonates

Neonatal	Maternal
- Intrauterine growth restriction - Small for gestational age (birth weight < 10th centile) - Large for gestational age (birth weight > 90th centile) - Preterm infants - Ill infants – sepsis, respiratory distress, HIE etc - Iatrogenic – reduced feeds, inadequate intravenous glucose - Hypothermia - Hypoxic Ischaemic Encephalopathy	- Maternal diabetes mellitus and obesity - Large or rapid infusions of glucose before delivery - Maternal B-adrenergic agonist or antagonist therapy



Signs and Symptoms

Most are asymptomatic

- Jitteriness
- Irritability
- High pitched cry
- Depressed consciousness
- Lethargy
- Hypotonia
- Apnoea
- Seizures



Treatment

Asymptomatic hypoglycaemia (blood glucose < 2.6 mmol/L) in late preterm or term baby

From birth to 4 hours of life

- Early enteral feeds within 1 hour after birth
- Check blood glucose 30 minutes after feed if 1.4 mmol/L (25mg/dL), feed and recheck after 1 hour. If < 1.4 mmol/L give 10% IV dextrose $3\text{-}5\text{ml/kg}$ bolus and start 10% IV dextrose infusion $5\text{-}8\text{mg/kg/min}$ at $80\text{-}100\text{ml/kg/day}$.

From 4 hours to 24 hours of life

- Feed every 2-3 hours. Check blood glucose before each feed if blood glucose < 1.9 mmol/L give 10% IV dextrose $3\text{-}5\text{ml/kg}$ bolus and start 10% IV dextrose infusion $5\text{-}8\text{mg/kg/min}$ at $80\text{-}100\text{ml/kg/day}$. If $1.9\text{-}2.6$ mmol/L refeed or give IV dextrose infusion
- In treatment of asymptomatic hypoglycaemia aim for blood glucose > 2.6 mmol/L on 2-3 occasions

Symptomatic hypoglycaemia (blood glucose < 2.6 mmol/L)

- Give 10% IV dextrose $3\text{-}5\text{ml/kg}$ bolus and start 10% IV dextrose infusion $5\text{-}8\text{mg/kg/min}$ at $80\text{-}100\text{ml/kg/day}$.
- If there is no response, increase IV dextrose concentration.

3.13 NEONATAL JAUNDICE



Description

A condition in which a neonate exhibits yellow discoloration of skin and mucous membranes due to elevated serum levels of bilirubin. Between 50-60% of normal newborns become clinically jaundiced in the first week of life. Jaundice may be physiological or pathological.

Physiological Jaundice

Results from many different causes including:

- Increased production of bilirubin (large erythrocyte mass with shortened life span)
- Decreased hepatic excretion of bilirubin (low hepatocyte ligandin level, low glucuronyl transferase activity)
- Increased entero-hepatic circulation of bilirubin (high intestinal B-glucuronidase levels decreased intestinal motility)
- Breast feeding jaundice is thought to be due to feeding problem, which lead to a decreased intake of milk, increased entero-hepatic circulation and sometimes dehydration
- Breast milk jaundice is diagnosed in clinically well breastfed infant who remains jaundiced for several weeks following physiological jaundice. The mechanism is unknown. It is thought that breast milk glucuronidase leads to increased absorption of unconjugated bilirubin via increased entero-hepatic circulation. Diagnosis is by exclusion. Breastfeeding may be continued.

Pathological Jaundice

May result from an increased unconjugated or conjugated fraction or both. Causes include:

- Blood group incompatibilities
- Haemolysis
- Sepsis
- Acidosis
- Prematurity
- Family history of pathological jaundice

Neonatal jaundice may also be classified as being early-onset (within 24hrs of birth) or late-onset (beginning after 24hrs). Early-onset jaundice requires evaluation for blood group incompatibilities and other causes of haemolysis such as membranopathies and enzymopathies.

Evaluation of Jaundice in the Newborn

Jaundice is established by applying gentle pressure on the skin of the sternum, nose or forehead and checking for the yellow discoloration of the skin before capillary refill. It can also be seen on inspection of the conjunctivae. Clinical estimation is unreliable as it is subjective, however, the Kramer rule offers a crude guide to the serum level of Bilirubin based on the extent on physical examination. The Kramer rule is demonstrated below.

Figure 6: The Kramer rule

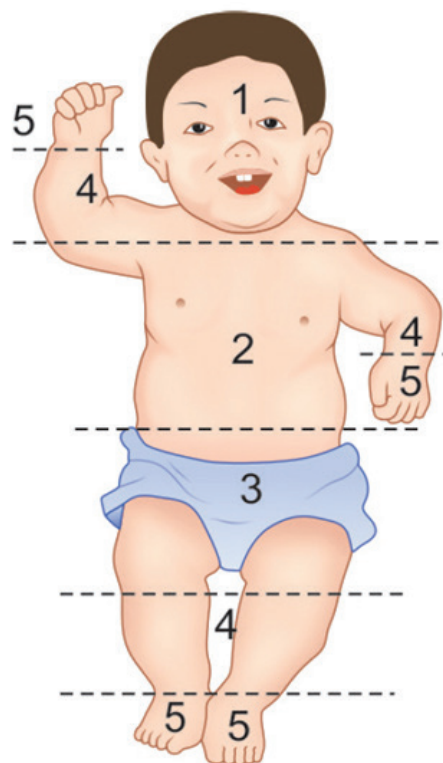


Table 21:Kramer Grading

Zone	1	2	3	4	5
Definition	Head and Neck	Upper truck	Lower truck and thighs	Arms and lower legs	Palms and soles
TSB ($\mu\text{mol/L}$)	100	150	200	250	>250

Objective evaluation can be done by assessing serum and transcutaneous Bilirubin levels and plotting on the phototherapy chart to decide whether or not a neonate should receive phototherapy. It may also be used to decide when to discontinue phototherapy.



Investigations

- Mother and baby's blood group
- Full blood count
- Peripheral smear
- Total serum Bilirubin
- Glucose-6-Phosphate levels
- Abdominal ultrasound scan
- May require abdominal Ct or MRI scan



Treatment

The objective is to reduce serum Bilirubin levels, and to reduce the likelihood of Bilirubin Encephalopathy and liver failure.

1. The main treatment modality is **Phototherapy**. A method which uses ultraviolet light at a set wavelength of 450-490nm to convert unconjugated bilirubin to less toxic conjugated forms that can easily be excreted from the body via stool and urine.

Phototherapy graph

In presence of risk factors use one line lower (the gestation lower) until <1000g.

If gestation age is accurate, rather use gestational age (weeks) instead of body weight

Infants >12 hours old with TSH below threshold, repeat TSH level as follows:

1-20 $\mu\text{mol/L}$ below line: repeat TSB in 6hrs or start phototherapy and repeat TSB in 12-24hrs

21-50 $\mu\text{mol/L}$ below line: repeat TSB in 12-24hrs

>50 $\mu\text{mol/L}$ below line: repeat TSB until it is falling and/or until jaundice is clinically resolving

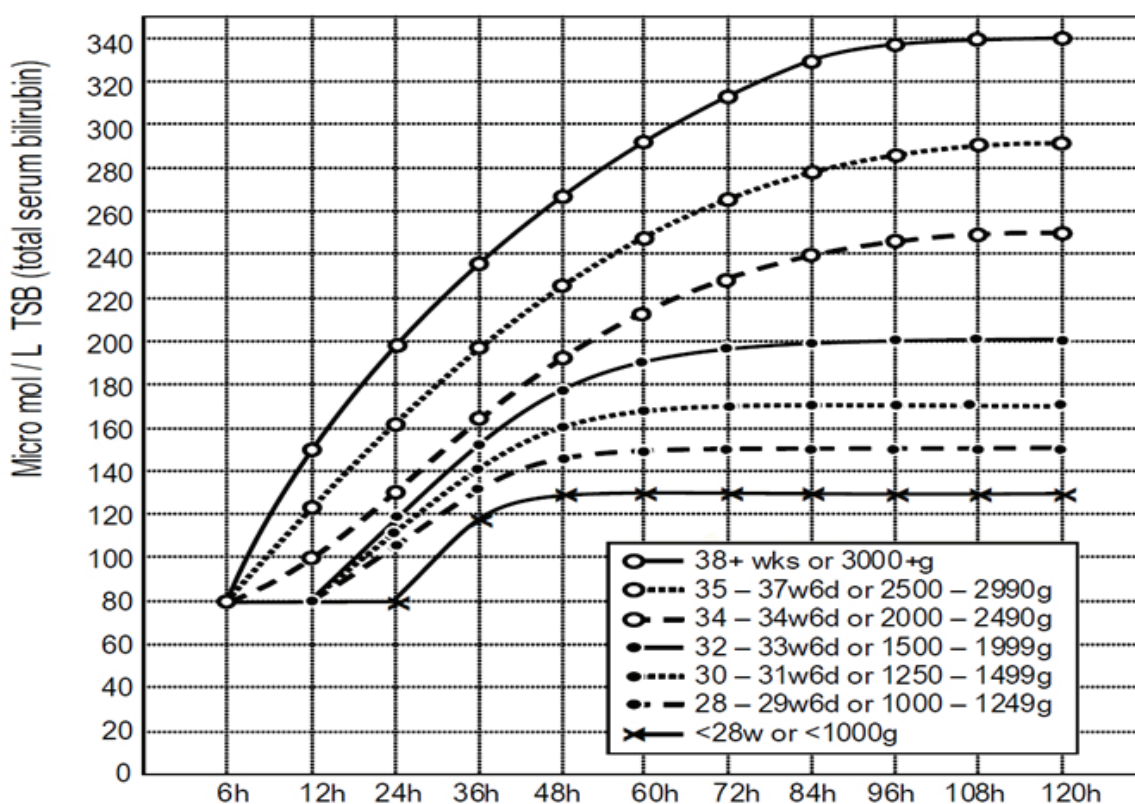
Infants under phototherapy:

Check the TSB 12-24 hourly but if TSB >30 $\mu\text{mol/L}$ above the line, check TSB 4-6 hourly

STOP Phototherapy:

If TSB > 50 μ mol/L below the line, Recheck TSB in 12-24 hrs.

Figure 7: Phototherapy graph



Time (age of baby in hours)

Start intensive phototherapy when the TSB is $\geq$ the line according to gestation or weight

2. Exchange transfusion may be used for:

- Severe unconjugated hyperbilirubinaemia.
- Any infant with clinical signs of acute bilirubin encephalopathy.
- Neonate with severe anaemia complicated by cardiac failure requiring transfusion.

3. Immunoglobulin Therapy (under specialist care)

Conjugated hyperbilirubinaemia is treated by addressing the cause which is usually obstructive/surgical in nature.



Referral Criteria

- Lack of phototherapy at referring facility
- Rapidly increasing serum Bilirubin levels
- Co-existence of Sepsis, Prematurity, Metabolic acidosis

There is no role of exposure to Sunlight in the treatment of jaundice



REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH

4.0

COMMON PAEDIATRIC CONDITIONS

4.1

COMMON PAEDIATRIC EMERGENCIES

The goal in managing Paediatric emergencies is to differentiate between patients who can be treated as outpatient and those that need to be stabilized then transferred to a higher level of care.

Common conditions encountered in the Paediatric Emergency Room (ER) include:

- Fever
- Respiratory failure
- Cardiopulmonary arrest
- Altered Mental Status
- Seizures
- Coma
- Vomiting
- Respiratory Distress
- Abdominal Pain

Table 22: Vitals for Paediatrics

AGE	HEART RATE (beats/min)	BLOOD PRESSURE (mm Hg)	RESPIRATORY RATE (breaths/min)
		Systolic/diastolic	
Premature	120-170*	55-75/35-45**	40-70
0-3 mo	100-150*	65-85/45-55	35-55
3-6 mo	90-120	70-90/50-65	30-45
6-12 mo	80-120	80-100/55-65	25-40
1-3 yr	70-110	90-105/55-70	20-30
3-6 yr	65-110	95-110/60-75	20-25
6-12 yr	60-95	100-120/60-75	14-22
12+ yr	55-85	110-135/65-85	12-18

Note:

- *In sleep, infant heart rates may drop significantly lower, but if perfusion is maintained, no intervention is required
- **A blood pressure cuff should cover approximately two-thirds of the arm; too small a cuff yields spuriously high-pressure readings, and too large a cuff yields spuriously low-pressure readings. A blood pressure cuff should cover approximately two-thirds of the arm; too small a cuff yields spuriously high-pressure readings, and too large a cuff yields spuriously low-pressure readings.

Ref: Nelsons Textbook of Paediatrics

Table 23: Glasgow Coma Scale (GCS)

Glasgow Coma Scale (GCS)							
EYE OPENING (TOTAL POSSIBLE POINTS 4)	VERBAL RESPONSE (TOTAL POSSIBLE POINTS 5)				MOTOR RESPONSE (TOTAL POSSIBLE POINTS 6)		
	OLDER CHILDREN		INFANTS AND YOUNG CHILDREN				
Spontaneous	4	Oriented	5	Appropriate	5	Obeys	6
To voice	3	Confused	4	words, smiles,	4	commands	
To pain	2	inappropriate	3	fixes and follows	3	Localises	5
None	1	Incomprehensible	2	Consolable cry	2	pain	
		None	1	Persistently irritable	1	Withdraws from pain	4
				Restless/agitated		flexion	3
				None		Extension	2
						None	1

Quick Neurologic Assessment

Table 24: AVPU neurologic Assessment

	AVPU neurologic Assessment
A	Awake, Alert, and interactive with parents and care providers
V	Responds only to Voice call
P	Responds only to Pain
U	Unresponsive to all Stimuli

4.1.1. Shock



Description

Shock is an acute process that is characterized by the inability of the body to meet the demands of oxygen delivery at tissue level for normal aerobic cellular metabolism for all vital organs.

Table 25: The different types of shock and potential causes

HYPOVOLEMIC	CARDIOGENIC	DISTRIBUTIVE	SEPTIC	OBSTRUCTIVE
Decreased preload due to volume loss	Cardiac pump failure due to poor cardiac function	Abnormalities of venous and arterial tone	Encompasses multiple forms of shock	Decreased cardiac output due to direct block to right or left heart flow or restriction of all cardiac chambers
POSSIBLE CAUSES				
Blood loss Acute necrotic disease /vomiting Burns Nephrotic syndrome	Congenital Heart Disease Cardiomyopathies Ischemia Arrhythmias	Anaphylaxis Spinal cord or brain stem injuries Certain drugs	Bacterial Fungal Viral causes of infections.	Tension Pneumothorax Pulmonary tamponade Pulmonary embolism Critical coarctation of the aorta



Investigations

Guided by potential cause based on history and physical examination.

- FBC/DC
- CRP/ESR
- Urine or Blood culture
- Urea/Creatinine/Electrolytes
- ECG/ECHO
- CXR



Treatment

Recognition of shock: Cold extremities with capillary refill time >3 second and weak and fast pulse.

Immediate goals [ABCDE]

A: Stabilize the airway, ensure patent using airway adjunct (e.g. airway positioning, chin tilt head lift, jaw thrust, guedel airway)

If severe angioedema, consider severe anaphylaxis as cause

B: Provide oxygen by mask (15L high flow) or nasal catheter if mask unavailable (2 litre/min).

C: Establishment of vascular access

- Two large bore peripheral intravenous cannulae should be established.
- If peripheral access is not readily available, intra-osseous access should be established.
- Assess for **malnutrition** (wasting, peripheral oedema, skin changes, z-score) and **severe anaemia** (pallor).

D: Disability (AVPU – Alert/responsive to Voice/responsive to Pain/Unresponsive) and Do Not Forget Glucose (do RBS and treat appropriately).

E: Exposure (body temperature, rash).

Weigh the child or estimate the child's weight using formulas below.

If <1 year old (kg): (Age in months + 9) / 2 >1year old (kg): (Age +4) x 2

This does not substitute a child's true weight – the child must be weighed immediately once stable.

Fluid Resuscitation

10-20ml/kg crystalloid IV over 5-10 minutes.

Reassess after each bolus. If patient develops respiratory distress, discontinue fluids but maintain IV line.

Refractory shock

- If no response to 20mls/kg fluid bolus, carefully administer second bolus of 20mls/kg.
- If no response to 40mls/kg fluid bolus, then assess for referral to ICU/higher level hospital, prepare for intubation and start inotropes with cardiac monitoring.

Avoid fluid bolus in cardiogenic shock unless history of overt losses and signs of hypovolemia are present.

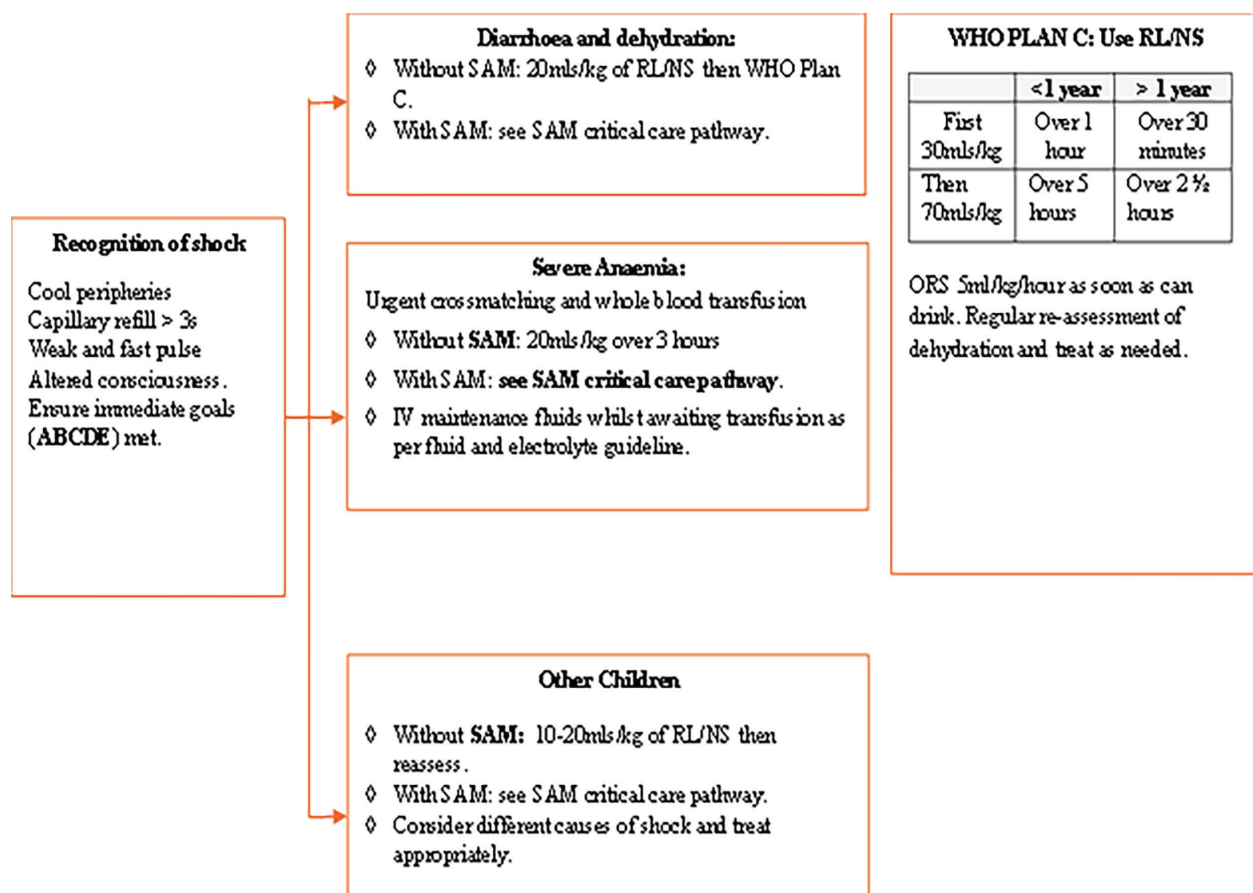
All children with shock which is not obviously due to trauma or simple watery diarrhoea should receive antibiotic cover for probable sepsis. **Start broad spectrum antibiotics within first hour (as per local protocol).**

Continually reassess with thorough history and clinical examination.

Further Management

- Maintain normothermia (temperature 36.5-37.5C): Keep warm / give antipyretics.
- If blood sugar < 3.0 correct with 10% dextrose 5ml/kg and recheck after 15 minutes.
- Consider different types of shock and treat appropriately.
- Liaise with senior doctors if not improving.
- Unless the child is severely anaemic, whole blood transfusion is not recommended for circulatory shock.
- Prepare to use inotropes as a first line when not responding to fluid resuscitation.

Figure 8: Further management of Shock



SAM = Severe Acute Malnutrition, RL = Ringers Lactate, NS = 0.9% Normal Saline, ORS = Oral Rehydration Salts

Table 26:Formulae for Administration of Inotropes

Drug	Dose ranges	Infusion Preparation	Infusion rate
Dopamine Dobutamine	Dopamine (3 to 20 mcg/kg/min) Dobutamine (1 to 20 mcg/kg/min)	Body weight in kg x 6 = Amount of drug (mg) to be added to total volume of 100 ml IV fluid	1 ml/h = 1 mcg/kg per minute (Example: to deliver 10 mcg/kg per minute, run infusion at 10 ml/h)
Epinephrine Norepinephrine Milrinone	Epinephrine (0.01 to 1.0 mcg/kg/min) Norepinephrine (0.01 to 1.0 mcg/kg/min)	Body weight in kg x 0.6 = Amount of drug (mg) to be added to total volume of 100 ml IV fluid	1 ml/h = 0.1 mcg/kg per minute (Example: to deliver 0.3 mcg/kg per minute, run infusion at 3ml/h)

NOTE: Deliver Inotropes using a central vein preferably. Peripheral line can be used with caution.

4.1.2. Diabetic Ketoacidosis (DKA)



Description

Diabetic Ketoacidosis (DKA) is the state of uncontrolled catabolism associated with insulin deficiency, resulting in hyperglycaemia (RBS >11mmol/L), osmotic diuresis, and dehydration and ketonaemia (>3mmol/L) Acidaemia (blood pH <7.3), significant ketonuria (2+or more or standard urinalysis). It is the commonest endocrine emergency usually encountered in previously diagnosed diabetics. It is caused by increased fatty acid metabolism and the accumulation of fatty acids due to reduced insulin activity or deficiency of insulin, an intercurrent illness or it could just be a new presentation.

In DKA, a child may die from hypokalaemia or cerebral oedema. Cerebral oedema is unpredictable, occurs more frequently in younger children and new diabetics, and has mortality of around 80%.

These guidelines are intended for the management of children who are more than 5% dehydrated and/or vomiting, drowsy or clinically acidotic.



Signs and Symptoms

- Dehydration
- Abdominal pain
- Ketone smell in the breath
- Acidosis
- Acidotic breathing/hyperventilation
- Unexplained coma
- Nausea
- Vomiting



Investigations

- Random glucose
- U/E, Creatinine, LFTs
- FBC
- Malaria parasite
- Urinalysis
- Urine m/c/s
- Arterial blood gases



Treatment

General resuscitation: **ABCDE**.

- **Airway:** Ensure that airway is patent. If comatose, insert an airway. If comatose and has recently vomited, insert NGT, aspirate and leave on open drainage.
- **Breathing:** Give 100% oxygen *where indicated*. Bag and mask ventilation if apnoeic.
- **Circulation:** Insert **two large bore IV cannulae** and take blood samples.
If shocked give 20 ml/kg 0.9 saline as quickly as possible, and repeat, if necessary, up to a max of 60mls/kg.
- **Disability:** Conscious Level, GCS or BCS. Signs of cerebral oedema: Irritability, slow pulse, high BP. Fundal examination.
- **Evaluate:** Evaluate for any focus of infection and **treat accordingly**.

Patient must be admitted to ICU for close monitoring of Strict fluid balance chart, Hourly blood glucose, Daily weights, GCS or BCS and continuous cardiac monitoring.

Fluids

Requirement = maintenance + deficit

Deficit = % dehydration x body weight

Maintenance = 100mls/kg-1st 10kgs, 50mls/kg- next 10kgs, 20mls/kg for every kg thereafter.

Add deficit and maintenance and give over the next 36 – 48 hrs.

Example:

For a 25kg diabetic patient, fluid is calculated as follows:

Deficit = $10\% \times 25 = 2.5L = 2500\text{mls}$, to be given over 48 hrs, therefore 1250mls to be given over 24hrs

Maintenance = $1000\text{ mls} + 500\text{ mls} + 100\text{mls} = 1600\text{mls}/24\text{hrs}$

Therefore, total amount of fluid to be given over 24hrs is $1600\text{mls} + 1250\text{mls} = 2850\text{mls}$

This may be divided by 3 or 4 to be given at 950 mls 8 hourly or ~710 mls 6 hourly respectively.

Type of fluid is 0.9% normal saline. Change to DNS once RBS has reduced 12 mmol/l.

In the presence of hypernatraemia, half normal saline must be used (*please consult*).

Potassium

Commence potassium immediately unless anuria is suspected or there are peaked T waves on ECG, or the serum potassium is > 7 mmol/l.

Add 10 to 20 mmol KCl to every 500 ml intravenous fluids given for the first 24 hrs while on insulin infusion.

Insulin

Soluble insulin e.g. 0.1 IU/kg/hour continuous intravenous infusion.

Average rate of fall of blood glucose must not exceed 5mmol/l per hour. If the drop in blood sugar is more rapid (>5 mmol/l per hour), dose may be reduced to 0.05 IU/Kg/hour to avoid cerebral oedema.

4.1.3. Coma



Description

A state of deep unarousable unconsciousness with total loss of awareness of self and environment. Coma results from alteration of consciousness due to disease, poisoning or trauma.

Table 27: Presentation of Coma

Coma with fever	Coma without fever
Meningitis/sepsis Cerebral malaria Viral meningo-encephalitis	Metabolic disorder Hypertensive encephalopathy Post-ictal state Non-Convulsive status epilepticus Stroke Poisoning/intoxications Mass brain lesions with raised ICP



Investigations

- Blood glucose
- Malaria parasite slide/RDT
- FBC, Renal function tests, Electrolytes (calcium, phosphate, Mg), blood culture,
- LFTs
- Blood/Urine toxicology
- CSF studies (if not contraindicated)
- EEG
- X-rays to localize infection.
- Neuroimaging based on clinical findings and judgement.



Treatment

Treat any established cause based on history and physical examination.

Primary assessment/resuscitation

Table 28: Primary assessment/resuscitation

A	Airway patency, manoeuvres	
B	Effort of breathing: Recessions, RR, grunting, flaring, use of accessory muscles. Effect of breathing: HR, skin colour, mental state, cyanosis Pattern of breathing: Cheyne- stokes	
C	Circulation: Pulse volume, pulse rate, capillary refill time, BP	
D	Disability: A	Alert
	V	Verbal
	P	Pain
	U	Unresponsive
		Degree of coma (see below), posture (decorticate, decerebrate, hemiparesis), pupils, seizures
E	Exposure: Temperature, rash, evidence of poison	

Degree of coma

This can be measured using the Glasgow Coma Scale (GCS):

Table 29: Glasgow Coma Scale

	> 1 Year		< 1 year	Score
EYE OPENING	Spontaneously	Spontaneously	4	
	To verbal command	To shout	3	
	To pain	To pain	2	
	No response	No response	1	
MOTOR RESPONSE	Obeys	Spontaneous	6	
	Localises pain	Localises pain	5	
	Flexion withdrawal	Flexion withdrawal	4	
	Flexion-abnormal (decorticate rigidity)	Flexion-abnormal (decorticate rigidity)	3	
	Extension (decerebrate rigidity)	Extension (decerebrate rigidity)	2	
	No response	No response	1	
	> 5 years	2 – 5 years	0 – 23 Months	

	> 1 Year		< 1 year	Score
VERBAL RESPONSE	Oriented	Appropriate words / phrases	Smiles/ cools appropriately	5
	Disoriented/confused	Inappropriate words	Cries and is consolable	4
	Inappropriate words	Persistent cries and screams	Persistent inappropriate crying and/or screaming	3
	Incomprehensible sounds	Grunts	Grunts, agitated, and restless	2
	No response	No response	No response	1
TOTAL PAEDIATRIC GLASGOW COMA SCALE (3 – 15):				

4.1.4. Adrenal Crisis



Description

Severe adrenocortical insufficiency resulting in peripheral shutdown, cyanosis, tachycardia, tachypnoea, hypotension, drowsiness and coma. It can be fatal if not quickly recognised and urgently treated.

It may be due to several processes such as, congenital adrenal hyperplasia, Congenital adrenal hypoplasia and adrenoleukodystrophy

Acquired causes include Acute haemorrhagic destruction of both adrenal glands in previously well children due to sepsis especially meningococemia, rapid withdrawal of steroids, autoimmune process (Addison's disease), tuberculosis, birth asphyxia and hypopituitarism



Signs and Symptoms

- Vomiting/diarrhoea
- Weight loss
- Nausea
- Dehydration
- Hypotension
- Acidosis
- Convulsions
- High fever, rash (petechiae, ecchymoses, purpura, dermal gangrene, neck stiffness- Meningococcaemia)



Investigations

- Random glucose (hypoglycaemia)
- Urinalysis (ketosis)
- ECG (Hyperkalaemia)
- Serum Cortisol - $<3\mu\text{g/dL}$ in the morning (09.00) defines low cortisol
- ACTH- often high
- U/Es (Hyponatraemia, Hyperkalaemia), Creatinine – (GFR decreases)
- Aldosterone – levels are often normal.
- Urinary Na and Cl increased; K is decreased.
- Abdominal U/S, CT scan, MRI – size of adrenal glands
- CXR- ncidenc picture or opacities suggestive of TB
- Gene Xpert



Treatment

- Assess Airway and Breathing, ensure maintainable
- Circulation – correct shock with normal saline at 20 mls/kg, then correct dehydration.

Treat hypoglycaemia

- Normal saline to correct salt deficit.
- Hydrocortisone 8mg/kg start then, Hydrocortisone 4mg/kg 6 hourly daily maintenance
- Treat underlying cause

NB: Dexamethasone has no mineralocorticoid activity and so should not be used to treat adrenal crisis

4.1.5. Anaphylaxis



Description

Anaphylaxis is a severe allergic reaction that can be life threatening because of airway compromise and circulatory shock. Common causes include, Antibiotics, vaccines, blood transfusion and certain foods (e.g. nuts) and medications. There are associations with other allergic disorders e.g. asthma, eczema, family history.

Not all allergic reactions cause anaphylaxis.

Table 30: Symptoms and signs of mild and moderate allergic reaction

Mild allergic reaction	Moderate allergic reaction
• Mouth Itching • Nausea • Urticaria • conjunctivitis, • Nasal congestion	• As mild; plus • red throat • cough • wheeze • diarrhoea • sweating • tachycardia • pallor.

If any life-threatening signs:

- Treat as anaphylaxis urgently.



Treatment

Manage via the ABCDE approach (see shock guideline), do not stop to take a detailed history – early treatment is lifesaving.

4.1.6. Aspirin Toxicity

Aspirin is used as an analgesic, an antipyretic and an anti-inflammatory agent.



Signs and Symptoms

- Tinnitus, rapid breathing, vomiting, dehydration, fever, and double vision are early signs.
- Later signs include drowsiness, confusion, bizarre behaviour, unsteady gait, and coma.
- Respiratory alkalosis and metabolic acidosis
- Rhabdomyolysis (dark urine), acute renal failure and respiratory failure may occur.



Investigations

- Plasma salicylate concentration should be measured in all patients with suspected toxicity.
- The acute toxic dose of salicylates is generally considered to be > 150 mg/kg.



Treatment

- Gastrointestinal decontamination: Activated charcoal, 1 g/kg (max: 50 g) within 4 hours of potential toxic ingestion
- IV Sodium bicarbonate 8.4 % 1 mmol/kg over 4 hours to correct acidosis and raise urine pH to above 7.5.
- Maintenance IV fluids unless the child shows signs of dehydration.
- Supplemental Potassium: 20-40 mEq/L to the maintenance fluids used.
- Monitor blood glucose every 6 hours.

Table 31: Management of Aspirin toxicity

Parameter	Mild	Moderate	Severe
Plasma salicylate	< 350 mg/l	> 350 mg/l	> 700 mg/l
Fluids	Oral fluids	Intravenous (two thirds maintenance)	Intravenous (two thirds maintenance)
Sodium bicarbonate	No	1 mEq/kg IV bolus then a continuous infusion of 100 -150 mEq in 1 L of 5% Dextrose to run at 2 times maintenance	1 mEq/kg IV bolus then a continuous infusion of 100 -150 mEq in 1 L of 5% Dextrose to run at 2 times maintenance
activated charcoal	No	Yes	Yes
haemodialysis	No	No	Yes

4.1.7. Organophosphate Poisoning



Description

Sources of organophosphate poisoning include insecticides and rat poison. Suspect poisoning in a patient with miosis, excessive salivation.



Signs and Symptoms

- **Muscarinic**
 - o Diaphoresis, emesis, urinary and faecal incontinence, excessive lacrimation, drooling, bronchorrhoea and bronchospasm, miosis, hypotension and bradycardia.
 - o Nicotinic Muscle weakness, fasciculations, tremors, hypoventilation, hypertension, tachycardia, and necidencemi

- **CNS effects**
 - Malaise, confusion, delirium, seizures and coma.



Treatment

- Give atropine until heart rate and blood pressure are normal for age, chest is clear, sweating stops and pupils are dilated (Full atropinisation).
- Pralidoxime [in combination with atropine] at 20-50 mg/kg/dose. Repeat in 1-2 hours if muscle weakness has not been relieved, then 10 to 12 hours intervals if cholinergic signs recur.
- For management of seizures, (refer to seizure management).

4.1.8. Hydrocarbon Poisoning



Description

Sources of hydrocarbon poisoning include petrol, kerosene, lighter fluid, paraffin oil, diesel, lubricating oil, furniture polishes, essential oils, mineral turpentine.



Signs and Symptoms

- Transient mild CNS depression
- Aspiration is characterized by coughing and tachypnea.
- Respiratory symptoms may remain mild or may rapidly progress to respiratory failure.
- Fever occurs and may persist for as long as 10 days after aspiration.



Investigations

CXR 24 hours post exposure if signs of respiratory distress present



Treatment

- Induced emesis is contraindicated because of the risk of aspiration.
- Gastric lavage is also contraindicated.

- If hydrocarbon-induced pneumonitis develops, respiratory treatment is supportive.
- Corticosteroids should be avoided because they are not effective and may be harmful.

4.1.9. Iron Overdose



Description

Sources of iron overdose includes maternal antenatal and patient iron treatment (ensure to estimate iron dose taken). Commonly presents with gastrointestinal features usually within the first 6 hours. A child who is asymptomatic for this time probably does not require an antidote.



Signs and Symptoms

- Nausea
- Vomiting
- Abdominal pain and diarrhoea
- In severe poisoning, gastrointestinal bleeding, hypotension, drowsiness, convulsions and metabolic acidosis.
- **NB:** Vomitus and stools are often grey or black.



Investigations

- Chest and abdominal x-ray in case of iron tablets as they are radiopaque and can be seen on x-ray.
- Serum iron studies.



Treatment

- ABCs
- Fluid bolus of 20ml/kg of normal saline or ringer's lactate as for hypotension.
- Gastric lavage if potentially toxic amounts of iron were taken.
- Do not give activated charcoal.
- Decide whether to give the antidote. As this can have side-effects, it should be given only if there is clinical evidence of poisoning
- Deferoxamine, preferably by slow IV infusion: initially 15 mg/kg/hour, reduced after 4–6 hours so that the total dose does not exceed 80 mg/kg in 24 hours maximum dose, 6 g/day.

- If deferoxamine is given IM: 50 mg/kg every 6 hours. Maximum dose, 6 g/day (Avoid IM administration in shock).
- Stop infusion if patient is clinically stable. This is usually within 24 hours.

4.1.10. Paraquat Poisoning



Description

Paraquat (1,1'-dimethyl-4,4'-dipyridylum) is a broad-spectrum liquid herbicide associated with both accidental and nonaccidental ingestion, leading to severe and often fatal toxicity. It is rapidly but incompletely absorbed and then largely eliminated unchanged in urine within 12–24 h.



Signs and Symptoms

Clinical features are largely due to intracellular effects. Paraquat generates reactive oxygen species which cause cellular damage via lipid peroxidation, mitochondrial damage and apoptosis in many organs.

- Vomiting
- Fever
- Tachycardia
- Tachypnea
- Occasional diarrhoea
- Drowsiness

Paraquat is actively taken up against a concentration gradient into lung tissue leading to pneumonitis and lung fibrosis.

It also causes pancreatic, renal and liver injury.



Investigations

- Electrolytes,
- Renal and liver function tests,
- Full blood count,
- A chest radiograph (if pneumomediastinum, pneumothorax or lung fibrosis is suspected).
- A CT scan of the chest (useful in detecting early lung fibrosis or assessing long-term damage in survivors).
- Amylase and lipase (acute pancreatitis suspected if patients develop abdominal pain and a raised blood sugar).

- Plasma paraquat concentrations
- Urine and plasma dithionite tests



Treatment

- Gastric lavage is helpful.
- Activated charcoal (1gm/kg of activated charcoal by gastric tube every 2 hours 3 to 4 doses) routinely given to minimize further absorption.
- Supplemental oxygen should be withheld because oxygen may contribute to the pulmonary damage, mediated through lipid peroxidation.

4.1.11. Drowning and Submersion Injury



Description

Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid. Outcome can be non-fatal or fatal. The injury following a drowning event is hypoxia.



Treatment

Initial is identifying the duration of submersion, how quickly was the rescue and effectiveness of resuscitation efforts.

Secondly, identification of responsiveness. i.e. children who require minimal resuscitation and are later transported and children who have had cardiac arrest and require prolonged resuscitation.

- ABCs and hemodynamic stabilization to quickly restore oxygenation to vital organs.
- protect the cervical spine for those with potential spinal injury
- Initiate treatment of hypothermia, remove wet clothing (AFTER CPR), check for arrhythmias and treat accordingly (see treatment of arrhythmia). Use isotonic fluids and avoid hypotonic or glucose containing fluids.
- Observe in hospital for at least 6-8 hours even if asymptomatic. Closely monitor all vitals, including GCS because acute respiratory failure and pulmonary oedema can occur 4-6 hours after drowning.
- Give Oxygens
- Monitor cardiovascular function and give inotropes if needed.

4.2 CENTRAL NERVOUS SYSTEM

4.2.1. Infections

4.2.1.1. Bacterial Meningitis



Description

Inflammation of the meninges covering the brain and spinal cord.



Signs and Symptoms

- Headache
- Neck stiffness
- Fever
- Seizures
- Refusing to suck/feed/lethargy/irritability.
- Nausea and or vomiting



Treatment

- Supportive treatment: fever, pain and seizure control (see ref below). If GCS low, insert NGT and urethral catheter.
 - Pharmacological treatment in children and infants >1 month-old
 - Dexamethasone 0.15mg/kg STAT then
 - Cefotaxime 50 mg/kg or Ceftriaxone 50 mg/kg daily as a single dose can be increased up to 80mg/kg as a single dose in severe infection.
- OR**
- Benzylpenicillin 50 000- 100 000 IU IV 6 hourly + Chloramphenicol 50 – 75mg/kg I.V. 6 hourly.

4.2.1.2. Viral Meningitis and Viral Encephalitis



Description

Inflammation of the meninges covering the brain and spinal cord due to a viral infection. These cause severe morbidity and mortality. Common causes include:

- Herpes Simplex Virus

- Epstein Barr Virus
- Cytomegalovirus
- Adenovirus



Signs and Symptoms

- Headache
- Neck stiffness
- Fever – May be low grade or no fever at all
- Seizures
- Altered consciousness
- Refusing to suck/feed/lethargy/irritability
- Nausea and/or vomiting



Treatment

Supportive

- Fever, pain and seizure control (see ref below).
- If GCS low, insert NGT to minimize risk of aspiration. Can also be used for feeding.
- Maintain good hydration. Cautious use of IV fluids. Adjust ssssmaintenance to 2/3 of calculated volume.
- Insert Urethral catheter to monitor input/output.

Pharmacological

- Infants >1 month-old Acyclovir IV 30-60mg/ kg /dose TDS with Empirical antibiotic treatment for bacterial meningitis (see above).

4.2.2. Paediatric Stroke



Description

A focal neurological deficit with an underlying vascular pathology, can be ischemic or hemorrhagic.

Commonest cause of paediatric stroke in Zambia is sickle cell anaemia.



Signs and Symptoms

- Hemiparesis
- Cranial nerve palsies

- Seizures (common in neonates and infants)
- Deterioration in level of consciousness (seen in progression of bleed)
- Headache
- Nausea and vomiting



Investigations

- FBC, differential count, ESR, random blood sugar, sickling test, clotting defects (e.g. protein C & S deficiencies, Antithrombin III deficiency)
- Clotting profile
- Electrolytes initially, then daily until stable
- Blood, urine, and CSF cultures if febrile (remember to withhold LP if evidence of ↑ICP)
- After stabilization, Neuroimaging (preferably MRI) and angiography



Treatment

Ischemic

Emergent care

- ABCDE
- Place NGT, Catheter
- PICU admission (if available)
- Monitor:
 - o BP (keep between 50th-95th percentile for age and height with permissible hypertension of 20% above the 95th centile), Pulse, Respiratory rate, GCS (see reference above)
 - o RBS
 - o Temperature (must be kept normal)
 - o Signs of raised Intracranial Pressure (ICP) (ref to ICP)
- Treat infections. If CNS infection is suspected see above
- Other management is dependent on cause, e.g. exchange transfusion/ blood transfusion in SCD, anticoagulants in prothrombotic coagulopathy.

Haemorrhagic

- ABCDE
- Place NGT, Catheter
- PICU admission (if available)
- Monitor
 - o BP (Maintain normal blood pressure)
 - o Pulse, Respiratory rate, GCS (see reference above)

- o RBS
- o Temperature (must be kept normal)
- o Signs of raised ICP (ref to ICP)
- Monitor for new or worsening neurological symptoms-extension of haematoma, herniation, hydrocephalus.
- Isotonic IVF for at least 24 hours
- Manage raised ICP, if present (see ICP)
- Manage acute seizures.
- Manage the cause.
- Replace clotting factors, platelet transfusion for thrombocytopenia.
- MRI/MRA to look for vascular malformation if possible.
- Neurosurgery sometimes can embolize/resect malformation to prevent future strokes.

All patients must undergo rehabilitation -physiotherapy, speech therapy and any other supportive care depending on the needs.

4.2.3. Raised Intracranial Pressure (ICP)



Description

Intracranial pressure is the pressure within the cranium and is measured in mmHg (normal 5-15mmHg). Raised intracranial pressure occurs when the pressure is above 20mmhg for sustained period of time.

Causes

- Traumatic Brain Injury, with mass effect
- Large vessel ischemic stroke (Carotid or MCA occlusion)
- Cerebral oedema with mass effect.
- Intracranial haemorrhage with mass effect.
- Hydrocephalus
- Diffuse cerebral oedema (hepatic failure, cerebritis/encephalitis/meningitis.
- Jugular venous obstruction or elevated right sided cardiac venous pressure.
- Brain neoplasms causing mass effect or vasogenic oedema.
- Idiopathic oedema



Signs and Symptoms

Vary with age.

Infants

- Increasing head circumference.
- Sun setting eyes.

- Distended scalp veins.
- Irritability
- Lethargy
- Vomiting
- Developmental delay or regression
- Neonates may present with Apnoea and Bradycardia

Older children

- Headache
- Vomiting
- Depressed level of consciousness.
- Seizures
- Ataxia
- Abnormal eye movements.
- Double vision.
- Behavioural changes.
- Meningism

Late Signs

- Anisocoria
- Sixth nerve palsy
- Pupillary dilation.
- Decerebrate or decorticate posturing.
- Cheyne-Stokes respiration.
- Focal neurological deficits.
- Cushing Triad: Increased systolic pressure (with widening pulse pressure). Irregular breathing. Bradycardia



Investigations

Computer tomography brain to determine underlying cause and presence of cerebral oedema as well as determine safety of performing lumbar puncture for CSF analysis.



Treatment

Supportive

- ABCDE
- Place NGT, Catheter
- PICU admission (if available)

- Place head in midline and raised at 30 degrees.
- Monitor
 - o BP (keep between 50th-95th percentile for age and height with permissible hypertension of 20% above the 95th centile), Pulse, Respiratory rate, GCS (see reference above)
 - o RBS (maintain between 6-10)
 - o Temperature (must be kept normal)
 - o Signs of raised Intracranial Pressure (ICP) (ref to ICP)
- Treat other conditions
 - o CNS infection is suspected see above.
 - o Seizures see below.
 - o Pain management see above.
- Fluid of choice is DNS as maintenance.

Pharmacological

- Treat the underlying cause
- Sodium chloride 3% IV 10 mls /kg (maximum 250mls) infused over 30mins. OR
- Mannitol 250mg /kg (0.25-1g) infused over 30 minutes with strict monitoring of fluid output.
- If ICP is due to a space occupying lesion- Dexamethasone 0.15mg/kg 6 hourly (max 12mg/kg/dose)

4.2.4. Paediatric Seizures and Epilepsy



Description

- *Acute Seizures*: acute symptomatic seizure occur due to an acute cause, e.g. ncidencemia, hypocalcemia.
- *Unprovoked seizure*: seizure without clear cause or trigger.
- *Epileptic Seizure*: manifestation of symptoms or signs caused on by abnormal, excessive, or synchronized brain neuronal activity. Maybe focal or generalized.



Signs and Symptoms

Muscle spasms, shaking, Jerks, head drops, tonic movements on one side of the body or generalized.



Investigations

- Blood glucose level RBS
- Serum electrolytes- calcium, and magnesium

- Toxicology screen
- EEG
- Emergent neuroimaging for any child with
 - o Persistent unresponsiveness
 - o Focal neurological deficits or other unexplained neurological deficits.
 - o Focal EEG, findings

4.2.4.1. Febrile Seizures

Seizure occurring in a child that febrile between the ages of 6 months to 6 years, WITHOUT an underlying CNS infection or significant neurological impairment.



Signs and Symptoms

Simple febrile seizures	Complex febrile seizures
Generalised tonic-clonic seizures	Focal seizures
Maximum 15 minutes	>15mins
Usually, 1 seizure in 24 hours	More than 1 seizure in 24 hours



Investigations

- Evaluate for fever, FBC/DC, CRP, urinalysis/urine MCS, malaria RDT/MPS
- EEG and neuroimaging are not routinely required. The investigations for complex seizures should be individualized.



Treatment

- For IV administration Lorazepam 0.05 to 0.1 mg/kg (maximum 4 mg) OR Diazepam 0.1-0.2 mg/kg (maximum 10 mg)
- If IV access is a challenge, Diazepam can be given Per Rectum Diazepam 0.5mg/kg PR (maximum 10 mg)

4.2.4.2. Epilepsy



Description

A chronic neurological condition characterized by the predisposition to generate epileptic seizure with neurobiological cognitive, psychology, and social consequences.

- 2 or more unprovoked seizures more than 24 hours apart.

- First unprovoked seizure after a remote brain insult (eg Stroke, HIE, meningitis)
- Seizures occurring as part of a syndrome.



Investigations

- Epilepsy is a clinical diagnosis. Electroencephalogram (EEG) can be performed BUT diagnosis is not entirely dependent on EEG findings.
- A Normal EEG does not rule out Epilepsy!



Treatment

Focal Seizures

- Carbamazepine 5 mg/kg once daily for a week then increase to 15-20 mg/kg/day TDS or BD. Max 35mg/kg/day or 1.8g/day

Generalised Seizures

- Phenobarbital 2-5mg/kg/day Once daily OR 12 hourly.
- **Sodium Valproate 10-40mg/kg/day 12 hourly. *Lamotrigine 0.6mg/kg once daily for 2 weeks then increased by 0.3mg /kg /day weekly
- **Levetiracetam 20-60mg/kg/day 12 hourly 4-12 yrs old. Maximum dose 1500mg 12-16yrs old maximum dose 3000mg.

PAEDIATRIC

4.2.4.3. Status Epilepticus

Seizure lasting more than 5 minutes or recurrence of two or more seizures, between which there is incomplete recovery of consciousness.



Investigations

Dependent on the suspected cause.

Common: missed dosages of medication, cerebral malaria, encephalitis, meningitis, or stroke, in born errors of metabolism, brain malformations.

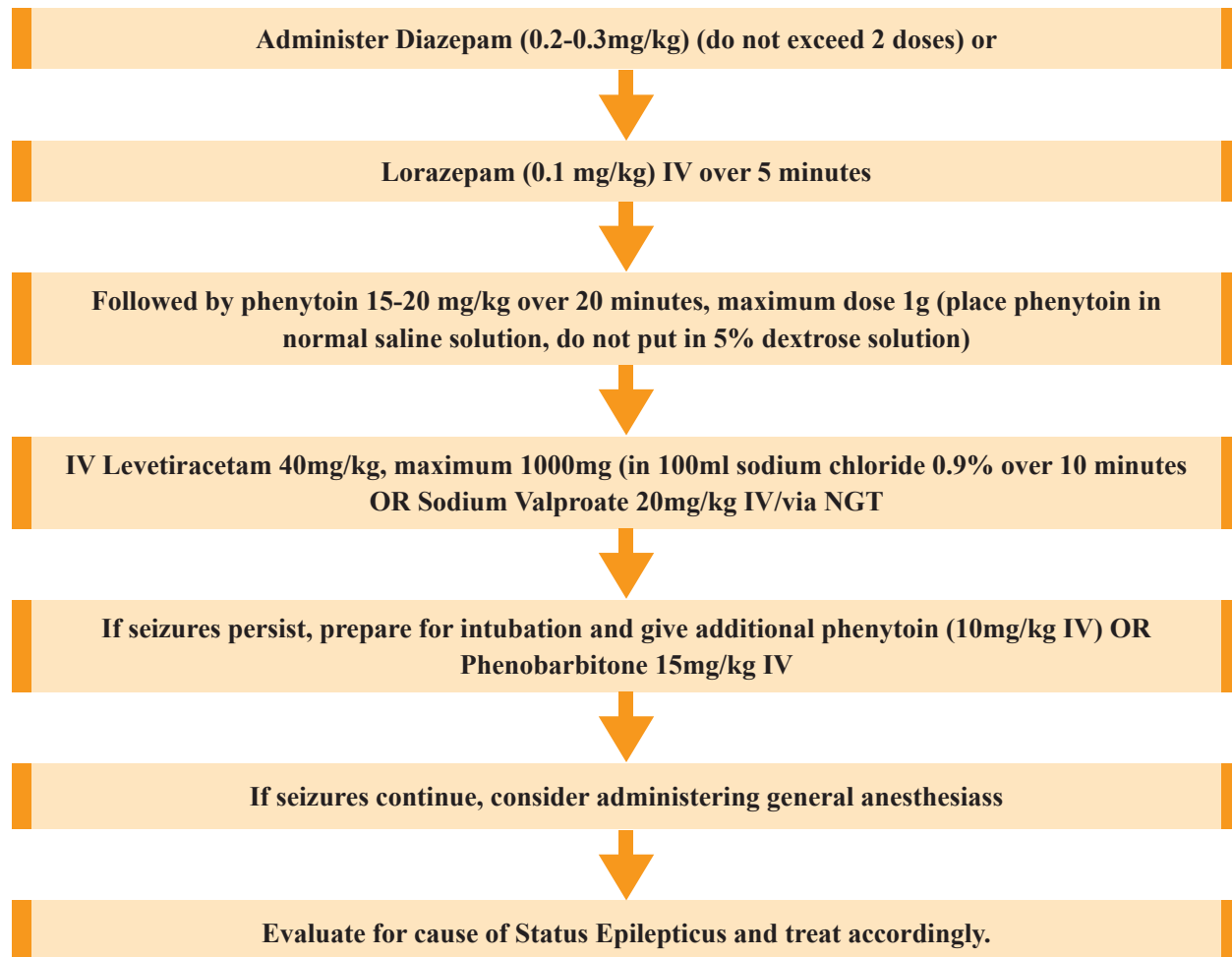
- FBC and DC
- Random Blood Sugar
- Electrolytes & creatinine
- LFTs
- Calcium, magnesium, phosphate
- Gas analysis
- Lactate
- CSF studies (after brain CT)



Treatment

- Assess ABCDE
- Drugs

Figure 9: Management of Status Epilepticus



PAEDIATRIC

4.2.5. Neurodevelopmental Disorders

4.2.5.1. Attention Deficit Hyperactivity Disorder (ADHD)



Description

Attention deficit hyperactivity disorder (ADHD) is characterised by a persistent pattern (at least 6 months or more) of inattention (inability to concentrate or finish tasks) and/or hyperactivity-impulsivity that has a direct negative impact on academic, occupational, or social functioning.



Signs and Symptoms

Inattentiveness:

- Characterized by a short attention span, easily distracted, difficulty listening and following to instructions, inability to follow instructions/complete schoolwork, difficulty organizing tasks, avoidance of sustained mental effort, and forgetfulness.

Hyperactivity/ impulsivity:

- Characterised by the display of excess motor activity or energy, running about, rapid speech, fidgeting, etc. They may also have problems remaining seated, Tendency to blurt out answers before question is completed, have difficulty waiting for one's turn, often interrupt and intrude on others.



Investigations

- DSM V for ADHD
- Vanderbilt screening tool for teachers
- These symptoms must be present for more than 6 months and should be present in more than one situation (eg at home and at school).



Treatment

Supportive (1st step before/with medication)

- Stimulants
- Behavioural parent therapy
- Cognitive behavioural therapy,
- Environment restructuring
- Behavioural classroom management
- Family therapy
- Play therapy
- Exercise
- Social skills training

Pharmacological

- Methylphenidate: 5mg-20mg 12 hourly for long acting
- 8 hourly for the short acting (Should not exceed 60mg daily).
- Dextroamphetamine:
- 10mg-60mg 12 hourly.

Note: When stimulant medications (Amphetamines) are not available or non-effective, other psychotropic drugs may be used to give symptomatic relief after careful evaluation of risks and benefits to patients. The child can be referred to a mental health specialist.

Refer child to paediatrician/paediatric neurologist for diagnosis and management.

4.2.5.2. Autism Spectrum Disorder



Description

Autism spectrum disorder (ASD) is a biologically based neurodevelopmental disorder characterized by deficits in social communication and social interaction and restricted, repetitive patterns of behaviour, interests, and activities.

Screening tools

- M-CHAT (for children between 16 and 30 months)
- DSM V



Signs and Symptoms

- Caregiver concerns about deficits in social skills
- Caregiver concerns about deficits in language skills or behaviour
- Caregiver concerns about frequent tantrums or intolerance to change
- Delayed language and social/communication skills:
 - Lack of orientation to name by age 12 months
 - Lack of pointing or gesturing to indicate interest (e.g., by pointing to an airplane flying over) by age 14 months
- Lack of pretend play (e.g., “feeding” a doll) by age 18 months
- Avoiding eye contact or wanting to be alone
- Having trouble understanding other people’s feelings or talking about their own feelings
- Repeating words or phrases over and over (echolalia)
- Giving unrelated answers to questions
- Getting upset by minor changes
- Having obsessive interests
- Flapping their hands, rocking their body, or spinning in circles
- Having unusual reactions to the way things sound, smell, taste, look, or feel

Adapted from: Centres for Disease Control and Prevention. Autism spectrum disorder. Signs and symptoms of autism spectrum disorders. Available at: www.cdc.gov/ncbddd/autism/signs.html (Accessed on January 02, 2020).



Treatment

Supportive

- Social skills and family interventions.
- Functional assessments (like occupational therapy) and diagnostic screens are essential.
- Education and school placement.
- Behaviour modification, specifically adapted for autism spectrum disorders.
- Early intervention is important for optimal outcome.
- Screen for comorbidities such as ADHD, mood and anxiety disorders which commonly co-exist.

Pharmacological

Not for core autistic symptoms. For irritability, severe aggression and self-injurious behaviour: Risperidone, oral. 5–12 years (under 50 kg)

Starting dose: 0.01 mg/kg/day. Maintenance dose: 0.02–0.04 mg/kg/day.



Referral Criteria

Refer all patients not responding to risperidone to a neurologist or psychiatrist, or appropriate sub-specialist.

4.2.5.3. Cerebral Palsy (CP)



Description

A group of disorders of movement and posture. It is the commonest cause of developmental disturbances in children. CP results from a non-progressive insult to the developing foetal or infant brain. There may be associated abnormalities of sensation, perception, cognition, communication and behaviour. Motor deficit or delay in developmental milestones (not regression). Risk factors include:

- Prematurity
- SGA
- Multiple pregnancy
- HIE in the neonatal period
- Neonatal meningitis/sepsis



Signs and Symptoms

Types

- Spastic
- Diplegia
- Hemiplegia
- Global involvement
- Spastic
- Quadriplegia
- Dyskinetic
- Dystonic
- Athetoid
- Ataxic
- Ataxia



Treatment

- Medication mainly supportive and multidisciplinary
 - Baclofen – for spasticity
 - Levodopa – for the dystonia
- Assessment and management of comorbid conditions that occur with CP.
- Assess level of functioning according to the Gross Motor Function Classification System (GMFCS).



Complications

- *Neurological*: Epilepsy, hydrocephalus, visual and hearing impairment.
- *Behavioural and learning*: Sleep disturbance, depression, autistic features, learning difficulties, vulnerability.
- *Gastro-intestinal*: Difficulty swallowing, gastro-oesophageal, reflux, constipation.
- *Bone*: Osteoporosis, scoliosis, hip dislocation, pathological fractures
- *Respiratory*: Susceptibility to chest infections and aspiration.
- *Skin*: Drooling, pressure sores.
- *Dental*: Poor oral hygiene, susceptibility to dental caries.
- *Genito-urinary*: Neurogenic bladder

4.2.6. Neuromuscular Diseases

4.2.6.1. Guillian Barre Syndrome (GBS)



Description

Guillain Barre Syndrome (GBS) is an autoimmune polyradiculopathy that is precipitated by an infection, viral or other. It is a notifiable disease that is a common acquired polyneuropathy in children. GBS has many variants, the most common in children are:

- Acute Inflammatory Demyelinating Polyradiculoneuropathy (AIDP) 80-90%
- Acute Motor Axonal Neuropathy (AMAN)
- Miller fisher Variant



Signs and Symptoms

- Symmetrical, ascending motor weakness
- Areflexia, i.e. absence of tendon reflexes
- Distal sensory alteration
- Pain/paraesthesia
- External ophthalmoplegia, sensory ataxia, weakness with Areflexia – Miller fischer variant
- Ascending flaccid symmetrical weakness, which usually is preceded by a non-specific infection (e.g. upper respiratory infection or acute diarrhoeal disease).
- Weakness may arise rapidly to affect muscles of the trunk (cause respiratory failure), affect the arms and neck muscles, face and cranial nerves. Autonomic dysfunction. Mild or no sensory signs



Investigations

- As for Acute flaccid paralysis
- Two Stool samples 24-48 hours apart sent to the virology lab within 14 days of symptoms to exclude polio.
- Lumber puncture
- CSF findings after 1 week show elevated protein and few or no cells, i.e. nciden-cytological dissociation.
- CSF glucose is normal.



Treatment

Supportive

- Notify as AFP.Refer to hospital with PICU.

- Monitor respiratory and autonomic disfunction closely.
- If rapidly progressing, consider ventilation support.
- Provide adequate nutrition and fluid replacement.
- Up to 90% of children are in pain therefore pain management must be started early in the treatment plan.

Pharmacological (Use under specialist supervision)

- Immunoglobulin IV 1 g/kg/day, slowly over 12–16 hours on two consecutive days or 0.4 g/kg as a single daily dose on 5 consecutive days early in the disease process

4.2.6.2. Myasthenia Gravis



Description

An auto-immune disorder resulting in muscle fatigue. Mild cases involve the eyes alone, i.e. ptosis and ophthalmoplegia, and severe cases involve proximal muscle groups, respiratory and bulbar control.



Signs and Symptoms

Muscle fatigue that gets worse with exercise. Early signs may be a myasthenic crisis (inability to breath or swallow or worsening symptoms), maybe precipitated by a systemic infection or isolated ptosis.



Investigations

- CT chest- rule out thymoma.



Treatment

- Pyridostigmine, oral, 1–5 mg/kg/day in 4–6 divided doses
- Prednisolone 1mg/kg once daily, maximum 60mg
- For myasthenic crisis (specialist care required)
- Immunoglobulin IV 1 g/kg/day, slowly over 12–16 hours on two consecutive days or 0.4 g/kg as a single daily dose on 5 consecutive days early in the disease process



Referral Criteria

All Patients must be referred to a higher facility.

4.2.6.3. Duchenne Muscular Dystrophy (DMD)



Description

An X-linked recessive disorder causing progressive muscle weakness, typically in males.

Carrier females may have some degree of weakness. Due to a mutation in the gene coding for dystrophin. There may be a family history of DMD.



Signs and Symptoms

- Delayed walking
- Toe walking
- Gowers sign
- Waddling gait
- Lumbar lordosis
- Calf pseudohypertrophy
- Short stature
- Progressive proximal muscle weakness, usually confined to a wheelchair by age 13 years
- Cardiomyopathy
- May have mild cognitive impairment
- Behavioural issues



Investigations

- Creatinine Kinase markedly elevated.
- AST/ALT may be elevated.



Treatment

Supportive

- Treat pain.
- Physiotherapy and occupational therapy
- Nutritional support.
- Psychosocial support for patient and family.

Pharmacological

Consider oral corticosteroids once plateau or decline in motor function is achieved, in consultation with neurologist.

- Prednisone, oral, 0.75 mg/kg daily.
- Maximum dose 30–40 mg



Referral Criteria

All cases for specialist assessment.

4.2.7. Acute Disseminated Encephalomyelitis (ADEM)



Description

Demyelinating disorder of the white matter of the brain and spinal cord. May follow a vaccination or systemic viral illness. Characterized by acute onset of encephalopathy with focal or multifocal neurological deficits which peak between 2 and 5 days from onset but may change or worsen up to 3 months.

Cerebral spinal fluid shows pleocytosis, normal protein and glucose.



Signs and Symptoms

- Multifocal CNS symptoms
- Encephalopathy (alteration in consciousness or behaviour unexplained by
- Fever, systemic illness or postictal syndrome).
- Brain MRI abnormalities consistent with demyelination during the acute (initial three-month) phase.
- Seizures
- Cranial nerve palsies.
- Meningism
- Optic neuritis.
- Hemiparesis
- Pyramidal signs.
- Ataxia



Treatment

- **Supportive:** Preferably in ICU. Mechanical ventilation may be necessary to maintain respiratory function.
- **Pharmacological:** Immune modulators and immunoglobulins in consultation with a neurologist.



Referral Criteria

As MRI is required for diagnosis.

4.3 RESPIRATORY TRACT SYSTEM

4.3.1 Common Cold



Description

This is a self-limiting disease caused by viruses and allergies. Common colds are highly infectious, and symptoms may be mild but systemic upset may occur.



Signs and Symptoms

- Running nose/nasal congestion
- Cough
- Irritation of the throat
- Fever
- Sneezing



Treatment

Supportive

- Encourage plenty oral fluids.

Pharmacological

- Analgesics: Paracetamol, 10 – 25mg/kg 4-6 hourly.
- Nasal decongestants: Saline nasal drops or spray

Antibiotics are NOT indicated in the common cold



Complications

- Lower respiratory tract infection
- Bronchitis and pneumonia

4.3.2. Child with Stridor



Description

Stridor is an abnormal high pitch sound produced during inspiration, due to narrowing of the airway from the oropharynx, glottis, and the trachea. It usually occurs in inspiration but may occur in expiration. It indicates partial obstruction of the upper airway.

The common causes are viral croup, foreign body, epiglottitis and congenital anomalies in neonates. Other causes include anaphylaxis, burns, retropharyngeal abscess and laryngeal papilloma.

4.3.2.1. Viral Croup (Laryngotracheobronchitis)



Description

Croup is a common cause of upper airway obstruction in toddlers (1-3years old). The clinical presentation is due to inflammation in the laryngeal region.



Signs and Symptoms

- Sudden onset of inspiratory stridor. Stridor is most evident when the child is upset or agitated.
- Low grade fever and coryzal symptoms are followed over 12–24 hrs. by a harsh, barking cough.
- Pain in the larynx.
- Hoarseness of voice.
- Respiratory distress of varying degrees. Usually, resolves spontaneously over a 3–4-day period.



Investigations

- Croup is a clinical diagnosis.
- Neck x-rays are unnecessary unless the diagnosis is in doubt.

Assessment of severity.

Table 32: Assessment of Severity

Sign	Mild croup	Moderate croup	Severe croup
Stridor	Only when agitated	At rest	Severe, both inspiratory and expiratory
Recession	Mild subcostal	Moderate tracheal tug	Use of accessory muscles
Level of consciousness	Restless when disturbed	Anxious, agitated	Lethargic, drowsy



Treatment

Supportive

Mild Croup: Home care – steam inhalation. Antibiotics NOT required.

Moderate Croup:

- Keep the child calm on the mother's lap and handle gently.
- Do not attempt to forcefully examine the oropharynx.
- Defer cannulation.

Severe Croup:

- Admit to hospital.
- Supportive measures as in moderate croup.
- Minimal handling.
- 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 indrawing is no longer present.

Pharmacological

Mild and Moderate Croup:

- Prednisone, oral, 2 mg/kg as a single dose.
- To a maximum of:
 - o 20mg once day Children < 2 years for 5 days.
 - o 30mg once a day Children 2–5 years for 5 days
 - o 40mg once a day Children 6–12 years for 5 days.
- Dexamethasone 0.6mg/kg oral stat.

Severe Croup:

- Dexamethasone 0.6 (PO) mg/kg daily in 1–2 divided doses **AND**
- Nebulized Adrenaline (1:1000) 400 mcg/kg(0.4ml/kg) stat Can be repeated after 15- 30 minutes if effective, until expiratory obstruction is abolished.
- Paracetamol 10-15mg/kg 4 hourly.

Injectable Dexamethasone can be given ORAL if tablets are unavailable

4.3.2.2. Acute Epiglottitis



Description

Epiglottitis is inflammation of the epiglottis. It's a medical emergency that may result in death if not treated quickly due to rapid airway obstruction.

The incidence of epiglottitis due to has reduced due to Hib vaccine in the Extended Program on Immunization Programme.



Signs and Symptoms

- Sore throat with difficulty in speaking
- Difficulty in breathing
- Stridor
- Fever
- Drooling of saliva, difficulty in swallowing or inability to drink.
- Child prefer to sit in the Tripod position.



Treatment

Supportive:

- Treatment of patients with epiglottitis is directed to relieving the airway obstruction and eradicating the infectious agent.
- Keep the child calm in a seated or leaning forward position (TRIPOD), and provide humidified blow-by oxygen, with close monitoring. Avoid laying the child in supine position.
- Avoid examining the throat if the signs are typical, to avoid precipitating obstruction.
- Elective intubation is the best treatment if there is severe obstruction but may be very difficult due to severe swelling; consider tracheostomy for airway management.

Pharmacological:

- IV antibiotics when the airway is safe: Ceftriaxone at 80 mg/kg once daily for 5 days.
- Paracetamol 15mg/kg 6 hourly orally or Ibuprofen 10mg/kg 8 hourly when airway is secure.

4.3.2.3. Foreign Body Inhalation



Description

Children are usually at high risk due to the tendency to play with small objects. The foreign body usually lodges in a bronchus (commonly the right main bronchus) and can cause collapse or cause consolidation of

the portion of lung distal to the site of blockage. Inhalation of a foreign body should be considered in a child with sudden onset of choking, coughing, or wheezing; or segmental or lobar pneumonia that fails to respond to antibiotic therapy.



Signs and Symptoms

- Choking
- Stridor
- Acute or persistent wheeze,
- Cough; Persistent or chronic
- Tracheal tug
- Difficulty breathing use of accessory muscles.

NB: A large object lodged in the larynx can cause death from asphyxia, unless it can be dislodged, or an emergency tracheostomy be done.



Investigations

- Diagnosis is largely based on clinical suspicion.
- Physical examination findings: unilateral wheeze an area of decreased breath sounds that is either dull or hyper-resonant on percussion, deviation of the trachea or apex beat.
 - o Obtain a chest X-ray at full expiration to detect an area of hyperinflation or collapse, mediastinal shift (away from the affected side) or a foreign body if it is radiopaque.
 - o CT chest if Xray is inconclusive.



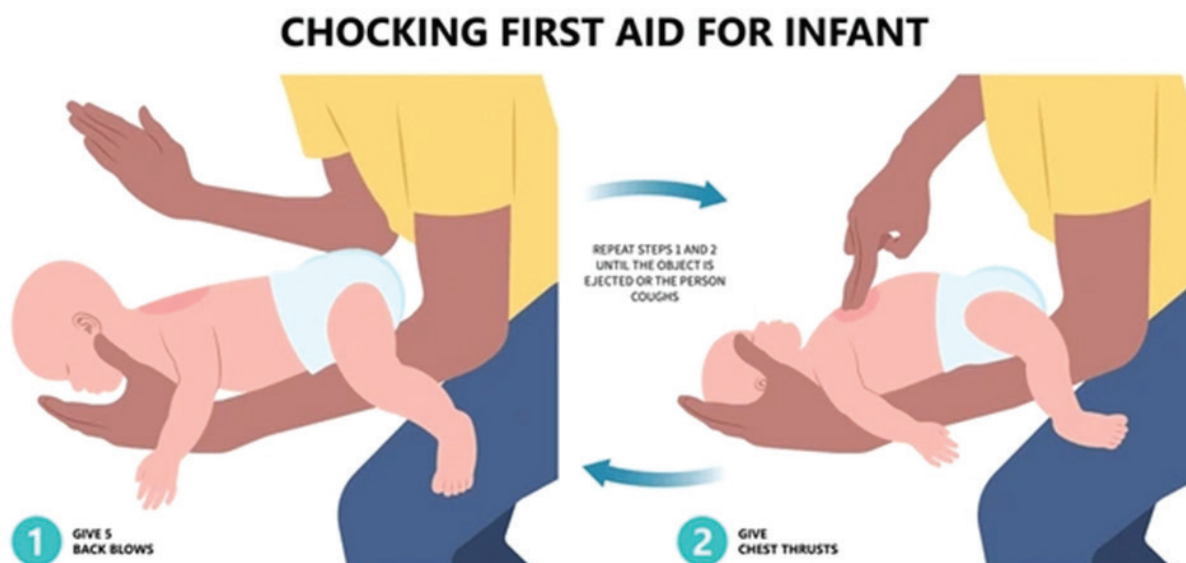
Treatment

Emergency first aid for the choking child: Attempt to dislodge and expel the foreign body. The management depends on the age of the child.

For infants:

- Lay the infant in a head-down position on one of your arms or on your thigh.
- Strike the middle of the infant's back five times with the heel of your hand.
- If the obstruction persists, turn the infant over and give five firm chest thrusts with two fingers on the lower half of the sternum.
- If the obstruction persists, check the infant's mouth for any obstruction that can be removed.
- If necessary, repeat this sequence with back slaps.

Figure 10: Chocking First Aid for Infant



For older Children:

- While the child is sitting, kneeling, or lying, strike the child's back five times with the heel hand
- If the obstruction persists, place the child in front and pass your arms around the child's body; form a fist with one hand immediately below the sternum; place the other hand over the fist and thrust sharply upwards into the abdomen. Repeat this up to five times.
- Then check the child's mouth for any obstruction that can be removed.
- If necessary, repeat the sequence with back slaps.
- Once this has been done, it is important to check the patency of the airway by checking for chest movements, listening for breath sounds and feeling for breath.
- If further management of the airways is required after the obstruction is removed, keep the child's airways open and prevent the tongue from falling back to obstruct the pharynx while the child recovers.

Figure 11: Chocking First Aid for older Children



Later treatment of suspected foreign body aspiration



Referral Criteria

Refer the child to a hospital for imaging and bronchoscopy is available.

4.3.3. The Wheezing Child



Description

Wheezing is a common presentation in young children.

Key points:

- Determining the cause of wheeze in young children can be difficult and sometimes is determined only following a trial of treatment.
- Parents' description of wheeze can be inaccurate and often needs elaboration or confirmation with impersonation or video recordings.
- Asthma is very common but other causes are also common and worth considering in the event of poor efficacy of asthma treatment.
- A diagnosis of protracted bacterial bronchitis should be considered for children with >4 weeks of continuous wet cough.

Table 33: Presentation of the Wheezing Child

Condition	Estimated incidence in children	Clinical signs	Investigation	Expected clinical course	Management
Viral wheeze Viral LRTI Bronchiolitis	Very common, especially in the first 2 years of life 50% of children will have at least one wheezing episode	Wheeze associated with respiratory tract infections. May be singular or recurrent. Crackles and rhonchi on auscultation	No specific investigations Nasal samples sent for virology usually do not change clinical management but isolation of RSV in infants is highly suggestive of bronchiolitis	60% will outgrow wheeze by 6 years. A further 15% acquire wheezing after 6 years. After 7–8 years, only 1 in 5 will outgrow it	Trial salbutamol if >1 year of age and continue only if effective. Supportive care involving monitoring adequate fluid intake (>50% of usual intake) and for signs of increasing respiratory distress
Asthma	15–20 % of the paediatric population	Wheeze on a regular basis. Some will have persistent/interval	Spirometry with bronchodilator response may be possible in	Usually expected to be lifelong but clinical	Exacerbations: Regular salbutamol

Condition	Estimated incidence in children	Clinical signs	Investigation	Expected clinical course	Management
		symptoms between episodes of viral wheeze (cough and/or wheeze at night or with exercise)	children ≥ 5 years of age in experienced laboratories	courses can vary widely between individuals	(as per asthma guidelines) and consider oral prednisolone for up to 5 days Regular preventer usually indicated
Airway malacia (airways floppiness): either tracheomalacia or bronchomalacia	1 in 2100	Present soon after the neonatal period stridor, cough, and rattling; Children are usually well and often labelled as 'happy wheezers'	Bronchoscopy usually diagnostic but not necessary in most cases	Resolves by age 2 years. Secondary PBB can occur, presumably from poor cough clearance	Treatment is rarely required. If there are worsening symptoms or failure to thrive, specialist referral is indicated
Protracted bacterial bronchitis (PBB)	Unknown	Chronic wet cough (typically >4 weeks). Concurrent wheeze and/or rattly breathing is common	Bronchoscopy may assist diagnosis, but usually unnecessary Radiological findings usually normal or non-specific	Majority resolve with 1–2 courses of antibiotics	2–6 week course of antibiotics: commonly amoxicillin/clavulanic acid (approximately 20 mg/kg/dose twice daily)

4.3.3.1. Bronchiolitis



Description

Bronchiolitis is inflammation of the bronchioles usually caused by an acute viral infection. It typically begins with an acute upper respiratory tract infection followed by progressive respiratory distress and fever. Illness usually resolves without intervention in 7 – 10 days, with peak severity two to three days post onset.

High Risk Infants:

- chronic lung disease,
- congenital heart disease
- chronic neurological conditions
- chromosomal abnormalities including Trisomy 21
- post-natal exposure to cigarette smoke age in young infants (under 3 months)
- premature birth, particularly under 32 weeks
- neuromuscular disorders
- immunodeficiency



Signs and Symptoms

- Recent respiratory symptoms.
- Difficulty feeding including.
- Breast feeding refusal.
- Cough
- Tachypnoea
- Retractions
- Diffuse crackles or wheeze on auscultation

Table 34: Assessment of severity of acute bronchiolitis

Assessment of severity of acute bronchiolitis			
	Mild	Moderate	Severe
Mental status	Normal	Some/intermittent irritability	Increasing irritability and/or lethargy, fatigue
Respiratory rate	Normal – mild tachypnoea	Increased	Marked increase or decrease
Use of accessory muscles	Nil to mild chest wall retraction	Moderate chest wall retractions Tracheal tug Nasal flaring	Marked chest wall retractions Marked tracheal tug Marked nasal flaring
Oxygen saturations in room air	SpO ₂ >92%	SpO ₂ 90-92%	SpO ₂ <90% May not be corrected by oxygen
Apnoeic episodes	None	May have brief apnoea	frequent or prolonged apnoea >20s
Feeding	Normal	May have difficulty with feeding or reduced feeding	Reluctant or unable to feed



Treatment

Infants with mild bronchiolitis can be managed as outpatient with danger signs of worsening symptoms clearly explained. While those with moderate to severe bronchiolitis require admission as well as those with known risk factors for more severe bronchiolitis.

For Outpatient care consider the following:

- social circumstances
- the skill and confidence of the carer in looking after a child with bronchiolitis at home. Confidence in being able to spot red flag symptoms.
- distance to healthcare in case of deterioration.

Key safety information for looking after a child at home:

Provide key safety information for parents and carers for children who will be looked after at home;

- Worsening work of breathing (for example grunting, nasal flaring, marked chest recession)
- Fluid intake is 50–75% of normal or no wet nappy for 12 hours.
- Apnoea or cyanosis
- Exhaustion (for example, not responding normally to social cues, wakes only with prolonged stimulation).
- Avoid cigarette smoke in the child's home because it increases the risk of more severe symptoms.
- How to get immediate help from an appropriate professional if any red flag symptoms develop
- Arrangements for follow-up if necessary.

Consider seeking senior emergency/paediatric advice for infant with moderate and severe disease. Refer early to higher level facility.

Table 35: Management of Bronchiolitis

	Mild	Moderate	Severe
Hydration/nutrition	Small frequent feeds	If not feeding adequately (less than 50% over 12 hours), administer NG hydration	If not feeding adequately (less than 50% over 12 hours), or unable to feed, administer NG hydration
Oxygen saturation/oxygen requirement	Nil requirement	Administer oxygen to maintain saturations greater than or equal to 90%. Once improving and not requiring oxygen for 2 hours discontinue oxygen saturation monitoring	Administer oxygen to maintain saturations greater than or equal to 90%
Respiratory support		Begin with Nasal prong oxygen. High-flow nasal cannula to be used only if nasal prongs oxygen has failed	Consider High-flow nasal cannula or Continuous Positive Airway Pressure
Disposition escalation	Consider further medical review if early in the illness and any risk factors are present or if child develops increasing severity after discharge	Decision to admit should be supported by clinical assessment (including risk factors), social and geographical factors, and phase of illness	Consider ICU review/ admission or transfer to local centre with paediatric HDU/ICU capacity if: • Severity does not improve. • Persistent desaturations • Significant or recurrent apnoea associated with desaturations. • Has risk factors

	Mild	Moderate	Severe
Parental education	Provide advice on the expected course of illness and when to return (worsening symptoms and inability to feed adequately)	Provide advice on the expected course of illness and when to return (worsening symptoms and inability to feed adequately)	Provide advice on the expected course of illness.

Oxygen and respiratory support

Administer oxygen for children with saturations persistently below the target oxygen saturations (SpO₂) ≥92%

Table 36: Oxygen Therapy guide

Oxygen Administration Device	Flow Rate	Fraction of inspired Oxygen FiO ₂
Nasal Catheter	Neonates: Not Recommended Infant/child: 1-2 L/min	Delivers 40% to the patient
Nasal Prong	Standard flow L/min- Neonate 1-2 L/min – Infant 1-4 /min- Child High flow rate Preterm: 1 L/min Term Neonate: 2 L/min Infants: 4 L/min Child: 4-8 L/min	Delivers 35% to the patient Delivers 50%
Mask (Non-Rebreather)	All groups: 10-15 L/min	Delivers 80- 95% oxygen

High flow nasal cannula oxygen (HFNC) Therapy

Consider HFNC therapy in infants with bronchiolitis who are hypoxic (SpO₂ <92%) with moderate to severe work of breathing.

- HFNC therapy is **not** recommended for infants without hypoxia.
- Continuous positive airways pressure (CPAP).
- Nasal CPAP therapy for infants with bronchiolitis can also be used.

Monitoring

Continuous pulse oximetry is recommended for hypoxic infants or unstable infants receiving oxygen.

Hydration/nutrition

- Give small frequent feeds for infants with mild bronchiolitis.
- Consider nasal saline drops prior to the time of feeding.
- Suction of the nares may assist feeding in infants with moderate distress.

Caution: Deep suctioning of the nasopharynx is not recommended as may cause oedema and irritation of the upper airway resulting in increased length of illness.

- Oral Gastric Tube insertion is highly recommended for infants on HFNC. Advantages include:
 - gastric decompression
 - ability to feed without interrupting HFNC.
 - avoid potential for worsening of respiratory symptoms during feeding.
- Oral Gastric Tube or IV hydration is recommended for infants with moderate -severe bronchiolitis who are feeding inadequately (less than 50% over 12 hours)
- if using IV route, isotonic IV fluids (0.9% sodium chloride with glucose, or similar) are recommended.
- the volume of fluids required to maintain hydration is unclear.

Treatments NOT recommended:

- beta 2 agonists (e.g., Salbutamol)
- corticosteroids
- adrenaline (nebulised, IM, or IV) except in peri-arrest or arrest situation
- antibiotics
- antivirals

Consider discharge for the following infants:

- is clinically stable.
- has maintained oxygen saturation over 92% in air for 4 hours, including a period of sleep.
- feeding adequately
- parent/caregiver can safely manage the infant at home (consider time of day, parent/carer comprehension and compliance, access to transport and distance to the local clinic).

4.3.3.2. Acute Exacerbation of Asthma



Description

Asthma is a chronic inflammatory disorder of the airways, associated with airway hyperresponsiveness leading to recurrent wheezy episodes, breathlessness, chest tightness and persistent cough.



Signs and Symptoms

- Recurrent episodes of breathlessness
- Chest tightness
- Wheezing
- Persistent cough with diurnal variation.
- Airflow obstruction, variability and reversibility by peak flow measurement or spirometry



Treatment

If no pulse oximeter is available, check for cyanosis.

Table 37: Management of Moderate asthma

Moderate asthma
Normal mental state
Ability to talk in sentences or vocalise as normal
Some accessory muscle use
PEF $\geq$ 50% of best or predicted
O ₂ saturations > 92% in air
Moderate tachycardia
HR $\leq$ 125 min ⁻¹ (> 5 years)
HR $\leq$ 140 min ⁻¹ (2–5 years)
RR $\leq$ 30 min ⁻¹ (> 5 years)
RR $\leq$ 40 min ⁻¹ (2–5 years)
Management
Continuous O ₂ saturation monitoring
High-flow O ₂ via NRB mask titrated to achieve O ₂ saturations 94–98%
β_2 agonist 2–10 puffs via inhaler + spacer
+/- face mask, repeat dose every 20 min reviewing effect; no improvement in 1 h treat as acute severe
Ipratropium bromide given early via pMDI
+ spacer +/- face mask, particularly if poorly responsive to β_2 agonist
Oral steroids: prednisolone 20 mg for children aged 2 to 5 years: 30 to 40 mg for children > 5 years

Use a spacer to increase effectiveness. If conventional spacer not available, take a 500ml plastic water bottle, create a hole on the bottom of the bottle then insert the mouthpiece of the inhaler into the hole (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. (Diagram of homemade spacer)

Table 38: Management of Acute severe asthma

Acute severe asthma
Agitated, distressed
Can't complete sentences in one breath
Moderate to marked accessory muscle use
PEF 33–50% of best or predicted

O ₂ saturations > 92% in air
HR ≤ 125 min ⁻¹ (> 5 years)
HR ≤ 140 min ⁻¹ (2–5 years)
RR ≤ 30 min ⁻¹ (> 5 years)
RR ≤ 40 min ⁻¹ (2–5 years)
Management
Continuous O ₂ saturation monitoring
High-flow O ₂ via NRB mask titrated to achieve O ₂ saturations 94–98%
β ₂ agonist nebulised (salbutamol 2.5–5 mg) every 20 min with Ipratropium bromide (250 mcg) for first 2 h; review frequently
Oral steroids: 20 mg prednisolone for children aged 2 to 5 years; 30 to 40 mg for children > 5 years
Consider intravenous magnesium and aminophylline if the child is unresponsive to maximal doses of bronchodilators and steroids
Consider ABG if poor response to early treatment
Refer to PICU

Table 39: Management of Life-threatening asthma

Life-threatening asthma
Confused, drowsy, exhausted
Unable to talk
Maximal accessory muscle use (poor respiratory effort is pre-terminal)
Marked tachycardia (sudden fall in HR is pre-terminal)
PEF < 33% of best or predicted
O ₂ saturations < 92% in air
Silent chest
Cyanosis
Hypotension
Management
Continuous O ₂ saturation monitoring
High-flow O ₂ via mask titrated to achieve O ₂ saturations 94–98%
Refer to PICU
β ₂ agonist nebulised (salbutamol 2.5–5 mg) every 20 min with Ipratropium bromide (250 mcg) for first 2 h; review frequently
Oral steroids: 20 mg prednisolone (2–5 years); 30 to 40 mg (> 5 years). Repeat dose if vomiting or consider intravenous steroids (hydrocortisone 4 mg kg ⁻¹ every 4 h)
Give bolus of intravenous magnesium.

Consider early single bolus dose of IV salbutamol where child has responded poorly to inhaled therapy followed by an infusion

Consider aminophylline if child unresponsive to maximal doses of bronchodilators and steroids

Consider ABG if poor response to early treatment.

NOTE: Aminophylline and adrenaline should never be used as first line treatment for acute exacerbation of asthma, except in situations where no better alternative is available.

Discharge plan

- Patient can be discharged when stable on 4 hourly salbutamol inhalations.
- To complete 3 days course of prednisolone.
- Patient/parent education on avoidance of triggers.
- Those with moderate, severe, or life-threatening exacerbations should be reviewed regularly.
- Check and correct modifiable risk factors including inhaler technique.
- Written **action plan**.

Long-term follow up of Children with Asthma:

- Assess severity and classification of chronic asthma before long-term initiating treatment.
- Classify the grade of severity of patient illness according to the presence of the most severe feature.
- Infrequent asthma: less than one acute exacerbation in 4–6 months.
- Persistent asthma: Mild, moderate or severe.

Table 40: Long-term follow up of Children with Asthma

Diagnostic Criteria	Classification		
	Mild	Moderate	Severe
Day time symptoms	2-4 per week	More than 4 per week	Continuous
Nighttime Symptoms	2- 4 per week	More than 4 per month	frequent
Prior Hospital Admission	None	One	More than one
PEFR	More than 80%	60- 80 %	Less than 60%

Pharmacological Treatment of Persistent Asthma

Use spacer devices with a metered dose inhaler (MDI) for children aged 2-5 yrs old. Prime all spacers with 2 doses of inhaled medication prior to first use.

Mild persistent asthma:

- Inhaled Short acting β_2 -agonist- Salbutamol 100–200 mcg using MDI + Spacer as required 3–4 times daily until symptoms are relieved.

PLUS

- Inhaled Low dose inhaled corticosteroids -Beclomethasone or budesonide 50–100 mcg, 12 hourly using MDI + Spacer.

Moderate persistent asthma:

- Inhaled Short acting β_2 agonist -Salbutamol 100–200 mcg, as required 3–4 times daily until symptoms are relieved.

PLUS

- Daily treatment with medium-dose inhaled Beclomethasone or budesonide, inhalation, 100–200 mcg, 12 hourly.

Children responding poorly to the two measures require low-dose inhaled corticosteroids plus long-acting beta agonist (LABA) under SPECIALIST CARE.

- Salmeterol/fluticasone, 25/50 MDI, 2 puffs 12 hourly.
- Salmeterol/fluticasone 25/125 MDI, 2 puffs, 12 hourly.

Severe persistent asthma:

- Inhaled short acting β_2 -agonist Salbutamol, inhalation, 100–200 mcg, as required 3–4 times daily **plus** low-dose ICS **plus** LABA
- SABA /Salmeterol/fluticasone, 25/50 MDI, 2 puffs, 12 hourly **OR** Salmeterol/fluticasone 25/125 MDI, 2 puffs, 12 hourly.

4.3.4. Pneumonia



Description

- Pneumonia is inflammation of the lung parenchyma. Both bacteria and viruses are important causes of pneumonia.
- Bacterial causes are the most common in HIV-infected children. Common causes are; Streptococcus pneumoniae, Haemophilus influenzae, Staphylococcal aureus and Mycoplasma pneumoniae.
- Common viral causes include respiratory syncytial virus, adenovirus, cytomegalovirus, influenza, parainfluenza, adenovirus, herpes, human metapneumovirus and measles.



Signs and Symptoms

- Fever above 38 degrees Celsius
- Cough
- Difficulty breathing
- Increased respiratory rate of > 60 breaths in an infant and >50 breaths/min in older children
- Severe chest indrawing
- Reduced level of consciousness
- Severe acute malnutrition
- Seizures
- Vomiting and poor feeding

Table 41: Cut-offs for fast breathing

Age	Cut-offs for fast breathing
< 2 months	60 breaths/min or more
2 – 12 months	50 breaths/min or more
12 Months - 5 Years	40 breaths/min or more

Table 42: WHO classification of pneumonia

CATEGORY	CHARACTERISTICS
No Pneumonia	No signs of Pneumonia
Pneumonia	Immune competent child aged 2 months and above. Tachypnoea: RR > 50 (2-12 months) RR > 40 (1-5 yrs) Lower chest wall indrawing
Severe Pneumonia or Very Severe Disease	Infants under 2 months: Any Danger signs. Lower chest wall indrawing Tachypnoea > 60/minute HIV Exposed or Infected Infants Malnourished children

Indications for admission

- Cyanosis, SpO₂ < 92%
- Increased respiratory rate
- Subcostal recession
- Intermittent apnoea, grunting (infants)
- Poor feeding
- Convulsions
- Restlessness or agitation
- Signs of dehydration
- Unconscious or lethargic
- Capillary refill time > 3 seconds

**Investigations**

- Chest x-ray
- FBC, ESR
- Urea, electrolytes
- Blood culture



Treatment

- Oxygen by nasal cannula or mask
- IV fluids if required should be < 2/3 of requirements (risk of SIADH in hypoxic children)
- Antipyretic and analgesia as indicated.

Antibiotic Therapy

Table 43:Antibiotic Therapy

Drugs	Classification
Amoxicillin or Amoxicillin and Clavulanate Amoxicillin 40 -80mg/kg in 3 divided doses OR Co-Amoxiclav 45mg/kg of Amoxicillin component 8 hourly	Pneumonia
1st Line 0-3 months Benzylpenicillin 50,000 IU/kg/dose every 6 hours + Gentamicin 7.5 mg once a day or 3.75mg/kg 12 hourly. More than 3 months Benzylpenicillin 50,000 IU/kg/dose every 6 hours + Gentamicin 7.5 mg once a day or 3.75mg 12 hourly. 2nd line Ceftriaxone 50-80 mg/kg/dose once daily IV or Cefotaxime 50 mg/kg 8 hourly IV. If no improvement and the infant with HIV infection or exposure, consider adding. PCP therapy with high dose IV/PO cotrimoxazole (20 mg/kg/day of trimethoprim)	Severe Pneumonia
In suspected staphylococcus pneumonia, add IV Cloxacillin 12.5mg/kg- 25mg/kg 6 hourly. Macrolides should be considered in school-going children and adolescents who do not improve on 1st line treatment. Erythromycin (oral) 1month – 2 years: 125 mg 6 hourly 2 – 8 years: 250 mg 6 hourly 8 – 18 years: 250-500 mg 6 hourly Azithromycin (oral) 6 months-2years: 10 mg/kg once a day. 3 – 7 years: 200 mg once a day. 8 – 11 Years: 300 mg once a day. 12 – 14 years: 400 mg once a day. >14 years: 500 mg once a day.	

4.4 CARDIOVASCULAR SYSTEM

4.4.1. Congestive Cardiac Failure (CCF)



Description

CCF is a clinical syndrome in which the heart is unable to pump enough blood to the body to meet its needs or dispose of venous return adequately or a combination of the two.

Diagnosis of CCF relies mainly on clinical findings and no single test is specific. CCF may result from congenital or acquired heart diseases with volume and/ pressure overload or from myocardial insufficiency.

Table 44: Causes of Congestive Cardiac Failure (CCF)

Cause	Example/s
1. Cardiac	
A. Congenital	• Ventricular Septal Defect (VSD) • Atrial Septal Defect (ASD) • Patent Ductus Arteriosus (PDA) • Arrhythmias
B. Acquired	• Endocardial/Valvular disease e.g. Rheumatic Heart Disease (RHD) • Myocardial diseases e.g. Viral myocarditis, Dilated cardiomyopathies, hypertrophic cardiomyopathy • Pericardial diseases e.g. TB pericarditis
2. Extracardiac	
• Anaemia • Pulmonary diseases e.g. Pulmonary hypertension, • Severe pneumonia especially in neonate • Systemic hypertension • Metabolic disorders e.g. Electrolyte imbalances, hypoglycaemia • Endocrine e.g. Thyroid disease • Drugs e.g. antineoplastic	



Signs and Symptoms

- Poor feeding,
- Failure to thrive
- Difficulties in breathing
- Poor weight gain

- Easy fatiguability in older children
- Tachypnoea
- Tachycardia
- Hepatomegaly
- +/- Cardiac murmurs
- Oedema



Investigations

- FBC/DC
- Urea and Serum Creatinine
- Serum Electrolytes
- ECHO and ECG.
- Chest x-ray



Treatment

Supportive

- Propped up position.
- Oxygen
- Salt and fluid restriction
- Daily weight in hospitalised patients

Pharmacological

- *Preload reduction:* Diuretics e.g. Frusemide 1mg/kg/dose, 2-3 times a day IV/PO
- *Afterload reduction:* ACEIs Captopril 0.1-0.5mg/kg Divided 8hourly, max. dose 0.6mg/Kg OR Enalapril 0.1mg/Kg divided OD or BD, Max. dose 0.5mg/kg/day
- *Inotropes:* Digoxin 0.02 - 0.05 mg/kg OD PO for stable patients. Dobutamine/dopamine Infusion for Severe CCF.
- *β -blockers* e.g. Carvedilol (used in chronic heart failure state typically in dilated cardiomyopathies 0.08 mg/kg 12 hourly, if tolerated increase by 0.08 mg/kg every 1-2 weeks to a maximum 0.50mg/kg 12 hourly.

4.4.2. Acute Rheumatic Fever (ARF)



Description

An acute autoimmune process following pharyngitis caused by streptococcal infection. Diagnostic criteria for rheumatic fever are based on the modified Jones criteria. Has defined high risk population recognizing

variability in clinical presentation and had included Echocardiography as a tool to diagnose for subclinical carditis.

Table 45: Modified 2015 Jones' criteria

Major	Minor
Carditis (clinical or subclinical)	Monoarthralgia
Arthritis – monoarthritis or polyarthritis	Fever ($\geq 38.0^{\circ}\text{C}$)
Polyarthralgia	ESR ≥ 30 mm/hour and/or CRP ≥ 3.0 mg/dl
Chorea	Prolonged PR interval (after considering the differences related to age: if there is no carditis as a major criterion)
Erythema marginatum	
Subcutaneous nodules	

ESR – erythrocyte sedimentation rate; CRP – C-reactive protein (Adapted from ref 13). All patients with ARF should have an Echocardiography done even in the absence of clinical suspicion of valvular done.

Two major manifestations *plus* evidence of preceding streptococcal infection **OR one major** and **two minor** manifestations *plus* evidence of preceding streptococcal infection are required to make a diagnosis.



Investigations

- FBC/DC
- ESR/CRP
- Throat swab culture for Streptococcal
- Anti Streptolysin O titres (ASOT)
- ECG
- ECHO
- CXR



Treatment

- Benzathine penicillin IM injection 600 000 IU - 1.2 MU stat OR
- Oral phenoxymethyl penicillin 10-12.5mg/kg/dose twice daily for ten days maximum 500mg every 6 hours.
- Patients with hypersensitivity to penicillin can be treated with oral first generation cephalosporins for 10 days.
- Treat chorea (if severe)
- Anti- heart failure medication (see section of CCF)
- Relieve symptoms, Bed rest, Relief of arthritis, pain and fever with Anti-inflammatory Agents

Table 46: Management of Acute Rheumatic Fever (ARF)

	Arthritis	Carditis
Prednisolone 2 mg/kg/day	Nil	2 – 4 weeks
Aspirin 50 to 60 mg/kg/day in four to six divided doses	1 – 2 weeks	Until symptoms subside
Ibuprofen 30 mg/kg/day in 3 divided doses, where Aspirin not tolerated	Until symptoms subside	Until symptoms subside

NB: The dose of prednisolone should be 2 mg/kg/day (max 60 mg); then taper by 20–25% per week. Aspirin can be reduced to 25 to 30 mg/kg/day when symptoms improve. The dose of prednisolone should be tapered, and aspirin started during the final week.

Management of Sydenham's chorea

- Reduce physical and emotional stress and use protective measures as indicated.
- Benzathine penicillin IM stat (Eradicate GAS), then every 28 days for secondary prophylaxis.

Anti-inflammatory agents not indicated.

For severe chorea, any of the following drugs may be used:

- Carbamazepine 7–20 mg/kg/day (7–10 mg/kg/day usually sufficient) given TDS PO until chorea is controlled for at least 2 weeks, then trial off medication
- Valproic acid Usually 15–20 mg/kg/day (can increase to 30 mg/kg/day) given TDS PO until chorea is controlled for at least 2 weeks, then trial off medication.
- Phenobarbitone, Haloperidol and Chlorpromazine can be used when above not available.

Further management plan

- ARF register (cardiac clinic), issue Acute Rheumatic Fever (ARF) prophylaxis card
- Education of patient and family
- Dental examination
- Long term secondary prophylaxis plan

Secondary prophylaxis to prevent recurrent ARF is a long term, regular administration of antibiotics to:

- Prevent group A β -Haemolytic Streptococcal (GAS) pharyngitis.
- Prevent repeated development of ARF.
- Prevent development of Rheumatic heart disease (RHD)
- Reduce severity of RHD
- Help reduce the risk of death from severe RHD

Antibiotic regimens for secondary prophylaxis.

Table 47:Antibiotic regimens for secondary prophylaxis

Antibiotic	Dose	Route	Frequency
First line			
Benzathine Penicillin G	1,200,000 U (900 mg) $\geq$ 30 Kg 600,000 U (450 mg) $\leq$ 30 Kg	Deep IM Injection	4-weekly
Second line (If IM route is not possible or refused, adherence should be carefully monitored)			
Phenoxymethylpenicillin (Pen V)	250mg	Oral	Once daily
Following documented penicillin allergy			
Erythromycin	250mg	Oral	Twice daily

NOTE: Duration of prophylaxis in all persons with ARF is for a minimum of 10 years after the most recent episode of ARF or until age 21 years (whichever is longer). For RHD, the duration of prophylaxis is for life.

4.4.3. Rheumatic Heart Disease



Description

Rheumatic heart disease (RHD) is including a spectrum of lesions from pericarditis, myocarditis, and valvulitis during ARF, to chronic valvular lesions that evolve over years following one or more episodes of ARF.

The common valvular lesions in RHD include mitral regurgitation/stenosis, aortic regurgitation/stenosis and tricuspid regurgitation/stenosis



Signs and Symptoms

Heart failure (as a result of valvular insufficiency or stenosis)



Treatment

Medical:

- Prevent ARF (Elimination GAS pharyngitis as above)
- Supportive treatment for CCF (as above)
- Prevent recurrent ARF in children with RHD (see secondary prophylaxis above)
- Monitoring for the complications and sequelae of chronic RHD.

Surgery:

- Indicated in patients with persistent CCF

OR

- Worsening after aggressive medical therapy for RHD to decrease valve insufficiency/regurgitation.



Complications

- Atrial arrhythmias,
- Pulmonary oedema,
- Recurrent pulmonary emboli,
- Infective endocarditis
- Intracardiac thrombus formation,
- Systemic embolism.

4.4.4. Infective Endocarditis (IE)



Description

Infective endocarditis (IE) is defined as an infection of the endocardial surface of the heart (heart valves and mural endocardium) by microorganisms (mainly bacteria) hence also called bacterial endocarditis.

Risk factors

- Congenital heart disease especially Cyanotic CHD
- Rheumatic heart disease
- Prosthetic heart valve
- History of endocarditis
- IV drug use or chronic IV access
- Immunocompromised (HIV, diabetes)

Classification

Acute infective endocarditis

Caused by virulent organisms, like *S. aureus*, enterococci and streptococcus, which are harmful even on healthy endocardium. Onset of disease is stormy with high grade fever and causes destructive lesions on the endocardium like ulcerations, perforation, regurgitation and ring abscesses especially around prosthetic valves.

Subacute infective endocarditis

Caused by relatively low virulent organisms e.g. *S. viridans* and HACEK group (*Haemophilus*, *Aggregatibacter*, *Corynebacterium*, *Eikenella*, *Kingella*). It runs a more insidious course:

- low grade fever, anorexia, weight loss, influenza like syndromes, myalgia, pleuritic pain
- No specific heart pathological features. Characterised by slowly growing chronic inflammation, fibrosis and with tightly held endocardial vegetations. Chronicity of this type of IE causes
- chronic antigenemia which in turn is prone to immune complex formation.



Investigations

- FBC/DC
- ESR
- ECG/ECHO
- CXR
- Blood culture 3 cultures within 24 hours

A fever with new/or changing murmur is IE until proven otherwise.

Duke's criteria for the diagnosis of IE

Table 48: Duke's criteria for the diagnosis of IE

Major criteria	Minor criteria
Positive blood culture Typical microorganism consistent with IE from ≥ 2 blood cultures, Microorganisms consistent with IE from persistently positive blood cultures, defined as: • ≥ 2 Positive cultures of blood samples drawn >12 h apart or • All of 3 or a majority of ≥ 4 blood cultures, irrespective of the timing • Positive blood culture for <i>Coxiella burnetii</i> or antiphase-I immunoglobulin G antibody titre $>1:800$ Evidence of endocardial involvement <i>Positive echocardiogram, defined as:</i> Oscillating intracardiac mass on valve or supporting structures, in the path of regurgitant jets, or on implanted material in the absence of an alternative anatomic explanation or Abscess OR New partial dehiscence of prosthetic valve OR New valvular regurgitation (worsening or changing of pre-existing murmur not enough)	• Predisposition: predisposing heart condition or IV drug use • Fever: temperature $\geq 38.0^{\circ}\text{C}$ • Vascular phenomena: major arterial emboli, septic pulmonary infarcts, mycotic aneurysm, intracranial haemorrhage, conjunctival haemorrhages, and Janeway lesions • Immunologic phenomena: glomerulonephritis, Osler nodes, Roth's spots, and rheumatoid factor • Microbiological evidence: positive blood culture but does not meet a major criterion as noted above or serological evidence of active infection with organism consistent with IE

Diagnosis is made when there are 2 major criteria or 1 major plus 3 minor or 5 minor criteria.



Treatment

Table 49: Management of Infective endocarditis

	Drugs	Dosage	Duration	Remarks
1 st Line	Crystalline Penicillin (X Pen) 50-100,000 IU/kg in 4 divided doses/day And, Gentamicin 3-5mg/kg/day in 2-3 divided doses/day	4 weeks	Then, Ciprofloxacin 15mg/kg/day in 2 divided doses for 2 weeks	
	Ceftriaxone 80-100mg/kg/day 1-2 times daily/day And, Gentamicin 3-5mg/kg/day 2-3 divided doses/day	4 weeks	Then, Ciprofloxacin 15mg/kg/day in 2 divided doses for 2 weeks	
2 nd Line	Vancomycin 30-40mg/kg/day in 4 divided doses And, Gentamicin 3-5mg/kg/day in 2-3 divided doses	4 weeks	Then, Ciprofloxacin 15mg/kg/day in 2 divided doses for 2 weeks	

4.5

GASTROINTESTINAL SYSTEM

4.5.1. Acute Diarrhoea



Description

Passage of three or more loose/watery stool or one voluminous loose/watery stool per day.

Causes

Infectious

- Bacterial infections: Commonly, *Vibrio cholerae*, *Salmonella* species, *Shigella*, and *Escherichia coli* (E. coli), *Campylobacter pylori*
 - Viral infections: rotavirus, novovirus, adenovirus, Norwalk virus, astrovirus
 - Parasites: *Giardia lamblia*, *Entamoeba histolytica*, *Cryptosporidium*
 - Systemic infections associated with diarrhoea include: influenza, measles, fever, HIV, malaria, pneumonia, urinary tract infection, meningitis, and sepsis.
- N.B.** Diarrhoea may be watery or bloody (dysentery)

Non-infectious causes

- Food poisoning
- Drugs: Antibiotics, anti-hypertensive, cancer drugs, and antacids containing magnesium

- Intestinal diseases: Inflammatory bowel disease and coeliac disease
- Food intolerance: Lactose
- Food allergy: Cow's milk, Soya

N.B: Some of the above causes may lead to persistent/chronic diarrhoea.



Signs and Symptoms

- Watery or loose stools $\pm$ bloody stools
- Abdominal cramps
- Tenesmus
- Urgency
- Abdominal pain
- May be associated with vomiting and fever, poor appetite and dehydration

Accurate clinical assessment of dehydration is very important!!



Investigations

- FBC, ESR
- Stool m/c/s for bloody and PDD
- U&E, Creatinine
- Abdominal x-ray
- Barium enema/meal

N.B: Other investigations will depend on the underlying/systemic conditions identified such as RDT/MPS

Assessment of hydration status

Table 50: Assessment of hydration status

	No dehydration	Some dehydration	Severe dehydration
General condition	Well, alert	Restless, irritable	Lethargic or unconscious
Eyes	Normal	Sunken	Very sunken
Thirst	Drinks normally, not thirsty	Thirsty, drinks eagerly	Drinks poorly, or not able to drink at all
Skin pinch	Goes back quickly	Goes back slowly (< 2sec)	Goes back very slowly (>2sec)
Treatment	PLAN A	PLAN B	PLAN C

Divided into four components to guide clinical management:

- i. Classification of the type of diarrhoeal illness
- ii. Assessment of hydration status
- iii. Assessment of nutritional status
- iv. Assessment of co-morbid conditions

Classification of levels of dehydration; using a combination of two to three physical signs reliably predict dehydration.



Treatment

Fluid management

- Intravenous fluids are required **ONLY** in the following cases (in all others, ORS should be preferred):
 - o Resuscitation from shock
 - o Dehydration with severe acidosis and prolonged capillary refill time.
 - o Severe abdominal distension and ileus
 - o An altered level of consciousness
 - o Resistant vomiting despite appropriate oral fluid administration
 - o Deterioration or lack of improvement after 4 hours of adequate oral fluids.
 - Check vital signs.
 - Assess and grade hydration status.
 - If in shock, refer to protocol on shock.
 - Depending on level dehydration, give fluids as outlined below:

Table 51: Fluid management

PLAN C – Severe dehydration: RAPID INTRAVENOUS REHYDRATION,	PLAN B – Some dehydration: ORAL REHYDRATION	PLAN A – No dehydration: ORAL REHYDRATION
• Give 100 ml/kg RL or ½ strength Darrow's with 5-10% dextrose. • Reassess patient every 1-2 hours. If hydration is not improving, give the IV drip more rapidly. • After completion of IV fluids, reassess the patient and choose the appropriate treatment Plan (A, B or C). • Repeat Plan C once if no improvement.	• 75mls of ORS x patient's weight (kg) to be given in 4 hours. • The approximate amount of ORS required (in ml) can be calculated by multiplying the child's weight (in kg) by 75, to be given in 4 hours. • After 4 hours, reassess the child and decide what treatment to be given next as per level of dehydration.	Amount of ORS to be given per loose stool dependent on specific age as listed below: • <i>Children less the 2yrs old</i> : 50-100mls ORS per loose stool. • 2- 5 years old: 100- 200mls/ loose stool. • Older than 5 years old- Can drink freely as tolerated.

If IV therapy is not available, then ORS by nasogastric tube or orally at 20 ml/kg/hour for 6 hours (total of 120ml/kg) should be given. If abdomen becomes distended or the child vomits repeatedly, then ORS should be given more slowly.	- Children who continue to have some dehydration even after 4 hours should receive ORS by nasogastric tube or ½ strength Darrow's intravenously (75 ml/kg in 4 hours). - In case of Resistant vomiting despite appropriate oral fluid administration, IV fluids may be used. Avoid Promethazine (Phenergan) Ondansetron may be used up to two doses at 0.15mg/kg. - If abdominal distension occurs, oral rehydration should be withheld and only IV rehydration should be given.	

Zinc supplementation

- Give zinc supplement for 10 to 14 days.
- Infants below 6months of age 10mg daily
- Children 6months and above 20mg daily

Nutritional Status:

- Children presenting with diarrhoea should be assessed for malnutrition according to WHO standards.
- Children with acute diarrhoea and malnutrition are at increased risk for developing fluid overload and heart failure during rehydration.
- The risk of serious bacterial infection is also increased.
- Such children require an individualized approach to rehydration and nutritional care.

Continued feeding is very important during episodes of diarrhoea!! Give appropriate feeds.

Avoid juices, carbonated drinks and cereal based ready to drink over the counter preparations.

N.B: Diarrhoea is a major risk factor for malnutrition which is associated with high mortality and deficits in physical and cognitive development.

Drugs

- Antibiotics are **NOT** indicated for most children with acute watery diarrhoea; dysentery and suspected cholera are important exceptions.
- Children with acute diarrhoea should **NOT** receive antimotility agents or antiemetics.

N.B: Antimotility agents (loperamide, diphenoxylate-atropine, and tincture of opium) prolong some bacterial infections and may cause fatal paralytic ileus in children

4.5.2. Persistent Diarrhoea



Description

Passage of 3 or more watery stools within 24hrs lasting for more than 14 days. Dehydration, malnutrition, and infections are major contributors to development of persistent diarrhoea. The many causes of PD can be divided into four principle pathophysiologic mechanisms: osmotic, secretory, dysmotility associated, and inflammatory.



Signs and Symptoms

- Liquid stools often passed after eating, may be explosive.
- Occasionally stool may contain visible blood.
- Weight loss often evident and signs of malnutrition often present
- Signs of dehydrations
- Features of Extra-intestinal infections: e.g. Pneumonia, UTI

Causes of Persistent Diarrhoea

Table 52: Causes of Persistent Diarrhoea

Cause	Major Signs and symptoms (In addition to PD)	Laboratory and Imaging Findings
Infectious (e.g. <i>E. coli</i> , <i>Cryptosporidium</i> , <i>Giardia</i> , <i>Salmonella</i> , <i>E. histolytica</i>)	Possible blood and/or mucus in stool Possible fever and/or abdominal pain	Positive stool culture, ova and parasite examination,
Lactose malabsorption	Abdominal discomfort, bloating, flatulence	Elevated breath hydrogen concentration after lactose ingestion
Immunodeficiency state (various diseases)	Recurrent infections Young age, typically in infancy	Abnormal immunoglobulins (eg, low IgG, low IgA, high IgM) Lymphopenia Low antigen titers to previous immunizations
Food Allergy	Most commonly in response to cow or soy milk	May have hypoalbuminemia and anemia Electrolyte abnormalities from diarrhea/vomiting Serum IgE may be elevated
Hirschsprung disease	Delayed passage of meconium Abnormal barium enema Distended abdomen Explosive stool with rectal examination	Abnormal barium enema Absent ganglion cells on rectal biopsy

Cause	Major Signs and symptoms (In addition to PD)	Laboratory and Imaging Findings
Toddlers' diarrhoea	Usually thriving toddler. Sweetened juices usually the cause	Normal laboratory and imaging results
Irritable Bowel Syndrome	Alternating constipation with diarrhoea Abdominal pain relieved by defecation Typically diagnosed in adolescence or later	Normal laboratory and imaging results
Celiac disease	FTT, abdominal distention, vomiting Typically, 9-24mo of age	Elevated anti-TTG IgA, antiendomysial IgA Antibodies
Inflammatory Bowel Disease	Bloody stool Stooling urgency, abdominal pain, Fatigue. Weight loss. Arthritis	Elevated ESR & fecal calprotectin thrombocytosis Iron-deficiency anemia Hypoalbuminemia



Treatment

- Appropriate fluids to prevent and treat dehydration.
- A nutritious diet to promote weight gain. **BEWARE** of foods worsen diarrhoea.
- If Severe Acute Malnutrition is present, treat according to SAM protocol.
- Supplementary vitamins and minerals, including zinc for 10-14 days.
- Antimicrobials to treat diagnosed infection

4.5.3. Severe Acute Malnutrition (SAM)



Description

WHO defines severe acute malnutrition in children 6 - 59 months old by a very low weight for height/weight for length $< -3SD$ with or without clinical signs of bilateral pitting oedema as well as mid upper arm circumference $< 11.5cm$.

Identifying and assessing the children with severe malnutrition

- Infants and children who are 6–59 months of age and have a mid-upper arm circumference < 115 mm or a weight-for-height/length < -3 Z-score of the WHO growth standards, or have bilateral oedema, should be immediately admitted to a programme for the management of severe acute malnutrition.

Criteria for inpatient or outpatient care

- Children who are identified to have severe acute malnutrition should first be assessed with a full clinical examination to confirm whether they have medical complications and whether they have an appetite. Children who have appetite (pass the appetite test) and are clinically well and alert should be treated as outpatients despite having SAM.

Children who have medical complications, severe oedema (+++), or poor appetite (fail the appetite test), or present with one or more Integrated Management of Childhood Illness (IMCI) danger signs should be treated as inpatients.

Identifying and assessing the children with severe malnutrition

- Infants and children who are 6–59 months of age and have a mid-upper arm circumference <115 mm or a weight-for-height/length <−3 Z-score of the WHO growth standards, or have bilateral oedema, should be immediately admitted to a programme for the management of severe acute malnutrition.



Investigations

- Blood Sugar and Haemoglobin Immediately on admission
- Full blood count, ESR
- Malaria slide (thick and thin smear)
- Blood culture
- Urinalysis
- Urine m/c/s
- Gastric lavage for AFB
- Lumbar puncture if indicated.
- Chest x-ray
- Routine counselling and testing (RVT)
- Reducing substances if passing watery, urine like stool (ask mother remove nappy and put patient on plastic)



Treatment

Assess for emergency and danger signs and manage promptly.

Manage patients based on 10 steps as recommended by WHO.

Time frame for management of a child with complicated severe acute malnutrition.

Table 53: Time frame for management of a child with complicated severe acute malnutrition

	Stabilization		Rehabilitation
	Days 1–2	Days 3–7	Weeks 2–6
1. Hypoglycaemia	— — — — — →		
2. Hypothermia	— — — — — →		
3. Dehydration	— — — — — →		
4. Electrolytes	— — — — — →	— — — — — →	— — — — — →
5. Infection	— — — — — →		
6. Micronutrients	— — no iron — — — — — →	— — — — — →	— — — — — with iron — — →
7. Initiate feeding	— — — — — →		
8. Catch-up growth			— — — — — →
9. Sensory stimulation	— — — — — →		— — — — — →
10. Prepare for follow-up			— — — — — →

4.5.4. Acute Upper GI Bleeding



Description

Upper gastrointestinal (GI) bleeding refers to haemorrhage from any level above the ligament of Treitz. Common causes are shown in the table below.

Table 54: Common causes of Acute upper GI bleeding

Age Group	Cause
Neonates	• Haemorrhagic disease of the newborn • Swallowed maternal blood • Stress ulceration • Coagulopathy
Infants (1 month – 1 year)	• Oesophagitis • Gastric ulceration
Infants (1 -2 years)	• Peptic ulcer disease • Gastritis
Children older than 2 years	• Oesophageal varices • Gastric varices
Adolescents	• Duodenal ulcers

PAEDIATRIC



Signs and Symptoms

- Presentation of bleeding depends on the amount and location of haemorrhage.
- Haematemesis
- Coffee ground vomiting
- Melaena
- Haematochezia - if the haemorrhage is severe
- May also present with complications of anaemia/shock



Investigations

- FBC, ESR
- U/E's, Creatinine, LFTs
- Barium swallow/meal

- Clotting profile
- Endoscopy (electrocautery, clipping or banding)



Treatment

- ABCDE
- Brief history as to possible cause of the bleeding.
- Consider antidote for bleeding due to poisoning, Iron – Desferrioxamine, Warfarin – Vitamin K
- Replacement of volume with intravenous solutions and blood products if required.
- Proton pump inhibitors (PPIs) – Omeprazole IV 0.5mg-2mg/kg OD
- H₂ receptor inhibitors – Cimetidine infants:10-20mg/kg/day or Oral QID/BD Less than 16yrs 20-40mg/kg/day IV/PO QID
- Ranitidine: Infants 1mg/kg TDS Children 12-16 yrs 150mg BD
- Variceal bleeds-Octreotide 1mg/kg bolus then 1mcg/kg/hr IV infusion.Taper by 50% when active bleeding is controlled for 24 hours.
- Propranol (Prevention of recurrent bleeding) 10mg- 20mg BD. Monitor for bradycardia

4.5.5. Acute Hepatic Failure



Description

Fulminant hepatic failure (FHF) is usually defined as the severe impairment of hepatic functions in the absence of preexisting liver disease. The child may present within hours or weeks.

Common causes:

- Infective Viral - Hepatitis A, B, C and D, HIV, Parvovirus, Herpesvirus, Enterovirus, Adenovirus, Varicella, Echovirus, CMV
- Drugs - Paracetamol, antituberculous drugs, carbamazepine, sodium valproate, halothane
- Toxins - Mushroom, particularly amanita phalloides, herbs and traditional medicines
- Infiltrative - Leukemias, lymphomas
- Metabolic - Wilson's, galactosemia, tyrosinemia



Signs and Symptoms

- Protracted vomiting
- Jaundice

- Tender hepatomegaly
- Coagulopathy (bruising, petechiae, bleeding)
- Hypoglycaemia
- Electrolyte disturbance
- Encephalopathy (early signs of encephalopathy include alternate periods of irritability, confusion and drowsiness. Older children may be aggressive or show unusual behaviour)



Investigations

- Liver Function tests:
 - o Serum albumin
 - o Transaminases
 - o Bilirubin total and direct
 - o Alkaline Phosphatase
- Blood Glucose levels
- Prothrombin time (PT) or International normalised ratio (INR)
- Full Blood Count
- Urea, creatinine and electrolytes
- CRP/ESR
- Imaging
- Investigate for underlying cause



Treatment

- ABCDE
- Oxygen by nasal cannulae or face mask
- Vitamin K, stat dose IV or IM (300 micrograms/kg for age 1 month to 12 years and 10 mg if >12 years to attempt correction of prolonged clotting time)
- If frank bleeding (GI or other), fresh frozen plasma at 10 ml/kg IV
- Maintain blood glucose between 4 and 9 mmol/litre using 2/3 of maintenance fluid volume consisting of 10% dextrose IV or orally.
- Strictly monitor urine output and fluid balance, aim for a urine output of not less than 0.5 ml/kg/hr
- Correct hypokalaemia if present as it can worsen encephalopathy.
- Broad spectrum antibiotics for example cephalosporin to treat sepsis.
- Systemic fungal infection may require IV amphotericin or oral fluconazole.
- Maintain normothermia by environmental measures, **do not give paracetamol.**
- Lactulose 5-10 mls 2-3 times daily to produce two to four soft and acid stools per day, to be omitted if diarrhoea occurs .
- Neomycin 20-30 mg/kg/day 6 hrly orally, maximum dose 2 gm/day

4.5.6. Intussusception



Description

Intussusception refers to the invagination (telescoping) of a part of the intestine into itself. It is the most common abdominal emergency in early childhood, particularly in children younger than two years of age. Ileocolic intussusception accounts for 90% of all cases. Typically presents between 6 and 36 months.



Signs and Symptoms

- Intermittent, severe, crampy, progressive abdominal pain of sudden onset.
- Inconsolable crying and drawing up of legs to the abdomen.
- Relative calm between paroxysms of pain.
- Vomiting, non-bilious initially but later bilious as condition progresses.
- Stool with red blood and mucus, currant jelly stool.
- Palpable sausage shaped mass in the right upper quadrant.
- Progressive weakness and lethargy.
- Shock like state with fever and peritonitis may develop.



Investigations

- Ultrasonography which shows the classic “target sign”.
- Plain abdominal X-ray to rule out perforation.



Treatment

- Stabilize the patient before surgery. Assess ABCDE and correct abnormalities.
- Reduction of an acute intussusception is an emergency procedure and should be performed immediately after diagnosis in preparation for possible surgery.
- Non-operative reduction in patients with no evidence of bowel perforation by hydrostatic or pneumatic pressure.
- Surgical intervention in patients who are acutely ill or have evidence of perforation and where radiographic facilities and expertise to perform non-operative reduction are not readily available.

4.5.7. Peptic Ulcer Disease (PUD)



Description

Peptic ulcer disease (PUD), the end result of inflammation caused by an imbalance between cytoprotective and cytotoxic factors in the stomach and duodenum, manifests with varying degrees of gastritis or frank ulceration.

The pathogenesis of peptic ulcer disease is multifactorial, but the final common pathway for the development of ulcers is the action of acid and pepsin-laden contents of the stomach on the gastric and duodenal mucosa and the inability of mucosal defense mechanisms to allay those effects.

Gastric ulcers are generally located on the lesser curvature of the stomach, and 90% of duodenal ulcers are found in the duodenal bulb.

The common causes of peptic ulcers include H pylori, medication use, and stress-related gastric injury. Less common causes include ingestion of corrosive substances, hypersecretory states (Zollinger-Ellison syndrome), IBD, systemic mastocytosis, chronic renal failure, and hyperparathyroidism.



Signs and Symptoms

- Vary with the age of the patient.
- Hematemesis or melena is reported in up to half of the patients with peptic ulcer disease.
- Epigastric pain and nausea, especially in school going children.
- Dyspepsia, epigastric abdominal pain or fullness is seen in older children.
- Infants and younger children usually present with feeding difficulty, vomiting, crying episodes, hematemesis, or melena.
- In the neonatal period, gastric perforation can be the initial presentation.



Investigations

- Esophagogastroduodenoscopy is the method of choice.
- Safely performed in all ages by experienced paediatric gastroenterologists. Endoscopy allows the direct visualization of esophagus, stomach, and duodenum.
- Biopsy specimens may be obtained from the stomach for histopathology, culture or rapid urease testing for H. pylori.
- Endoscopy also provides the opportunity for hemostatic therapy including injection and the use of a heater probe or electrocoagulation if necessary.
- Other investigations include **faecal-H. pylori** antigen test and urea breath test.

- ***Blood-H.** pylori antigen test and abdominal ultrasound are less informative hence a diagnosis should not be based solely on these.



Treatment

PUD treatment includes eradication of *H. pylori* and gastric acid suppression using triple therapy comprising of 2 antibiotics and a proton pump inhibitor (PPI). Examples of triple therapy regimens are shown in the table below.

Table 55: Triple therapy regimens

Medication	Dosage	Duration
Omeprazole	1mg/Kg/day in 2 divided doses	1 month
Amoxicillin	50mg/Kg/day in 2 divided doses	14 days
Clarithromycin	15mg/Kg/day in 2 divided doses	14 days
Omeprazole	1mg/Kg/day in 2 divided doses	1 month
Tinidazole	50mg/Kg/day (max 2g)	14 days
Clarithromycin	15mg/Kg/day in 2 divided doses	14 days
Omeprazole	1mg/Kg/day in 2 divided doses	1 month
Metronidazole	20mg/Kg/day in 2 divided doses	14 days
Clarithromycin	15mg/Kg/day in 2 divided doses	14 days

4.6 GENITO-URINARY SYSTEM

14.6.1. Urinary Tract Infection (UTI)



Description

UTIs are usually caused when bacteria invade and ascend the urinary tract from the urethra and into the bladder. Cystitis occurs when the infection and inflammatory response are localised to the bladder. Pyelonephritis is an upper UTI in which the bacteria and subsequent inflammatory response further ascend to the ureters and kidneys. Infants generally present late in the course of infection because of initial nonspecific signs, such as fever, and the inability to express symptoms or localize pain.

Older children can usually localise early symptoms of UTI and therefore present earlier in the clinical course.

Colonic bacteria are the typical causes, these include;

- Escherichia coli (54% to 67% of UTIs in children).
- Klebsiella (6%-7%),
- Proteus (5%-12%),
- Enterococcus (3%-(%)
- Pseudomonas (2%-6%) are other common causative organisms.



Signs and Symptoms

- Fever
- Dysuria
- Urinary frequency
- Suprapubic discomfort
- Flank pain.
- Costovertebral pain
- Abdominal pain



Investigations

- *Urinalysis*: A positive nitrite test makes UTI very likely, but the test maybe falsely negative. The leukocyte esterase test is an indirect measure of pyuria.
- *Urine microscopy*: A microscopic urinalysis finding of 10 white blood cell per microliter in uncentrifuged urine specimen is significant.
- *Urine culture*: For children who are not toilet trained, only urethral catheterisation and SPA are reliable methods for specimen collection for the purpose of culture. For toilet trained children, a midstream urine sample should be collected.



Treatment

- Start empiric treatment with Quinolones but depends on local susceptible patterns then change according to culture results.
- Oral antibiotics 10 to 14 days or
- IV antibiotics for 3 days, then 10 days oral antibiotics

4.6.2. Nephrotic Syndrome



Description

Nephrotic syndrome is characterised by heavy proteinuria $> 40 \text{ mg/m}^2/\text{hr}$ or urine protein 3+ or greater on a dipstick test, hypoalbuminaemia (serum albumin $< 25\text{g/L}$) and hyperlipidaemia and oedema. Common causes include idiopathic (primary) nephrotic syndrome, secondary nephrotic syndrome (secondary to a known cause e.g. Hepatitis B, malaria syphilis, SLE), congenital nephrotic syndrome - occurring in a child less than three months- it may be primary or secondary.



Signs and Symptoms

- Oedema with or without ascites,
- Pleural effusions,
- Anasarcaenital
- Hypertension and haematuria may be present.



Investigations

- *Blood:* FBC/ESR; U&Es; Creatinine; LFTs including serum albumin; C3/C4 ; ANA, ASOT, anti- Dnase B, RPR, HCV antibodies, HbSAg, Triglycerides and cholesterol levels.
- *Urine:* Dipstick urinalysis. Morning urine protein/creatinine ratio $\geq 200\text{mg}/\text{mmol}$ or $0.2\text{g}/\text{mmol}$ (morning so as to avoid orthostatic proteinuria).
- Varicella zoster virus (VZV) IgG blood levels
- Tuberculin skin test
- CXR, KUB ultrasound
- *Renal biopsy:* only if atypical features at presentation; macroscopic hematuria, less than 12 months or older than 12 years, low C3, vasculitic rash, suspected vasculitis.



Treatment

Supportive

- No added salt in the diet.
- Diuretics for severe oedema: Furosemide $1\text{mg}/\text{kg}$ BD initially- ensure that patient does not have intravascular volume contraction before commencing.

- Poor response to diuretics alone; 20% albumin 1g/kg given over 4-6 hours. Ensure that patient does not have renal failure as albumin can cause pulmonary oedema. Monitor closely for hypertension with this treatment.
- Prophylactic antibiotic cover (pen v) if patient has gross oedema including ascites. In penicillin sensitive use erythromycin.
- Daily weight and daily urinalysis
- If antihypertensives are required ensure that the patient has a normal creatinine and serum potassium before using ACE- inhibitors. For initial treatment calcium channel blockers such as amlodipine or nifedipine are ideal- discuss with Nephrology.
- Dose of prednisolone in m2 60mg/m2 [2mg/kg] in the first 4 weeks and then reduced to 40mg/m2 [1.5 mg/kg] given on alternate days for 4 weeks then tapered off slowly over another 4-6 weeks.

Important Definitions

Table 56: Definitions

Remission	Urine albumin nil or trace (or proteinuria <40 mg/m2 /h) for 3 consecutive days
Relapse	Urine albumin 2 + or more for 3 consecutive days, having been in remission previously
Frequent relapses	Two or more relapses in six months of initial response, or more than four relapses in any twelve months
Steroid dependence	Children who relapse whilst on steroids therapy or within 14 days of discontinuation of steroid therapy
Steroid resistance	Absence of remission following at least 28 days of steroid therapy at a dose of 2 mg/kg per day



Complications

- Increased susceptibility to bacterial infections.
- Spontaneous bacterial peritonitis.
- Hypovolaemia and thromboembolism.
- Complications related to chronic steroid administration include hypertension, obesity, and linear growth retardation.

4.6.3. Acute Glomerulonephritis



Description

Results from inflammation in the glomerulus. It is a clinical syndrome that is said to be present when a constellation of four features is present in a patient; oedema, hypertension hematuria and renal dysfunction. Causes of acute glomerulonephritis include post-infectious, renal, and systemic aetiologies.

Post-infectious aetiologies

- *Bacterial*: Streptococcus species (i.e. group A beta-haemolytic), the commonest cause. syphilis, TB, salmonella, E.coli.
- *Viral*: Hepatitis B and C, HIV.
- *Parasitic*: Malaria.

Systemic causes

- Collagen vascular diseases (e.g. SLE)
- Vasculitis- IgA nephropathy, HSP, ANCA associated vasculitis
- Drug-induced (i.e. gold, penicillamine)
- HUS, TTP
- Ventriculo-atrial shunts



Signs and Symptoms

- Sudden development of puffiness of the eyelids and facial oedema in the setting of a post-streptococcal infection.
- Dark urine
- Reduced urine output and scanty
- Fever
- Abdominal pain
- Malaise
- Oedema
- Hypertension
- Haematuria on dipstick urinalysis
- Other signs depend on the underlying cause e.g. Malar rash and other vasculitic rashes.



Investigations

- Urine microscopy – RBC's, RBC casts (dysmorphic red blood cells), proteinuria, leukocytes
- Blood – FBC, U/E and creatinine, ESR
- Cultures – throat swab
- Others (as indicated) - CXR, U/S-renal, ECHO, ASOT, antinuclear antibody, anti-DNA antibodies. Complement levels (C3, C4), ANA, ANCA, +/- renal biopsy



Treatment

- Sodium restriction.
- Renally adjust all drug doses based on estimated GFR.

- Fluid restriction may be necessary depending on extent of renal dysfunction.
- Treat underlying cause.
- If patient progresses to acute renal failure, refer to acute renal failure protocol.
- As some patients may end up with rapidly progressive glomerulonephritis early nephrology consultation is highly encouraged.
- Antibiotics, i.e. penicillin if thought to be post-streptococcal infection.
- Antihypertensive, i.e. diuretics, calcium channel blockers, beta-blockers.

NB: Please avoid ACE-inhibitors as initial antihypertensive choice until blood results for serum creatinine and potassium are known. Monitor renal function of the patient.

4.6.4. Acute Kidney Injury (AKI)



Description

An acute, potentially reversible, deterioration in kidney function resulting in failure to maintain normal physiological homeostasis, characterized by an increase in blood urea and serum creatinine values, often accompanied by hyperkalaemia, metabolic acidosis, and hypertension. It may be accompanied by a urine output $< 0.5 \text{ ml/kg/hour}$ or $< 1.0 \text{ ml/kg/hour}$ in the neonate. Note however that some forms of AKI are accompanied by polyuria e.g. aminoglycoside toxicity.

Pre-renal causes resulting from reduced blood pressure or reduced effective intravascular volume thus resulting in hypoperfusion of the kidneys include dehydration, haemorrhage, sepsis, cardiac failure, nephrotic syndrome.

Renal causes of AKI are due to renal parenchymal damage, e.g. acute glomerulonephritis, Intrarenal vascular disease such as Haemolytic-uremic syndrome, Acute interstitial nephritis, acute tubular necrosis and nephrotoxins.

Post renal causes may be congenital such as posterior urethral valves, bilateral pelvic-ureteric junction, ureteroceles, prune belly syndrome, bladder outlet obstruction, neurogenic bladder. Acquired causes include urolithiasis, clots, tumours if both kidneys involved or if these result in bladder outlet obstruction.



Signs and Symptoms

- Fluid overload-hypertension, oedema.
- Heart failure - hepatomegaly, gallop rhythm, and pulmonary oedema.
- Intravascular volume depletion-tachycardia, hypotension, decreased skin turgor, dry mucous membranes, and changes in sensorium.
- Oliguria- 0.5 ml/kg/h in children and $< 1 \text{ ml/kg/hr}$ in neonates.
- Rash and arthritis- SLE and Henoch-Schonlein purpura nephritis.
- Flank masses- renal vein thrombosis, tumours, cystic diseases, urinary tract obstruction.



Investigations

- *Dipstick urinalysis*: leucocytes (UTI), Proteinuria & Haematuria.
- *Urine microscopy*: red blood cell casts (dysmorphic red blood cells), granular casts, and red blood cells, findings seen in glomerulonephritis.
- *Urine*: sodium and urine osmolality.
- *Serum bicarbonate*: if not done by lab routinely can be obtained from blood gas strip.
- *Electrolytes*: K^+ , Na^+ , Ca^{++} and Phosphate,
- Uric acid and urea and creatinine
- *Full blood count*: peripheral smear as indicated.
- Other blood tests as dictated by underlying cause.
 - o CXR: pulmonary congestion (fluid overload).
 - o KUB ultrasound (urinary tract obstruction).
 - o **+/-Renal biopsy**: ultimately if cause unclear or suspected rapidly progressive glomerulonephritis.



Treatment

Supportive

- Pass urinary catheter e.g. in neonates with suspected posterior valves, or for urine output monitoring in non-ambulatory children/adolescents during ARF.
- Fluids – if hypovolaemic will require volume expansion with isotonic saline at 20 ml/kg over 30 min.
- For Patients with relatively normal intravascular volume – give insensible losses at 400 ml/m²/day (30ml/kg/day) plus urine output for the previous 24 hours & extra renal losses as appropriate.
- Daily monitor urine & stool output, fluid intake, body weight, blood chemistries.
- Renally adjust all drug doses. Use the Schwartz formula to calculate the estimated GFR.
- Nutritional requirements should be addressed accordingly in consultation with the dietician.

Renal replacement therapy

Dialysis (peritoneal dialysis or haemodialysis) indications:

- Fluid overload/hypertension
- Severe acidosis not responding to medical management.
- Persistent hyperkalaemia uncontrollable electrolyte imbalance
- Symptomatic uraemia or urea > 35.7 - 53.6 mmol/l
- Dialyzable toxin
- Anuria

Pharmacological

Indicated by the following ECG changes: peaked T-waves, widening QRS complex, ST segment depression, ventricular arrhythmias and cardiac arrest

- Eliminate exogenous potassium (IVF, diet) including drugs sources,
- oral or enema K⁺-binding resin (Na polystyrene sulfonate [kayexalate]) at 1g/kg single dose.
- If K⁺ >7 mmol/l, + ECG changes, give the following:
 - o Nebulised salbutamol 2.5 mg if weight < 25kg or 5 mg if weight >25 kg or IV salbutamol 4µg/kg in 10 ml of water over 10 min
 - o 10% calcium gluconate (cardio-protective) at 0.5ml/kg IV over 10 min
 - o 8.4% sodium bicarbonate 1-2 mmol/kg IV over 5-10 min
 - o Regular insulin 0.1 u/kg with 50% glucose 1 ml/kg over 1hr
 - o Lasix at 1mg/kg BD may also be used to drive out potassium

The above are only temporal measures. Please discuss nephrology for arrangement of dialysis ASAP.

Hypocalcaemia: Calcium carbonate orally 45 to 65 mg/kg per day. If tetany, IV 10% calcium gluconate 0.5 to 1 ml/kg (up to 10 ml) if patient is symptomatic, with low phosphorus diet or phosphorus binders (calcium carbonate given with meals).

Hyponatraemia (dilutional usually):

- Treat if < 120 mmol/l or symptomatic (seizures, lethargy). Correct to 125 mmol/l using the following formula:
- Required NaCl (mmol) = $0.6 \times \text{weight} \times \text{deficit}$ (125 mmol/l – serum Na) given over 4-6 hours
- 3% hypertonic saline IV. if not available discuss with pharmacist how NaCl tablets or table salt can be given orally.

Metabolic acidosis: Mild acidosis is common and does not require treatment. Severe acidosis (pH = 7.15, serum bicarbonate < 8 mmol/l) should be corrected partially with IV sodium bicarbonate to pH = 7.20, serum HCO₃⁻ = 12 mmol/l, then the remainder corrected by oral sodium bicarbonate.

Rapid metabolic acidosis correction with IV NaHCO₃ may reduce ionised serum calcium leading to tetany! Preferably correct metabolic acidosis by instituting dialysis. Hypertension and Anaemia treat as per appropriate protocol.



Complications

Hyperkalaemia > 6 mmol/l

4.6.5. Hypertension in Children



Description

Systolic and/or diastolic pressure levels greater than the 95th percentile for age and gender on at least three occasions. BP readings of 5mmHg or more above the 99th centile values are considered as severe hypertension. Pre-hypertension: average systolic or diastolic blood pressure between the 90th and 95th percentiles for age and gender. Essential or primary hypertension is diagnosed when a specific aetiology cannot be identified while secondary hypertension has an identifiable cause and is the commonest type of hypertension in paediatric population. More than 90% of the cases of secondary hypertension are caused by chronic renal disease, renovascular disease and coarctation of the aorta.

Commonest causes of secondary hypertension in children

Table 57: Commonest causes of secondary hypertension in children

	Examples of lesions/pathology
Renal	Acute and chronic Glomerulonephritis Acute and chronic Pyelonephritis Congenital anomalies [polycystic or dysplastic kidneys] Obstructive uropathies [hydronephrosis] Haemolytic-uremic syndrome Renal damage from nephrotoxic medications, trauma or radiation
Renovascular	Renal artery disorders (e.g. stenosis, polyarteritis, thrombosis) Renal vein thrombosis
Cardiovascular	Coarctation of the aorta Conditions with large stroke volume [PDA, aortic insufficiency, system A-V fistula, complete heart block]. These conditions cause only systolic hypertension
Endocrine	Hyperthyroidism (systolic hypertension) Excessive catecholamine levels (Pheochromocytoma, Neuroblastoma) Adrenal dysfunction Cushing's syndrome Hyperaldosteronism
Neurogenic	Increased intracranial pressure
Drugs and chemicals	Steroids Sympathomimetic drugs [cough medications] Heavy metal poisoning [mercury, lead] CNS stimulants: Cocaine [acute or chronic use]



Signs and Symptoms

- Mild hypertension is usually **asymptomatic**.
- Severe hypertension -headache, dizziness, nausea and vomiting, irritability, personality changes) occasionally presenting with neurological manifestation.
- Secondary hypertension- Children will have clinical features of primary disease: CCF, renal dysfunction, and stroke.



Investigations

Table 58: Investigations for hypertension in children

Routine Laboratory Tests	Significance of Abnormal Results
Urinalysis, urine culture, urea Creatinine, uric acid	Renal parenchymal disease
Serum electrolyte (hypokalaemia)	Hyperaldosteronism 1° or 2°, Adrenogenital syndrome, renin producing tumours
ECG, CXR, ECHO	Cardiac causes e.g. coarctation of the aorta
Specialised tests	
IVU, US KIDNEY, CT scan	Renal parenchymal disease, renovascular disease, tumours (neuroblastoma, Wilms)
Plasma renin activity	High-renin hypertension Renovascular disease Renin-producing tumours Some Cushing's syndrome Some essential hypertension Low-renin hypertension Adrenogenital syndrome Primary hyperaldosteronism
24-hr urine collection for 17-ketosteroids and 17-hydroxycorticosteroids	Cushing's syndrome, adrenogenital syndrome
24-hr urine collection for catecholamine levels and VMA	Pheochromocytoma, neuroblastoma
Aldosterone	Hyperaldosteronism, primary or secondary renovascular disease, renin-production tumours
Renal vein plasma renin activity	Unilateral renal parenchymal disease, renovascular hypertension
Abdominal aortogram	Renovascular hypertension, abdominal CoA, unilateral renal parenchymal disease, pheochromocytoma.



Treatment

Supportive

- Encourage weight reduction if indicated.
- low salt foods/diet
- avoidance of smoking
- Regular exercise and restriction of sedentary lifestyle

Whom to treat

- Symptomatic hypertension and severe hypertension
- Prehypertension in presence of comorbid conditions, such as chronic kidney disease or diabetes mellitus
- Hypertensive children with diabetes mellitus or other risk CVD factors, such as dyslipidaemia
- Hypertensive target-organ damage, most often left ventricular hypertrophy (LVH)
- For essential hypertension (without any evidence of target-organ damage) that persists despite a trial of four to six months of nonpharmacologic therapy.

Pharmacological

Secondary hypertension is the commonest cause of hypertension in children and the treatment of the underlying medical conditions influences the choice of specific class of antihypertensive drugs.

In children with chronic kidney disease- ACE inhibitors be used as the initial antihypertensive agent. In patients who cannot tolerate ACE inhibitors, angiotensin-receptor blockers (ARBs) are a reasonable alternative.

In adolescents with primary HTN without target-organ damage- low-dose thiazide diuretic therapy be used as the first antihypertensive agent

In children with either type 1 or type 2 diabetes mellitus- ACE inhibitors be used as the initial antihypertensive agent. In patients who cannot tolerate ACE inhibitors, angiotensin-receptor blockers (ARBs) are a reasonable alternative.

Diuretics are the cornerstone of antihypertensive drug therapy in essential hypertension and are not used in patients with renal failure.

ACE inhibitors are contraindicated in obstructive lesions like bilateral renal artery stenosis, aortic stenosis and coarctation of the aorta.

The stepped-care approach, using three classes of drugs: diuretics, B-blockers, and vasodilators.

Step 1: Initiate with a small dose of a single antihypertensive drug (thiazide diuretic or adrenergic inhibitor), adjust upwards as necessary.

Step 2: If the first drug is not effective, a second drug may be added to, or substituted for, the first drug, starting with a small dose and proceeding to full dose.

Step 3: If the blood pressure remains elevated, a third drug, such as a vasodilator, may be added to the regimen. At this point, the possibility of secondary hypertension should be reconsidered.

Hypertensive crisis

A hypertensive emergency is defined as any of the following features:

- The patient has severe hypertension [>180 mm Hg systolic or 110 mm Hg diastolic] or rapidly increasing blood pressure.
- The patient has neurologic signs [hypertensive encephalopathy] with severe headache, vomiting, irritability, apathy, papilloedema, retinal haemorrhage, or exudates.
- The patient has CHF or pulmonary oedema.

Aggressive administration of antihypertensive drugs is indicated to lower blood pressure – no more than 25% reduction of systolic BP in the first 8 hours; gradually attain normal BP over 24-48 hours.

Admit Patient to ICU

Table 59: Treatment of Hypertensive Crisis in Children

Drug	Dose	Comment
Nifedipine	0.2 - 0.5 mg/kg, every 4 to 6 hours, 12 to 24 hourly if retard Nifedipine is used	If patient is conscious
Hydralazine	0.15 mg/kg IV slow infusion over 20 minutes	The dose may be repeated at 4 to 6 hours interval.
Nitroprusside	1-3 μ g/kg per min as IV infusion	
Labetalol	0.2-2mg/kg/hour IV infusion	Alpha and beta blocker
Diazoxide	3-5mg/kg as IV bolus	
Furosemide	1mg/kg IV bolus	To initiate diuresis

NB: Fluid balance must be controlled carefully, so intake is limited to urine output plus insensible loss. Seizures may be treated with slow intravenous infusion of diazepam [Valium], 0.2 mg/kg or another anticonvulsant medication. When a hypertensive crisis is under control, oral medications replace the parenteral medications.

4.7 HAEMATOLOGY

4.7.1. Anaemia



Description

Haemoglobin (**Hb**) concentration or hematocrit two or more standard deviations below the mean value for age and sex.

Table 60: Age-Specific Normative Red Blood Cell Values

Age	Haemoglobin (g per dL)		Haematocrit (%)		Mean corpuscular volume (fL)	
	Mean	2 SDs below mean	Mean	2 SDs below mean	Mean	2 SDs below mean
26 to 30 weeks' gestation	13.4	11.0	41.5	34.9	118.2	106.7
28 weeks' gestation	14.5	NA	45	NA	120	NA
32 weeks' gestation	15.0	NA	47	NA	118	NA
Full term (cord sample)	16.5	13.5	51	42	108	98
1 to 3 days	18.5	14.5	56	45	108	95
2 weeks	16.6	13.4	53	41	105	88
1 month	13.9	10.7	44	33	101	91
2 months	11.2	9.4	35	28	95	84
6 months	12.6	11.1	36	31	76	68
6 months to 2 years	12.0	10.5	36	33	78	70
2 to 6 years	12.5	11.5	37	34	81	75
6 to 12 years	13.5	11.5	40	35	86	77
12 to 18 yrs (male)	14.5	13.0	43	36	88	78
12 to 18 yrs (female)	14.0	12.0	41	37	90	78
Adult (male)	15.5	13.5	47	41	90	80
Adult (female)	14.0	12.0	41	36	90	80

NA = not available; SD = standard deviation.

Adapted from Robertson J, Shilkofski N, eds. The Harriet Lane Handbook. 17th ed. Philadelphia, Pa.: Mosby; 2005:337. ss

Anemia will occur due to

- Decreased red cell production due to deficiency of haematopoietic precursors (Iron, Folate, vitamin B12) or bone marrow failure due malignant infiltration, aplastic or congenital defects
- Increased red cell destruction leading to hemolytic anemia. Hemolysis can occur due to extra corpuscular and intra corpuscular defects. Extra corpuscular defects are usually Immune mediated: while Intracorpouscular defects occur due to inherent red cell abnormalities such as Enzyme defects- G6PD, Membrane defects; hereditary spherocytosis, eliptocytosis and globin defects: Sick cell anemia, Thalassemia



Signs and Symptoms

- Fever
- Poor weight gain or weight loss
- jaundice

- Pica
- Headache
- Poor concentration
- Palpitations
- Easy fatigability
- Bruising episodes
- Bleeding episodes
- Pallor
- Fever
- Tachycardia
- Oedema
- Hepatosplenomegaly
- Lymphadenopathy
- Petechiae
- Purpura



Investigations

- Full blood count
- Peripheral blood smear
- Reticulocyte count
- Total and direct serum bilirubin levels

NB: These above first four tests are key in the characterization of the type of Anaemia and possible cause.

Other tests

- ESR – (erythrocyte sedimentation rate)
- LDH
- Coombs – direct and indirect - tests
- Sickling test
- Bone marrow aspiration and bone marrow biopsy
- Coagulation studies (APTT, PT/ INR, D-dimers, FDPs)
- Stool for occult blood and parasites and ova.
- Urinalysis – dipstick, microscopy



Treatment

- Treat the underlying pathology.
- If the anaemia reoccurs, without establishing the underlying cause, refer to the next level of care.

- Replace the appropriate blood product deficit.
- Can treat mild anaemia with haematinics. This raises the Hb by 1g/dl in a month.

Do not routinely give iron in sickle cell disease unless there is documented iron deficiency.

Blood replacement formulae when a transfusion is indicated:

- Packed red blood cells in mL = body weight x **deficit Hb x 4**
- Whole blood in ml = Body weight x **deficit Hb x 6**
- **Do not exceed a maximum 20ml/kg/day.**
- **Indicate amount of blood to be transfused on the drug chart.**

4.7.1.1. Iron Deficiency Anaemia



Description

Occurs mainly due to poor nutrition, chronic blood loss, malabsorption, and hookworm infestations.



Signs and Symptoms

- Fatigue,
- Palpitation,
- Dizziness
- Glossitis
- Pica
- Koilonychias (spoon shaped nails)



Investigations

- FBC-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.



Treatment

- Treat the cause of blood loss: E.g. menorrhagia in adolescents, 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.
- Ferrous Sulphate 5 mg/kg (PO) 8 hourly. Continue for 3 months after the normal hemoglobin has been achieved.

4.7.1.2. Megaloblastic Anaemia



Description

Results when the bone marrow produces large, structurally abnormal, immature red blood cells (megaloblasts) due to inadequate intake or malabsorption of vitamin B12 or folate.



Signs and Symptoms

- Pallor
- Depression
- Hair loss
- Paraesthesia- pins and needles, numbness in hands or feet
- Tremors and palsies
- 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 B12 maybe low or normal,
- Serum folate level,
- Urea and Creatinine
- Serum electrolytes
- LFT
- Reticulocyte count
- Bone marrow studies if indicated.



Treatment

Vitamin (B12 deficiency anaemia) and other macrocytic without neurological involvement

- 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 B12 and if clinically indicated increase the frequency to every 2 months or every month

Pernicious Anaemia (B12 deficiency) with neurological symptoms and signs:

- 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:**
 - o Folic acid 5mg (PO) once daily for least 2 months must be started simultaneously with injection vitamin B12
 - o Ferrous Sulphate 200mg 8 hourly for at least 3 months

4.7.1.3. Haemolytic Anaemia



Description

Haemolytic anaemia results from an increase in the rate of red cell destruction in the intravascular or in the reticuloendothelial system. The disease may occur at any age and sex. Patient may present with symptom and features of anaemia usually slow in onset however rapidly developing anaemia can occur with associated Jaundice. Splenomegaly is common but not always observed. Hemolytic anaemia is classified into acquired or hereditary haemolytic anaemia.

Table 61: Classification and Causes of Haemolytic anaemia

Classification	Cause
Acquired	Immune Mediated Autoimmune (Warm or Cold antibody) Alloimmune: Hemolytic transfusion reaction Microangiopathic anemia Mechanical: Arterial graft, Artificial cardiac valve
Hereditary	Membrane defects: Spherocytosis, elliptocytosis Enzyme defects: G6PD, Pyruvate Kinase Hemoglobin defects: HbSS, HbSC Thalassemia
Others	Infections: Malaria, Clostridia



Signs and Symptoms

- Pallor
- Jaundice
- Splenomegaly



Investigations

- FBC/DC
- Reticulocyte Count
- Bilirubin, direct and indirect bilirubin
- Peripheral smear.



Treatment

Supportive

- Treat the underlying cause.
- Blood transfusion if anaemia is severe.
- Plasmapheresis

NB: After supportive treatment refer EARLY to higher health facility with adequate expertise and facilities

Pharmacological

- Immunosuppressants for Autoimmune Hemolytic Anemia (**Under specialist care**)
- Prednisolone 1–1.5mg/kg/day (PO) for 1–3 weeks until Hb is greater than 10g/dl. OR
- Cyclophosphamide 60mg/m² IV OR Cyclosporin 2–5mg/
- Azathioprine 100–150mg/mg (PO) daily
- High dose immunoglobulin 400mg/kg daily IV for 5 days.
- Folic acid 5mg (PO) daily should be given in severe cases.

Surgical

Splenectomy may be considered in those who do respond to pharmacological treatment.

4.7.2. Sickle Cell Disease (SCD)



Description

Sickle cell disease is an inherited (genetic) disease that affects the haemoglobin in the red blood cell. The term Sickle Cell Disease describes a group of inherited red blood cell disorders characterized by the presence of hemoglobin S or sickle hemoglobin. Types include HbSC, HbS beta thalassemia and HbSS. Sickle cell anaemia (SCA) is the most severe form of SC, it occurs in individuals that inherit two copies of hemoglobin

S (homozygous state, HbSS). The clinical manifestations of SCA are variable may occur as acute onset of unexplained illness, including acute pain in any part of the body. Symptoms usually occur after 6 months of life and may fall into any of types of crises that occur in SCA. The hallmark of SCA is recurrent painful crises due to Vaso occlusion. This ranges from minor crises to life threatening emergencies. Prompt management of any crisis is important to minimise morbidity and mortality as well as prevent complications.



Signs and Symptoms

- Anaemia- Persistent Hb 6-8g/dl
- Recurrent jaundice
- Recurrent Abdominal pain
- Swollen joints of the hands and feet (Dactylitis- hand and foot syndrome)
- Painful limbs
- Acute neurological symptoms-
- Sudden circulatory collapse- Severely pale in shock
- Hepatosplenomegaly
- Recurrent infections
- Poor growth



Investigations

- For infants 0 – 3 months of age brn in Lusaka or Ndola, they can be referred to the University Teaching Hospitals (UTHs)- Children's Hospital or Arthur Davison Children's Hospital respectively for newborn screening for SCD.
- FBC/DC: Red cell indices may suggest macrocytosis due to increased reticulocytosis.
- Reticulocyte count: - usually ranges from 5–15% in sickle cell disease.
- Peripheral Smear: Irreversible sickled red cells, polychromasia, occasional nucleated red cells, and schistocytes, as well as Howell-Jolly bodies. Target cells may also be seen.
- Sickling test
- Sickle Scan
- Haemoglobin (Hb) electrophoresis or High-Performance Liquid Chromatography (HPLC)
- Blood Grouping and Cross match if requires transfusion.
- Biochemical changes include high LDH, low haptoglobin, high total and indirect bilirubin, and high AST



Treatment

4.7.2.1. Routine long-term care of Sickle Cell Anaemia patients.

Folic Acid supplementation

- Give 5mg once a day orally for all ages.
- For infants, the tablet can be crushed into a suspension for ease of administration.

Hydroxyurea

Mechanism: Hydroxyurea is an antineoplastic that may cause inhibition of DNA synthesis by acting as a ribonucleotide reductase inhibitor. It increases fetal haemoglobin, reduces neutrophils, alters adhesion of red blood cells to endothelium, increasing water content of red blood cells and increases deformability of sickled cells.

Indication: All Hb SS or Hb S beta0 thalassaemia patients ≥ 9 months of age should be counselled on the potential benefits and risks of chronic hydroxyurea therapy, and encouraged to begin taking it..

Exclusions: Acute liver disease, history of severe hydroxyurea toxicity or hypersensitivity, pregnancy or sexually active and unwillingness to use contraception.

Baseline investigations prior to initiating hydroxyurea treatment: FBC with differential count, reticulocyte count, Hb electrophoresis or High-Performance Liquid Chromatography (HPLC), (with quantitative Hb F%, & Hb S%), Chemistry profile, Liver Function Tests (AST, ALT), renal function tests (urea, creatinine).

Patients on hydroxyurea shall have Hb electrophoresis done every 6 months for monitoring.

Consult with paediatric haematologist for appropriate work-up before initiating a patient on hydroxyurea.

Dosing:

- Starting dosage for infants and children is 20 mg/kg/day given as a single daily dose. Maximum dose 35mg/kg/day
- Monitor FBC with differential and reticulocyte count at least every 4 weeks when adjusting dosage.
- If dose escalation is warranted based on clinical and laboratory findings, proceed as follows- increase dose by 5 mg/kg/day every 8 - 12 weeks.
- Increase dose until absolute neutrophil count is 2, 000/iL- 4, 000/iL (mild myelosuppression) is achieved or up to a maximum tolerated dose (MTD) of 35mg/kg/day dose achieved.
- Once a stable dose is established, laboratory safety monitoring should include FBC with differential, reticulocyte count, and platelet count every 2-3 months.
- The effectiveness of hydroxyurea depends on their adherence to daily dosing. Counsel parents/caregivers on **adherence** and **NOT** to double up doses if a dose is missed.
- Clinical response to treatment with hydroxyurea may take 3- 6 months. Monitor RBC MCV and Hb F levels for evidence of consistent or progressive laboratory response.
- If neutrophil count $< 2.0 \times 10^9/L$, or retic count $< 80 \times 10^{12}/L$, or platelets $< 80 \times 10^9/L$ or Haemoglobin $< 5 \text{ g/dL}$, discontinue hydroxyurea until counts recover (usually for 5- 7 days) and repeat FBC. If FBC returns to baseline, restart at same dose.
- Liquid formulation can be prepared by compounding pharmacy using published guideline. The liquid formulation expires after 2 weeks.
- Hydroxyurea therapy should be continued during hospitalizations or illness.

Malaria prophylaxis

Deltaprim to all patients with sickle cell anaemia. A tablet contains pyrimethamine at 12.5 mg and dapsone at 100 mg.

Dosing:

- Infancy up to 3 years of age $\frac{1}{4}$ tablet once weekly PO,
- 3- 10 years old $\frac{1}{2}$ tablet once weekly PO and
- Over 10 years old 1 tablet once weekly PO.

In event of allergy to deltaprim, use dapsone once weekly orally.

Penicillin prophylaxis

Penicillin V 125 mg BD PO daily for 2 months – 3 years

Penicillin V 250mg BD PO daily for > 3 years.

Substitute with erythromycin if penicillin hypersensitivity present.

Discontinuing penicillin prophylaxis can be considered for patients aged 5 years and older who meet the **criteria** below:

- Patients without prior history of documented pneumococcal infection
- Patients who have received 1 dose of PPV (pneumococcal 23) and appropriate PCV 13 doses).
- Never had a splenectomy.

Outpatient clinics follow up, see the schedule below.

Table 62: Outpatient clinics follow up schedule

AGE	VISIT FREQUENCY	LAB TESTS	ADDITIONAL INFORMATION
0-2 years	3 months	• Hb electrophoresis • Blood group • FBC/DC Reticulocyte Count.	• Under 5 Vaccination check • Antibiotic prophylaxis • Demonstrate palpation of spleen • Hydroxyurea (start after age 9 months) • Vitals: SpO₂, weight, height, every visit
2- 5 years	6 months	• FBC/DC Reticulocyte count • Bilirubin, RFTs, LFTs annually • HIV, Hepatitis B • Transcranial Doppler annually	• Vaccination check. • Pneumococcal polysaccharide vaccine (PPV23) should be administered at 24 months of age for supplemental protection. • Antibiotic prophylaxis • Hydroxyurea • Vitals: SpO₂, weight, height, every visit
5- 12 years	6 months	• FBC/DC Reticulocyte count • Bilirubin, urinalysis, RFTs, LFTs annually • HIV, Hepatitis B annually • Brain MRI/MRA/MRV (baseline scan) at age 8. • Transcranial Doppler annually	• Vitals, SpO₂, weight, height every visit • Hydroxyurea • Ophthalmology screen at age 10. • Echocardiogram with PHTN screen: Only when symptomatic • PFTs at age 10, if normal, again when symptomatic. • Linkages

AGE	VISIT FREQUENCY	LAB TESTS	ADDITIONAL INFORMATION
12-16 years	6 months	- FBC/DC Reticulocyte count - Bilirubin, Urinalysis, RFTs, LFTs annually - HIV, Hepatitis B annually	- Vitals, SpO2, weight, height every visit - Hydroxyurea - Ophthalmology screen annually - Echocardiogram: Only when symptomatic - PFTs - Linkages - Transition assessment

NB: Haemoglobin (Hb) electrophoresis or High-Performance Liquid Chromatography (HPLC) should be sent after 6- 12 months of age as long as there has not been a red blood cell transfusion in the previous 3 months.

4.7.2.2. Management of Uncomplicated Crises in Sickle Cell Anaemia

Acute pain crises

Caused by ischaemic tissue injury from the obstruction of blood flow by sickled red blood cells. Reduced blood flow causes hypoxia and acidosis. Infection, fever, acidosis, hypoxia, stress, dehydration, sleep apnoea, and exposure to extremes of temperature can precipitate crisis.

Uncomplicated Vaso occlusive Crisis (VOC)



Description

Common sites of pain include bone (extremities, hand/foot syndrome, back) and abdominal pain. May or may not be accompanied by swelling, low-grade fever, redness, and warmth. Swelling may be symmetrical, asymmetrical, or migratory. Dactylitis is a common presentation in infants and toddlers; back and abdominal pain are more common in older children. Abdominal pain in children with sickle cell disease is usually a simple VOC.



Investigations

- FBC/DC reticulocyte count (anaemia and Reticulocytosis typical).
- Peripheral smear: sickled red blood cells, red blood cell fragments, Howell- Jolly bodies (splenic infarction).
- Total bilirubin and LDH (hyperbilirubinaemia and elevated LDH due to haemolysis).



Treatment

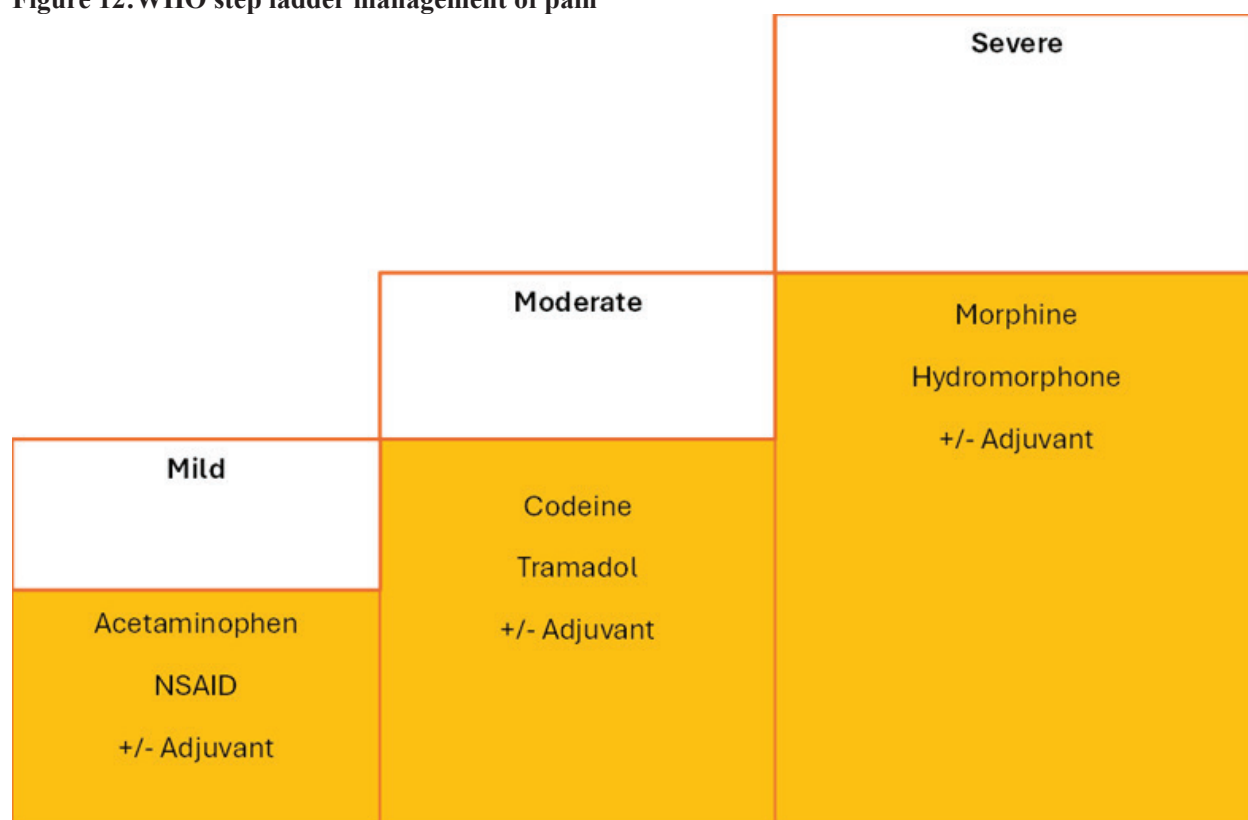
Adequate and prompt pain management

- Hospital admission is mandatory if pain control with oral analgesics is not adequate, or if other problems (such as fever or dehydration) exist.

- Patients should receive analgesia 30 minutes within hospital arrival.
- Assess severity of pain.
- **Mild pain:** Paracetamol 15 mg/kg with NSAIDs (E.g. Ibuprofen 10 mg/kg with food given 3 times a day- Maximum 30 mg/kg per day)
- **Moderate pain:** Add Tramadol 50- 100 mg orally 4- 6 hourly, for children > 12 years of age, adjusted according to response. Usual maximum 400 mg/ 24 hour
- **Severe pain:** Add opioid; IV or oral morphine. IV morphine; 0.1 mg/ kg 4 hourly adjusted according to response. Oral morphine, 0.2 - 0.3 mg/kg (maximum per dose 10 mg) 4 hourly, adjusted according to response.

For patients on morphine, prescribe stool softener (e.g. lactulose) unless the child has diarrhoea.

Figure 12:WHO step ladder management of pain



WHO step ladder management of pain

Hydration:

- Prescribe 50% more fluids in addition to daily maintenance IV fluid in 24 hours if no cardiopulmonary compromise.
- The fluid of choice is 5% dextrose in normal saline (DNS).
- Cautious Hydration in patients with ACS, severe acute anemia, stroke, or acute splenic sequestration- There is a risk of cerebral or pulmonary oedema.
- In these cases, use 2/3 of daily maintenance fluid.
- Monitors vitals and assess for improvement of symptoms.
- Rest and warm massage to the area of pain; avoid cold/ice as this can worsen pain.

Sickle Cell Disease with Infection/Fever



Description

Infection is a major complication of SCD, causing morbidity and mortality. Many children with sickle cell anemia have significant hemolytic anemia and impaired splenic function. Most individuals with SCD develop functional asplenia (due to recurrent splenic infarction) by the age of five and are therefore immunocompromised.

Common pathogens (encapsulated bacteria)

S. pneumoniae, *H. influenzae type b*, *E. coli*, *Salmonella*, *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, *Strep pyogenes*, *Staph aureus* and *Neisseria meningitis*



Investigations

- FBC with differential and reticulocyte count
- RDT for malaria or Malaria Parasite Slide (MPS)
- Group and save.
- Total bilirubin and/or LDH
- Urinalysis
- Blood culture
- CXR
- **When clinically indicated** - Urea, Creatinine and Electrolytes, Urine culture, Stool culture, lumbar puncture and evaluation for osteomyelitis.



Treatment

- Admit for intravenous antibiotic if any of the following are present age < 1yr, temperature >38°C, very ill or toxic appearance history of pneumonia, pulse oximetry reading <90%, on room air, Hb <6 g/dL, WBC <5, 000/mm³ or > 30, 000/mm³, platelet count < 100, 000/mm³.
- Oxygen if indicated.
- Blood transfusion if Hb < 5 g/dL.
- Hydration
- Cover for gram – negative rod with intravenous cephalosporin such as ceftriaxone OR cefotaxime for 7 – 10 days.
- Consider Ciprofloxacin for suspected *Salmonella* osteomyelitis.
- Patient with ACS/severe pneumonia, add erythromycin 50mg/kg/day 6 hourly/ or azithromycin 10 mg/kg daily.
- Anti-pyretic such as paracetamol.

4.7.2.3. Management of Emergency crises in Sickle Cell Anaemia

Priapism



Description

Sustained, unwanted painful erection unrelated to sexual stimulation and unrelieved by ejaculation. Affects ~ 35% of boys and men but frequently under reported. Prompt recognition and immediate initiation of conservative medical management may lead to penis returning to flaccid state & limit need for aggressive & invasive intervention.



Signs and Symptoms

- Onset usually occurs during sleep when relative oxygenation decreases. Document onset time of onset.
- Penile Erection lasting more than four hours unrelated to sexual interest or stimulation.
- Rigid penile shaft, but the tip of penis (glans) is soft.
- Progressively worsening penile pain without evidence of trauma.



Investigations

- FBC with differential and reticulocyte count
- Group and cross match.
- Urine M/C/S
- Blood culture if indicated.



Treatment

- **Rapid triage** – place immediately into examination room & establish intravenous access.
- **Hydration:** 1.5 x maintenance in 24 hours, if no cardiopulmonary compromise. The fluid of choice is 5% dextrose in normal saline (DNS). If DNS is not available, refer to the fluid guidelines.
- **Pain control:** Paracetamol + NSAIDs. Escalate to opioids if severe (See Pain Control section).
- Benefits in voiding or having a warm shower or bath to improve blood circulation.
- Maintain oxygen saturation above 95% (if the patient is hypoxic).
- If priapism continues after 4 hours from onset despite analgesics, & hydration, request urgent urology consultation for aspiration and irrigation.
- Transfusion 15 mL/kg only if no detumescence within 12 hours.
- Discharge if priapism is resolving, child is taking fluids & medications orally, is afebrile, and pain relief is adequate.

- Commence hydroxyurea as per protocol.
- Consider chronic phosphodiesterase type 5 (PDE5) inhibitor therapy such as Sildenafil in patients with recurrent priapism.
- Joint urology/hematology follow up.

Acute Splenic Sequestration



Description

Sudden onset enlargement of the spleen and reduction in Hb concentration by at least 2 g/dL below the baseline value. Splenic pooling of a large amount of blood and platelets Typically occurs in children with Hb SS between the age of 6 months and 5 years.



Signs and Symptoms

- Sudden onset asthenia
- Increased fussiness
- Thirstiness
- Decreased activity (lethargy)
- Acute anemia (pallor, tachycardia, tachypnea, frank cardiovascular collapse).
- Splenomegaly (pain in the left upper quadrant and abdominal distension).

PAEDIATRIC



Investigations

- FBC/DC and reticulocyte count
- Group and cross match.
- Imaging is not essential.



Treatment

Manage shock present. Normal saline bolus at 10mls/kg given cautiously. Refer to management of hypovolemic shock.

- Urgent Transfusion with pRBC with goal back to baseline Hb. (Notify blood bank).
- Generally, transfuse with 10mL/kg packed red blood cells as patient is at risk of auto- transfusion (sequestered blood leaving the spleen).
- Avoid aggressive splenic palpation to prevent splenic rupture.
- Usually resolves within 2- 5 days.

- In consultation with haematologist, discuss the possibility and timing of splenectomy to prevent recurrence.

Acute Chest Syndrome (ACS)/Pneumonia



Description

Presents with chest pain, tachypnoea, respiratory distress, fever >38.5, decreased oxygen saturation and chest X-Ray infiltrates. Most commonly in children aged 2 to 4-years old. Life threatening lung infarction occurs in 10-20% of hospitalized patients with SCD. Often precipitated by a lung infection. Low oxygen saturation leads to further sickling of red cells, thus exacerbating pulmonary and systemic hypoxemia, sickling and vasoocclusion. Usually occurs 1-3 days after admission for severe VOC.



Signs and Symptoms

- Fever
- Cough
- Excruciating chest pain
- Shortness of breath
- Low oxygen saturation



Investigations

- FBC with differential and reticulocyte count
- C- reactive protein
- Arterial blood gases
- Group and cross match.
- Hb electrophoresis
- LFTs
- Blood culture
- Total bilirubin and/or Lactate dehydrogenase (LDH).
- CXR – PA and lateral view (NOTE: 60% of children with ACS will have an infiltrate on CXR but a normal pulmonary exam.



Treatment

- **Hydration:** IVF at 2/3 maintenance maximum depending on oral intake. Can decrease or discontinue IVF if taking enough PO fluids to meet daily maintenance goal. Over- hydration can lead to pulmonary oedema and worsen acute chest syndrome.

- **Antibiotics for severe pneumonia:** Cefotaxime or ceftriaxone + Erythromycin or azithromycin.
- **Pain management:** be cautious with narcotics but do not withhold. Balance between pain control and sedation as either may lead to respiratory distress. Narcotics can lead to hypoventilation and worsen acute chest syndrome.
- **Respiratory care:** oxygen therapy with pulse oximetry monitoring.
- **Blood transfusion:** 10- 15mL/kg pRBC if significant anaemia (Hb <5g/dL or if Hb drops <2 g/dL from baseline), significant hypoxia, or worsening respiratory status.

Stroke



Description

Rapidly developing clinical signs of focal (or global) disturbance of cerebral function, lasting > 24 hours or leading to death, of vascular origin. Brain dysfunction occurs when oxygen supply to the brain falls below a critical level. Stroke occurs in 10- 15% of children with sickle cell disease. Peak age of onset is 2- 5 years.



Signs and Symptoms

- Hemiparesis
- Facial weakness
- Severe headache (w/without associated vomiting)
- Visual and language disturbances
- Seizures (especially focal seizure)
- Altered sensation, behaviour and mental status.
- Coma



Investigations

- FBC/DC reticulocyte count
- Blood glucose
- RDT for malaria/MPS
- Serum electrolytes
- Hb electrophoresis
- Group and cross match.
- Quantitative D-dimer if available
- Blood culture if signs of infection present
- Kidney and liver functions tests
- EEG (where indicated)
- Urgent CT scan or MRI, MRA/MRV (where available).

Contrast may exacerbate sickling. Discuss using contrast with paediatric haematologist on call.



Treatment

- The approach to management depends on the specific brain manifestations and the age of the patient.
- Evaluate ABC- Ensure Airway is patent and maintainable. High flow oxygen.
- Monitor Glasgow Coma Scale (GCS) and vitals regularly.
- Control seizures if present.
- Look for signs of raised ICP and Manage accordingly-refer to neurology section on stroke.
- Commence blood transfusion at 10mL/kg (NOTE exchange transfusion is preferred management where available) to target Hb S < 30%.
- Commence on hydroxyurea.
- Enroll in chronic monthly blood transfusion protocol (see National SCD management guidelines).
- For patients on chronic monthly transfusion, monitor for iron overload.
- Never exceed a haematocrit of 30%; risk of hyperviscosity
- Patient Rehabilitation post-acute phase.

4.7.2.4. Complications of Sickle Cell Anaemia

Sickle Cell Cardiomyopathy

Sickle cell anemia patients have a chronic hyperdynamic state hence are at increased risk of developing restrictive cardiomyopathy characterized by diastolic dysfunction, left atrial dilation and normal systolic function. This results in mild, secondary pulmonary venous hypertension and elevated tricuspid regurgitant jet velocity. Systolic dysfunction is uncommon. Clinical features of Sickle Cell Cardiomyopathy include tachycardia, galloping heart sounds, loud P2 due to pulmonary hypertension. Patients may be asymptomatic.

Management

- If the patient is asymptomatic for cardiac failure, Conservative management with ECHO screening annually.
- Avoid routine use of anti-failure medication Cardiomyopathy. Unless guided by Physical assessment, ECHO and Chest Xray.
- In the presence of high output failure due to severe anemia, Red Cell blood transfusion is used to treat the cardiac failure.
- Prolonged use of loop diuretics is not advised as it may lead to dehydration of the patient, which may trigger a VOC.

Osteomyelitis



Description

Acute or chronic bone infection affecting the metaphysis of bone. The commonest site of Osteomyelitis is usually in the lower limbs, especially the Tibia. It is important to make an early diagnosis of the acute stage

of osteomyelitis to prevent serious long-term orthopaedic sequela caused by chronic osteomyelitis. It may be difficult to distinguish between acute osteomyelitis and bone infarctions caused by VOCs. A high index of suspicion from history, and thorough work -up is important.

Osteomyelitis can be classified, depending on the duration and presentation, into; Acute, post-acute, chronic. Subacute osteomyelitis should be distinguished from post- acute as this is a type of osteomyelitis that is caused by less virulent organisms.

Micro-organisms implicated in OM include *Staphylococcus aureus* (commonest), *Salmonella typhi* (common), *non-Salmonella typhi spp* (common), *E. coli*, *Psuedomonas aeruginosa*, *Enterobacter spp*, *Hemophilus influenza type B*, *Klebsiella spp* and *Proteus spp*

Bacteremia caused due to the gram-negative microbes is believed to result from sickling within the mesenteric vessels and subsequent gastrointestinal infarction and translocation of the GI microorganisms into the bloodstream.



Signs and Symptoms

Table 63: Signs and Symptoms

Acute Osteomyelitis < 2 weeks	Subacute Osteomyelitis 2-6 weeks	Chronic Osteomyelitis 6 weeks or more
Fever or chills	Usually caused by indolent bacteria	Pus discharge from sinus
Irritability or lethargy in young children	Uncommon infection with bone pain	Pathological fractures presenting as acute pain.
Pain around the infection	Radiographic changes without systemic symptoms	Limb Deformity
Swelling of affected limb	Characterised by a Brodie's abscess on imaging.	Inability to bear weight on the affected limb.
Warmth and redness over the area of the infection		
Loss of movement		
Maybe asymptomatic		



Investigations

- Gold standard tools for the diagnosis is bone biopsy test with histopathological examination and tissue culture, (both aerobic and anaerobic bacteria culture)
- FBC/DC
- Blood cultures, pus Swab and culture
- CRP/ESR
- X- rays of affected limb

NOTE:

- Xray changes in acute osteomyelitis do not appear until about 10 days after the onset of symptoms which coincides with the post-acute stage
- Ultrasound/MRI in acute episodes are difficult to assess.
- Joint aspiration for culture of septic arthritis (never aspirate an affected joint without prior consultation with a Senior Doctor)



Treatment

- Acute osteomyelitis should be managed medically with antibiotics.
- IV Cloxacillin for *S. aureus* OM (commonest)
- If Gram stain shows gram-negative bacilli - add a third-generation cephalosporin,
- Ciprofloxacin can also be used If *Salmonella* infection is suspected or confirmed by culture.

Recommended duration for antibiotic administration is at least 4 – 6 weeks which should include 1 – 2 weeks of intravenous administration. Followed by 2 – 4 weeks of oral.

Serial monitoring of infection markers required to monitor antibiotic therapy effectiveness

ESR is less reliable in neonates and sickle cell patients.

Other Supportive management includes:

- Hydration
- Adequate Pain management
- Resting affected limb

Orthopaedics consultation:

- For post-acute and chronic osteomyelitis
- Bone drilling if acute (to relieve the exudate and hence pressure in the medullary cavity to prevent bone necrosis; sequestrum formation) and post-acute osteomyelitis (to reduce the pressure from the accumulated pus within the medullary cavity of the bone).
- Splintage of affected limb with Plaster of Paris (POP) or traction for pathological fractures prior to referral
- Co-Management of patients by Medical and surgical teams is needed.

4.7.2.5. Perioperative Management of Children with SCD

Children with SCD are predisposed to complications requiring surgical procedures, such as cholecystectomy and splenectomy. Peri-operative complications are higher in patients with SCD compared with the general population and may be sickle or non-sickle-related. Complications may be reduced by meticulous peri-operative care and blood transfusion. For most minor elective procedures (hernia repair, circumcision, and dental rehabilitation) in sickle cell patients, pre-operative transfusions are unnecessary, as these patients usually have uncomplicated courses. On the other hand, patients undergoing thoracotomy, laparotomy, or tonsillectomy/adenoidectomy are at higher risk of developing post-operative complications (the rate is 50%) and may benefit from pre-operative transfusion regimens. These procedures are characterized by longer intra-operative duration and by compromised chest wall and pulmonary mechanics.

If transfusion is undertaken, the choice includes simple or exchange (automated or manual) transfusion. A simple transfusion may be of benefit when the patient's haemoglobin is below baseline. But by raising Hb without significantly lowering HbS, a simple transfusion may dramatically increase blood viscosity and thereby increase the risk of sickle-related complications. Red cell exchange transfusion allows dilution of HbS without increasing haematocrit. Transfuse RBCs in children with SCD to bring the haemoglobin level to 10 g/dL.

Pre-operative assessment and preparation

- Senior members of the anaesthetic pre- assessment team should review elective case to assess arrangements for pre- operative transfusion, requirement for an ICU bed, and pain management plan.
- FBC, urea, electrolytes, creatinine, Hb electrophoresis, antibody screen (if possible) and group and cross match must be done before surgery.
- Measure baseline oxygen saturation.
- Patient should receive either a simple blood transfusion or exchange transfusion to bring the haemoglobin level to 10 g/dL prior to undergoing surgical procedure involving general anaesthesia.
- Echocardiogram should be considered for in children with symptoms suggestive of pulmonary hypertension ($\text{SpO}_2 < 94\%$, reduced exercise capacity).
- For children < 16 years old, the results of transcranial Doppler (TCD) assessment should be available and documented from the previous 12 months. If abnormal, there should be a multidisciplinary discussion as to how the child should be managed.
- Starvation instruction should be documented clearly and reinforced with the patient and their family.
- All patients should be given warmed DNS IV for a minimum of 12 hours at maintenance flow rate during starvation for the operation.

Perioperative management

- The operating room should be pre- warmed, with assurance that temperature can be well monitored and properly maintained, because hypothermia can trigger sickling.
- The patient should be well oxygenated pre- operatively; induction and intubation should be undertaken with little or no hypoxic insult.
- The temperature should be monitored regularly postoperatively. Note that a spike in temperature may be an early sign of sickling.
- Monitor oxygen saturation and Arterial Blood Gases (ABG) closely.

Post- operative management

- This begins in the operating room, with assurance that the patient does not become hypothermic, hypoxic, or hypotensive during emergence from anaesthesia. Before extubation, the patient should be well awake, ventilating and oxygenating well.
- In the recovery room, assess the patient carefully before transferring the child to a paediatric ward. Request a CXR, if there is any concern about respiratory function. ^[11]_{SEP}
- Patients should be monitored for O₂ saturation (aim to keep O₂ sat $>96\%$); children 4 years or older should be on a pulmonary clearing program (incentive spirometry). If atelectasis or oxygen desaturation develops, seriously consider admission to the ICU with intensified efforts at pulmonary clearing, including re-intubation if necessary.
- Maintain hydration to prevent vasoconstriction, hypoperfusion, and microvascular occlusion, which ultimately lead to sickling. Avoid over-hydration, however, because pulmonary interstitial oedema can lead to hypoxia and a sickling crisis.

- Warmed intravenous fluids should be continued until the patient is able to tolerate an adequate intake of oral fluids. Fluid balance should be monitored. [L]
[SEP]
- Provide appropriate analgesia so that the patient is co-operative with ambulation and pulmonary clearing, but not so much that he/she is constantly narcotized and asleep.
- Patients with SCD are more susceptible to infection than the general population, including respiratory and postoperative wound infections. Infection in the peri- operative period may precipitate sickle complications such as painful crisis or ACS. Antibiotic prophylaxis should be administered as dictated by the surgical procedure.
- If operative complications develop or the patient becomes toxic or septic, consider early transfer to the ICU (in consultation with paediatric haematology).

4.7.3. Glucose 6 Phosphate Dehydrogenase (G6PD) Deficiency



Description

G6PD Deficiency is an inherited X-linked recessive genetic disorder, haemolysis results from oxidative damage to RBCs due to loss of protective effect of the enzyme G6PD. Usually asymptomatic but prone to haemolysis if infection, incriminated drugs or foods are taken (e.g. sulphonamides, fava beans, tabs chloroquine or proguanil).



Signs and Symptoms

Pallor, Jaundice and Dark urine (Coca-coloured urine) during a haemolytic episode.



Investigations

- FBC and Reticulocyte count- Anaemia, Reticulocytosis,
- Peripheral smear-normocytic normochromic, spherocytes, bite cell, Heinz bodies, Positive Ham's test.
- Serum LDH- Elevated due red cell destruction
- Serum Haptoglobin level. Decreased signifying intravascular hemolysis
- Serum Bilirubin, Direct and Indirect Bilirubin Level.
- Urinalysis- Hematuria
- G6PD enzyme activity assay



Treatment

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

Pharmacological Treatment

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

4.7.4. Aplastic Anaemia (Bone Marrow Failure)



Description

Aplastic anaemia is defined as pancytopenia resulting from bone marrow failure resulting in pancytopenia – a reduction in the blood count of all the major cell lines, leading to hemoglobin <10 g/dL, platelet count <50 x 10⁹/L, granulocytes < 1.5 x 10⁹/L. Bone marrow biopsy demonstrates a decrease in cellularity and the absence of significant fibrosis or neoplastic infiltration.



Signs and Symptoms

- Pallor
- Easy Bruising
- Spontaneous bleeding- Epistaxis, Petechiae, Purpura
- Lymphadenopathy
- Hepatosplenomegaly
- Joint swelling
- Jaundice

Feature suggestive of congenital disorder: Café au lait spots, short stature, weight discordance for height, abnormal limbs, nails or digits, or other visible congenital anomalies.

Once a diagnosis is suspected based on FBC/DC, the patient must be referred to a tertiary hospital for further management.

Table 64: Differential diagnosis for aplastic anaemia

Acquired	Inherited
<i>Infections</i> • Hepatitis A, B, C. • CMV • HIV	Inherited syndromes • Fanconi anaemia • Dyskeratosis congenita/telomere biology disorders • Shwachman Diamond syndrome
<i>Medications/ Toxins</i> • Benzenes, chloramphenicol • Cytotoxic medications • Ionizing radiation	MDS secondary to haematopoietic malignancy predisposition syndrome

Acquired	Inherited
<i>Nutritional deficiencies</i> • Zinc • Copper, • Vitamin B12 • Folate	Pancytopenia associated with primary immunodeficiency
Myelodysplastic Syndrome (MDS)	
Rheumatologic disorders	
Paroxysmal nocturnal Haemoglobinuria (PNH)	



Investigations

- FBC, differential, peripheral smear, reticulocyte count
- Hb electrophoresis
- Bone marrow aspirate and trephine biopsy (BMAT), including cytogenetics. **((Preferably under anaesthesia in theatre)).**
- Liver enzymes and function tests - ALT, AST, alkaline phosphatase, bilirubin (conjugated & unconjugated), GGT, albumin, total protein, INR/PTT/fibrinogen.
- Electrolytes (Na, K, Cl), calcium, phosphate, magnesium.
- Renal function test - urea, creatinine
- Direct Antiglobulin Test (DAT), haptoglobin, LDH, ESR.
- Iron studies - serum iron, ferritin, transferrin.
- Viral studies - Hepatitis A, B and C, HIV, and CMV.
- Anti - nuclear antibody (ANA), anti- double stranded DNA, rheumatoid factor (RF).
- Complement C3 & C4, CRP, CH50, immunoglobulins (IgG, IgA, IgM)
- Serum vitamin B12, and serum and red cell folate
- Referral for HLA typing
- Group and cross match.

Investigations for Inherited aplastic anaemia

- Peripheral blood for chromosomal breakage analysis to exclude Fanconi Anaemia.
- Flow cytometry for CD55/CD59 to exclude Paroxysmal Nocturnal Haemoglobinuria
- Peripheral blood to test exon 2 of SBDS gene to exclude Shwachman- Diamond Syndrome.
- Telomere length testing to exclude Dyskeratosis Congenita.
- Abdominal ultrasound as screen for congenital anomalies that may related to an inherited bone marrow failure syndrome.
- Referral for HLA typing.



Description

Supportive measures:

1. **Transfusion support:** Transfuse packed red blood cells as needed for clinical symptoms related to anaemia and/or to maintain haemoglobin levels > 7 g/dL. Transfuse platelets as needed for clinical indications of bleeding and/or to maintain platelet counts $> 10 \times 10^9/L$ when patient is well and $> 20 \times 10^9/L$ when febrile.
2. **Management of fever:** In the event of fever and neutropenia (neutrophil counts $< 0.5 \times 10^9/L$) for more than 3- 5 days despite antibiotic therapy, then initiation of neutropen should be considered. 3 Neupogen dose is 5 mcg/kg/dose subcutaneously daily. Discontinue if there is no significant increase in neutrophil count within one week.

In case of severe infection, or recurrent bacterial or fungal infection, or clinical instability the neutropen should be increased by 5- 10 mcg/kg/dose every 3 - 5 days, up to a maximum of 60 mcg/kg/dose or 1,500 mcg/day whichever is less.

3. Infection Prevention

- a. **Pneumocystis Jirovecii Pneumonia (PJP) Prophylaxis:** Prophylaxis should be started on initiation of immunosuppressive therapy and discontinued once patient has responded to immunosuppressive therapy and has been discontinued.

Cotrimoxazole is not an option for PJP prophylaxis due to bone marrow suppression with its use.

Pentamidine 300mg/dose inhaled (if > 6 years of age) repeat every 4 weeks. IV Pentamidine 4 mg/kg/dose IV (If < 6 years of age) once fortnightly. Less effective in patients < 2 years of age.

Dapsone 4 mg/kg/day (maximum 200 mg/dose) PO once/week. Contraindicated in patients with G6PD deficiency. Obtain baseline methaemoglobin level prior to starting the drug.

- b. **Fungal Prophylaxis:** Fluconazole prophylaxis for patients with severe neutropenia (neutrophil count $< 0.2 \times 10^9/L$). Fluconazole dose is 3 mg/kg/day IV/PO once daily (maximum 400 mg/day). Due to the interaction with cyclosporine, discuss potential need to adjust doses with pharmacist.

Treatment of patients with a matched sibling donor for HSCT:

A matched sibling donor for Hematopoietic Stem Cell Transplant (HSCT) is the first line of therapy for patients with acquired severe and very severe aplastic anemia and IBMFS resulting in approximately 90% cure rate. HLA-typing of the patient and all immediately related family members (parents and siblings) is carried out as part of the initial work-up.

Arrangements must be made through the Ad-hoc committee at the University Teaching Hospital (UTHs)- Children's Hospital for HSCT abroad.

Treatment of patients without a matched sibling donor for (HSCT)- Immunosuppressive therapy:

Immunosuppressive therapy (IST) should be initiated as soon as possible. This requires admission to the paediatric haematology inpatient unit. Baseline blood work to be done within 24 hours of admission:

- FBC, differential, retic count, and PBS
- Liver enzymes- ALT, AST, Alk Phosphatase, bilirubin (Unconjugated & conjugated), GGT

- Liver Function Tests
- Renal function tests- urea and creatinine
- Na, K, Cl, Mg, Ca, Phos, LDH, and urate

Medications for immunosuppressive therapy

Table 65: Medications for immunosuppressive therapy

IST Regime	Dose	Notes
Anti-thymocyte Globulin (ATG) (ATGAM® = equine ATG)	40 mg/kg/dose IV over 6 hours daily x 4 days	Infused over a minimum of 6 hours; infusion may be prolonged up to a maximum of 12 hours
Prednisolone	1 mg/kg/dose (Max 40 mg/dose) PO two times daily x 7 days	• Start 3 hours before ATG. • Taper slowly over 3 weeks once ATG therapy completed.
Cyclosporine (CsA)	5 mg/kg/dose (max 250 mg/dose) PO q12h for 6 months after maximal response is achieved, then taper over 6 months.	• Trough CsA concentration to be drawn on day 3 of therapy. • Adjust dose to maintain whole blood serum concentration between 150 -200 mcg/L
Pre - medication	Dose	Notes
Paracetamol	15 mg/kg (max 1000mg/dose) PO pre- ATG and then q6h PRN	Dose limit of 75 mg/kg/day or 4 g/day, whichever is less.
Diphenhydramine	1 mg/kg/dose (max 50 mg/dose) PO/IV pre-ATG and then q6h PRN	
Pethidine	1 mg/kg/dose (max 50 mg/dose) IM q6h PRN for rigors	

If there is no response at 3-6 months' post-initial IST, then consideration should be made for a BMT from an unrelated HLA matched hematopoietic stem cell donor. A thorough discussion must occur with the parents/guardian and BMT team regarding potential donors and the approach to therapy that will yield the best possible outcome.

4.7.5. Immune Thrombocytopenia (ITP)

4.7.5.1. Acute Immune Thrombocytopaenia (AITP)



Description

Platelet count < 100, 000 x 10⁹/L, usually < 20 x 10⁹/L. Self- limiting disease with shortened platelet survival and increased megakaryocytes. Resolves in 80% of patients within 6 weeks to 6 months. Good prognosis.

Acute 0- 3 months, persistent 3- 12 months, chronic > 12 months. Shortened platelet survival due to platelet autoantibody production.



Signs and Symptoms

- Acute onset bruising, purpura and petechiae.
- History/evidence of mucocutaneous bleeding. petechiae and bruising but otherwise well appearing child
- History of previous viral infection in the last 2 – 3 months (often, but not always) or recent live virus vaccination administration.
- Absence of Hepatosplenomegaly, Lymphadenopathy, and evidence of serious cause/chronic underlying illness.
- If headache and/or neurological signs present suspect intracranial bleed, urgent CT scan of the head.



Investigations

FBC/DC – Isolated thrombocytopenia. Typically, < 20, 000/mm³.

Peripheral Smear results consistent with ITP

- Platelet size normal or large in size.
- Occasional giant platelets seen.
- Normal WBC and RBC morphology
- Microcytic, hypochromic red cells due to underlying iron deficiency is common.
- Occasional activated lymphocytes can also be seen.

Absence of tumour lysis (normal potassium, phosphorus, uric acid, LDH)

Routine Bone Marrow aspiration unnecessary unless:

- Neutropenia
- Hepatosplenomegaly
- Lymphadenopathy
- Pain limb with a limp or abdominal and back pain

ITP is a diagnosis of exclusion so a thorough history and physical examination and investigations. If the following features are present, consider another a diagnosis other than ITP.

- Family history of low platelets
- Medication exposure including antibiotics, anticonvulsants, heparin, anti- arrhythmia medication, sulfa drugs, aspirin.
- Haemarthroses or significant bleeding
- Evidence of active infection or fever.
- Arthralgia

- Weight loss, bone pain
- hepatomegaly, splenomegaly, lymphadenopathy.
- Dysmorphic features, skeletal abnormalities, growth delay, failure to thrive.
- Abdominal pain, bloody diarrhoea, renal failure, haemolytic anaemia in addition to thrombocytopenia then think HUS/TTP.
- HIV risk- exposure of HV + status (although ITP is common with HIV).



Treatment

Immediate Treatment

- None regardless of platelet count, unless life- threatening owing to significant bleeding. Monitor platelet counts and educate the family about potential bleeding symptoms.
- If significant bleeding (e.g. uncontrolled epistaxis, GI haemorrhage, intracranial bleeding), Transfuse platelets along with immunoglobulin (IVIG) at 0.8- 1 g/kg by IV infusion for 2 days.
- If moderate bleeding, prolonged mucosal bleeds, Prescribe prednisolone 2 mg/kg/day (Maximum 120 mg daily) for 5-7 days only. There is no benefit with longer duration of corticosteroids.
- Consider Tranexamic acid for mucosal bleeds.
- Avoid NSAIDs e.g. ibuprofen.
- Reassure parents. About 80% resolve in 6 months. Avoid contact sports.
- Continue monitoring FBC and PBS monthly until diagnosis is clear or recovery.

Manage patient in consultation with paediatrician or paediatric hematologist. Early Referral to Tertiary Centre complicated cases.

4.7.5.2. Chronic Immune Thrombocytopenia (CITP)



Description

Persistent signs of Immune Thrombocytopenia for 6 months. Investigate as in acute ITP.



Treatment

- Avoid NSAIDs
- Avoid contact sports
- Investigate for autoimmune diseases (ANA antinuclear antibody; APLA antiphospholipid antibodies; ACA, anticardiolipin antibody; and LAC, lupus anticoagulant) and immune deficiency (HIV, IgG, IgA, IgM).

- Treat only:
 - o Profound thrombocytopenia ($<10 \times 10^9/L$) with repeated mucosal bleeding.
 - o Older girls with menorrhagia.
 - o Diminished health related quality of life
 - o Trauma
 - o Acute neurological signs
 - o If treatment indicated, give dexamethasone 0.6 mg/kg/day (maximum 40 mg).
 - o If unresponsive, discuss with paediatric haematologist about treatment with thrombopoietin receptor agonist (eltrombopag) or rituximab.
 - o Splenectomy reserved for those with persistent/ significant bleeding non- responsive or intolerant of other therapies.

4.7.6. Infantile Haemangioma (IH)



Description

Infantile haemangiomas (IH) are the most common vascular tumours, affecting around 4% of infants. IH typically appear in the first few weeks of life and grow rapidly for the first few months. Thereafter, slow proliferation can continue for up to 6- 12 months. Majority do not require treatment due to their spontaneous involution. However, about 15% of IH result in complications such as obstruction, ulceration, or disfigurement, and then require therapeutic intervention.

PAEDIATRIC



Investigations

- FBC
- Blood glucose
- Urea and electrolytes.
- Thyroid Function Tests (TFTs)
- Liver Function Tests (LFTs)
- ECG
- ECHO
- Liver ultrasound should be requested for infants with more than 5 cutaneous haemangiomas to look for liver haemangiomas.
- MRI scan



Treatment

Propranolol has become the first- line therapeutic agent in the management of complex IH. It is a safe and effective treatment for IH in most patients.

Indications for initiating treatment with oral Propranolol

- Vision compromise
- Airway IH with actual or potential airway compromise.
- Nasal IH with actual or potential obstruction
- Lip IH causing actual or potential functional impairment and/or disfigurement.
- Involvement of the auditory canal causing recurrent infection
- Ulcerated IH, especially where topical treatment would not be appropriate or has not been effective.
- Risk of permanent disfigurement
- Spinal cord cord compression by IH
- Liver IH in conjunction with cutaneous IH in selected cases in collaboration with other specialists.

Absolute Contraindications

- Recent or ongoing hypoglycaemic episodes.
- Second- and third-degree heart block
- Hypersensitivity to propranolol hydrochloride.

Relative Contraindication

- Frequent wheezing
- Blood pressure outside normal range for age. Treatment in conjunction with paediatrician is advised.
- Heart rate outside normal range for age. Treatment in conjunction with paediatrician is advised.

Starting dose: A preparation of 1 mg/ml solution is preferable.

- *Week 1:* Propranolol 1 mg/kg day in 3 divided doses
- *Week 2:* Propranolol 2 mg/kg/day in 3 divided doses
- Dose escalation: If response is unsatisfactory after 4 weeks (and no adverse effects have occurred) the dose may be increased to Propranolol 3 mg/kg/day in 3 divided doses.

Follow- up:

Should be arranged 4 weeks after treatment commences.

Medication should be given with or shortly after food. If an inter-current illness causes significant vomiting, propranolol should be temporarily withheld to reduce the likelihood of hypoglycaemia.

Potential side effects of propranolol

- Bradycardia
- Hypoglycaemia
- Heart failure
- Hypotension
- Cardiac conduction disorders
- Bronchospasms

- Peripheral vasoconstriction
- Weakness and fatigue
- Sleep disturbances

Administration

Use of the medication should be explained to the parents and information leaflet provided. Advice on potential side effects should be explained to parents prior to starting therapy.

Stopping Propranolol

Propranolol should be temporarily discontinued in the setting of significant reduced oral intake or if the patient has wheezing that requires treatment.

Treatment of IH should extend beyond the proliferative period of IH to avoid rebound growth and the decision when to stop treatment will have to be guided by clinical features. There is no uniform cut off age that determines the risk of rebound growth, although a European study suggested that children aged 17 months or older had a significantly lower risk of rebound growth compared to younger age groups.

4.7.7. Haemophilia



Description

Haemophilia refers to inherited bleeding disorders caused by deficiency of specific coagulation factors. Haemophilia A is caused by coagulation factor VIII (FVIII) deficiency, haemophilia B by deficiency of coagulation factor IX (FIX), and haemophilia C by deficiency of coagulation factor XI. These clotting factor deficiencies are caused by recessive mutations of the respective clotting factor genes. As the recessive mutant FVIII and FIX genes are located on the X chromosome, both haemophilia A and haemophilia B are inherited in an X-linked pattern. Consequently, in these conditions, males are affected, and females are carriers of haemophilia. Both diseases have the same clinical presentation, so their specific diagnosis must be established by factor assay. The combined prevalence of both haemophilia A and B has been estimated as approximately 1 in 5 000 live male births. Haemophilia C is an autosomally inherited condition, uncommon in the general population of Zambia, and will therefore not be discussed further in this guideline.



Signs and Symptoms

- Many have spontaneous or provoked bleeding.
- Large or deep bruises
- Joint pain and swelling due to bleeding within them.
- Excessive bleeding following minor injury or surgery.
- Easy bruising
- Menorrhagia

- Nose bleeds.
- Spontaneous nose bleeds
- Unexplained bleeding and haematuria or haematochezia
- Intracranial haemorrhage



Investigations

Prolonged APTT with a normal PT and normal platelet count is suggestive.

Confirm with a Factor VIII or Factor IX assay

Table 66: Classification of haemophilia

Severity	Factor level
Severe	< 1%
Moderate	1 - 4 %
Mild	5- 40 %

NOTE: Normal factor level ranges from 50- 200%

Recommended weekly factor prophylaxis to prevent bleeds is 25- 40IU/ kg or more depending on clinical situation.



Treatment

Treatment of bleeding in haemophilia.

- Manage Patients with haemophilia at or under the supervision of a haemophilia comprehensive care centre.
- Patients with haemophilia can have spontaneous bleeding and/or excessive bleeding with mild trauma. It is imperative to treat haemophilia patients with factor within 30 minutes of presentation first and then consider diagnostic testing later.

Sites of bleeding in Haemophilia

Table 67: Sites of bleeding in Haemophilia

Non- life or non- limb- threatening bleeds	Life- or organ- threatening bleeds
Joints	Intracranial
Muscles	Muscle compartment
Easy bruising	Neck/throat
Mucosal bleeding (epistaxis, gingival)	Massive gastrointestinal
Gastrointestinal	Genitourinary tract

Factor replacement.

- Factor VIII deficiency (Haemophilia A)
 - o 1 unit/kg increases Factor VIII activity by 2%
 - o Give 30 units/kg of Factor VIII for an acute minor bleed.
 - o Give 50 units/kg of Factor VIII for an acute major bleed.
 - o After initial dose, discuss treatment plan with paediatric haematology unit. Half- life of Factor VIII is 8- 12 hours. Major bleed will likely need 8- 12-hour dosing.
- Factor IX deficiency (Haemophilia B)
 - o 1 unit/kg increases Factor IX activity by 1%
 - o Give 50 units/kg of Factor IX for an acute minor bleed
 - o Give 100 units/kg of Factor IX for an acute major bleed
 - o After initial dose, discuss treatment plan with paediatric haematology unit. Half- life of Factor IX is 18- 24 hours. Major bleed will likely need at least 24-hour dosing.
- It is important to round up both Factor VIII and IX to a unit vial dose whenever possible to avoid wastage.

Where Factor VIII or Factor IX is unavailable or not immediately available in emergency situations, Call blood bank immediately and order Fresh Frozen Plasma (FFP) at 10 – 20 mL/kg IV to run over 1 hour.

Supportive care (PRICE) of affected joint

- Protection
- Rest/Replacement
- Ice/Immobilization
- Compression
- Elevation

Add Tranexamic acid (antifibrinolytic- prevents clot breakdown) 10mg /kg 8 hourly IV (or 15- 25 mg/kg orally) for mucocutaneous (mouth, nose) bleeding. Contraindicated in urinary tract bleeds.

Pain management

- Pain in patients with haemophilia has multiple causes, and these include:
 - o Joint capsular stretching because of hemarthrosis.
 - o Haemophilic arthropathy
 - o Compartment syndrome.
- The goals of pain management include:
 - o To remove pain completely without increasing the risk of bleeding
- To improve the patient's quality of life.
 - o COX- 2 inhibitors (such as tramadol) are favored largely owing to their favourable side- effect profile, analgesic effects, anti- inflammatory effects and anti- angiogenic effects.
 - o Aspirin and other antiplatelet agents should be avoided.
 - o Analgesia requiring intramuscular injection should also be avoided.

For patients with a confirmed diagnosis of haemophilia, offer to enroll in the World Bleeding Disorder Registry (WBDR).

Surgery

- For patients with haemophilia requiring elective or emergency surgery, discuss with paediatric haematologist.

Vaccinations

- Vaccinate all individuals with haemophilia with appropriate vaccines. Standard vaccines for children can be given without factor concentrate prophylaxis.
- An ice pack can be applied to the injection area for 5 minutes before injection.
- The smallest gauge needle available (usually 25- 27 gauge) should be used.
- Application of ice and prolonged pressure for 10 minutes is recommended after administration of the vaccine.
- Prophylactic Clotting Factor Concentrate (CFC) cover for irritant vaccines such as tetanus should be given prior to vaccination.

Routine clinic follow-up, see the table below.

Table 68: Routine clinic follow-up

AGE	VISIT FREQUENCY	LAB TESTS	ADDITIONAL CHECKS
0-6 years	3 months	• Blood group at first visit. • FBC, diff, retic count every visit. • Serum ferritin annually. • Hepatitis B/Hepatitis C/ HIV serology annually. • HJHS annually.	• Demonstrate • Emergency preparedness. • Vaccination check • Counselling about Haemophilia.
6- 16 years	6 months	• Blood group at first visit. • FBC, diff, retic count every visit • Hepatitis B/HIV serology annually. • Serum ferritin annually. • HJHS annually.	• Assess readiness for self-infusion. • Emergency preparedness. • At 12 years of age, begin transition assessments.

4.8 ONCOLOGY



Signs and Symptoms

Common signs and symptoms of cancer in children

- Abdominal mass
- Persistent generalized lymphadenopathy

- More than one abnormal hematopoietic lineage
- Specific neurologic deficit
- Increased intracranial pressure.
- Proptosis
- White pupillary reflex
- Vaginal bleeding or mass
- Joint or bone swelling or pain

Common Paediatric Cancers

- Nephroblastoma
- Retinoblastoma
- Non-Hodgkin Lymphomas
- Leukaemias
- Hodgkin's lymphoma
- Rhabdomyosarcoma and other soft tissue sarcomas
- Osteogenic sarcoma
- Gonadal germ cell tumours
- Neuroblastoma



Investigations

Blood Test

- FBC/DC
- Peripheral Smear
- Erythrocyte sedimentation rate
- HIV Test
- Liver and Kidney Function Test
- Bone marrow aspirate and biopsy

Tissue Biopsy for histopathology, immunohistochemistry, cytogenic and molecular testing is generally available from resection or intra-operative biopsy

Cytology of pleural fluid or ascitic fluid aspiration and fine needle aspirations from tumours.

Lumbar puncture for CSF cytology – cell type and count and differential: This test is done to assess CNS involvement, the presence of which alters therapy.

Imaging Studies

- **Chest radiography:** Postero-anterior and lateral views to assess mediastinal masses, evaluate the airway exclude pulmonary parenchymal lesions

- **Ultrasonography:** Abdomen, Pelvis, Eye, Cranial to identify site and disease extent
- **Computed Tomography (CT)** scan of affected body region or organ.
- **Computed Tomography:** Contrast-Enhanced (CE) CT scans of the chest, abdomen, and pelvis can be used to stage lesions, assess for the degree of tracheal compression in patients with mediastinal masses, can also assist in excluding mass lesions and possible meningeal involvement among individuals with CNS disease.
- **Bone scanning and skeletal surveys:** When additional symptoms such as bone pain or pathological fractures are present, these tests help in identifying additional sites of disease.
- **Echocardiography** can be obtained as baseline findings before patients are given chemotherapy with anthracyclines, which can cause cardiomyopathy



Treatment

Treatment should aim at either:

- Cure or
- Palliation

Once diagnosis is made either histologically or clinically, stage the patient according to the staging system used for that malignancy and determine the risk category. Consult protocols to determine treatment modality which could be either one or a combination of two or more:

- Surgery
- Chemotherapy
- Radiation
- Haematopoietic Stem Cell Transplantation (HSCT)

4.8.1. Leukaemia



Description

These are diseases characterised by the proliferation of a single malignantly transformed progenitor cell in the haemopoietic system. Acute leukaemia if untreated has a rapidly fatal course. Chronic leukaemia has a more prolonged course but patients invariably die from it. Leukaemia is classified according to the morphological cell type involved and the speed of evolution of the disease:

- Acute Lymphoblastic Leukaemia (ALL)
- Acute Myeloid Leukaemia (AML)
- Chronic Myeloid Leukaemia (CML)

Chronic lymphocytic leukemia is rare in children.

Acute Lymphoblastic Leukaemia (ALL)



Description

Hematological malignancy characterized by the clonal proliferation of lymphoid cells in the bone marrow leading to infiltration of the bone marrow with lymphoblasts and consequent bone marrow failure.



Signs and Symptoms

- Fatigue, headache, palpitations, bleeding into skin, mucous membranes of nose and mouth, urogenital epithelial bleeding, bone pain, infections of the throat, lungs (pneumonia) and gastrointestinal tract (enterocolitis).
- Pallor, bruising, petechial haemorrhage, bleeding gums and gum hypertrophy, lymphadenopathy, splenomegaly and/or hepatomegaly, haemorrhage in the optic fundi.
- Central nervous system infiltration manifesting as headache, cranial nerve palsies and seizures.
- Hard enlarged testicles indicate leukaemic infiltration.
- Opportunistic infections do occur e.g Pneumocystis jirovecii pneumonia.



Investigations

- FBC/DC
- Peripheral Smear
- Erythrocyte sedimentation rate
- Liver and Kidney Function.
- Bone marrow aspiration and biopsy



Treatment

Supportive care

- I. Blood transfusion (packed red blood cells) to keep the haemoglobin level $\geq 7\text{g/dL}$, Platelet transfusion if platelet count below $10 \times 10^3/\mu\text{L}$ prophylactically or if count less than $20 \times 10^9/\mu\text{L}$ and patient has haemorrhage. Platelet transfusion should be given to patients within 24 hours of planned or scheduled lumbar puncture for intrathecal chemotherapy administration to keep count above $100 \times 10^3/\mu\text{L}$.

Packed red blood cell transfusions should be given at $10 - 20\text{mL/Kg}$ body weight. Pooled platelet concentrates or apheresis platelet units should be dosed at 10mL/Kg body weight.

- II. Appropriate antimicrobials at first sign of infection: Initial empiric combination therapy to include **ceftriaxone + gentamicin, metronidazole** added if anaerobic Gastrointestinal infectious agents suspected or vancomycin if skin infection/cellulitis. Empiric antifungal to include amphotericin B and/or Fluconazole, Voriconazole if aspergillus species likely. Therapy to be modified according to microbial culture results.
- III. Ensure adequate hydration 24hrs prior to initiation of chemotherapy with dextrose-saline solution to run at 3L/m²/day and continue for the first 5-7 days with Allopurinol 10 -20mg/kg in two divided doses for hyperuricemia prevention.
- IV. Prophylactic co-trimoxazole twice daily on 2-3 days (e.g. Friday, Saturday, Sunday) per week for Pneumocystis jirovecii pneumonia for the entire duration of leukaemia therapy and for 6 months thereafter. Barrier nursing.
- V. Patient and family counselling on disease, prognosis and treatment with anticipated outcome, emotional and material support through linkage to support groups/foundations.

Chemotherapy (Refer to Zambian Paediatric Protocols for detailed chemotherapy protocols. Patients should be managed in liaison with Paediatric Oncologist)

This is done in three phases: **Induction, Consolidation and Maintenance.**

Steroid prophase: prednisolone 60mg/m² for first 7 days, blood peripheral smear can be repeated on day 8 after the prophase if initial smear had blasts.

Induction phase: Duration 4 weeks

- Prednisolone at 40mg/m² daily for 3 weeks, Vincristine 1.5mg/m² IV push weekly on days 1, 8, 15, 22.
- L-Asparaginase 6000iu/m² IM on days 1, 3, 5, 8, 10, 12 of induction.
- Daunorubicin 25mg/m² IVI in Normal Saline at 125mL/m² over 1 hour on days 1 and 8 If patient has high risk disease.
- Age-adjusted intra-theclal (IT) methotrexate (MTX) on days 1, 8, 15, 28
- Bone marrow aspiration to check for remission status to be repeated between day 28-35 of induction.

Consolidation phase: Duration 4 weeks

- Prednisolone 60mg/m² for 14 days from day 1 of consolidation
- Cytarabine 75mg/m² IV push on days 1-4 and 8-11.
- Cyclophosphamide 1000mg/m² IVI in 125mL/m² normal saline on day 1 only.
- 6-mercaptopurine 60mg/m² daily orally for 14 days,
- Asparaginase 6000iu/m² IM on days 15, 17, 19 and 22, 24, 26,
- Vincristine 1.5mg/m² IV push on days 15, 22
- Age-adjusted intrathecal methotrexate Days 1, 8, 15

Interim maintenance: Duration 8 weeks

- Vincristine 1.5mg/m² IV push on days 1, 11, 21, 31,

- Methotrexate 100mg/m² IV push on day 1 but to escalate subsequent doses by adding to 50mg/m² to the previous dose for days 11, 21, 31, and 41

Delayed intensification: Duration 8 weeks

- Vincristine 1.5mg/m² IV push on days 1, 8, 15.
- Asparaginase 6000iu/m² IM on days 3, 5, 7 and 10, 12, 14.
- Dexamethasone 10mg/m² orally daily on days 1-7 and 22-28.
- Doxorubicin 25mg/m² IVI in 125mL/m² normal saline over 1 hour on days 1, 8, 15.
- Prednisolone 60mg/m² daily orally for 14 days from day 29 -42,
- Cytarabine 75mg/m² IV push on days 29-32 and 36-39.
- Cyclophosphamide 1000mg/m² IVI in 125mL/m² normal saline on day 29 only;
- 6-mercaptopurine 60mg/m² daily orally for 14 days from day 29-42;
- Vincristine 1.5mg/m² IV push on days 43 & 50.

Maintenance phase: Duration 22 months, 8 cycles each 84 days long (12 weeks) with one week in between cycles given as below.

- 6-mercaptopurine 75mg/m² daily orally for 84 days of each cycle, Methotrexate 20mg/m² orally weekly from week 2 – 12 if patient receiving IT MTX in week 1 of each cycle;
- Dexamethasone 6mg/m² orally daily on days 1-5, 29-33 & 57-61 of each cycle.
- Vincristine 1.5mg/m² IV push on days 1, 29, 57 of each cycle.
- Cranial radiation therapy (CRT) from Day 1 to 10 at 18Gy in 10 fractions of 1.8Gy each of the first cycle for those patients with #CNS 3 leukaemic infiltration.
- No IT MTX in subsequent cycles after CRT.

Acute Myeloid Leukaemia (AML)



Description

Rapidly progressing myeloid neoplasm characterized by clonal expansion of immature myeloid cells leading to ineffective erythropoiesis and megakaryopoiesis and consequent bone marrow failure.



Signs and Symptoms

- Recurrent infections
- Fever
- Pallor
- Easy bruising
- Spontaneous and excessive bleeding/DIC
- Bone and joint pain
- Hepatosplenomegally
- Lymphadenopathy



Treatment

Chemotherapy

Induction phase: Cytarabine 200mg/m²/day IVI in normal saline for 24 hours Days 1-7.

- Daunorubicin 60mg/m²/day IVI in normal saline for 30 minutes Days 1-3.
- Repeat induction chemotherapy 4 weeks after start of first induction cycle when marrow has recovered evidenced by Platelet count $\geq 75 \times 10^3/\mu\text{L}$ and neutrophil count $\geq 1.0 \times 10^3/\mu\text{L}$.

Consolidation: Cytarabine 3000mg/m² IVI BD Days 1, 3, 5 X 2 cycles 4 weeks apart. Cytarabine to be given as a 4 hours IV infusion in sodium chloride 0.9% 500mL – 1000mL. There is an 8-hour gap between the doses per day.

Acute Promyelocytic Leukaemia Variant of the AML

All-trans-Retinoic Acid (ATRA) 45mg/m² orally in two divided doses per day for 90 days is given as part of the first induction cycle with Cytarabine and daunorubicin at same doses of these as above.

Second cycle has the same drugs and doses, but ATRA is given for **15 days only**.

Third cycle with same drugs and doses for ATRA and daunorubicin as for cycle 2 but high dose Cytarabine at 1000 mg IVI in normal saline over 4 hours twice daily at least 8 hours apart on days 1-4. **Maintenance phase** follows: ATRA 45 mg/m²/day in two divided doses orally on Days 1-15 every three months for 2 years from start of induction; 6-Mercaptopurine 60 mg/m²/day orally for two years from start of induction; Methotrexate 20 mg/m² orally weekly 2 years from induction.

Chronic Myeloid Leukaemia (CML)



Description

Chronic myeloid leukemia (CML) is a myeloproliferative neoplasm associated with the Philadelphia chromosome t(9;22) (q34;q11) in at least 98% of cases, the resultant BCR-ABL1 fusion gene, and the constitutively active tyrosine kinase *BCR-ABL1*, which causes CML.

CML accounts for <5% of childhood leukaemias. It can progress from a relatively indolent disease (chronic phase) to more aggressive phases: an accelerated phase, during which time disease control is more difficult to achieve and a blast crisis or blast phase (acute leukaemia) which is generally refractory to treatment.



Treatment

Chemotherapy for CML in chronic phase

- Tyrosine Kinase Inhibitor (TKI) Imatinib mesylate 260mg – 340mg/m² (maximum dose 600mg) orally daily until disease progression or intolerable toxicity.

- If WBC counts $\geq 100 \times 10^3/\mu\text{L}$ Hydroxyurea 30-50mg/Kg orally in two divided doses until the count falls to 5 to 15 $\times 10^3/\mu\text{L}$, then it should be discontinued and patient left on Imatinib only.
- Second line TKIs: Dasatinib 60mg/m² orally once daily (maximum dose 100mg) or Nilotinib 460mg/m²/day in two divided doses orally (maximum dose 400mg).
- When disease progresses to either Accelerated Phase or Blastic Phase: refer for Allogeneic Stem Cell Transplantation (ASCT).

4.8.2. Lymphomas



Description

Lymphomas are malignant tumours of the lymphoreticular system and are classified into Hodgkin Lymphoma and Non- Hodgkin lymphoma.

Hodgkin Lymphoma (HL)



Description

A malignant condition arising from germinal centre B-lymphocytes with a characteristic Hodgkin Reed-Sternberg cell histologically. Three distinct forms of HL: a childhood form (14 years or younger), a young adult form (15 to 34 years).



Signs and Symptoms

- Progressive enlargement of lymph nodes, often over many weeks or even months; typically cervical, axillary and supraclavicular site.
- Systemic B symptoms that include unexplained fever ($>38.0^\circ\text{C}$), drenching night sweats, unintentional weight loss ($\geq 10\%$ loss within six months before diagnosis) are of prognostic significance.
- Loss of appetite, Pruritis, Pallor, Pain in the infiltrated tissue (Alcohol-induced), Hepato-splenomegaly



Investigations

- Excisional lymph node biopsy
- FBC/DC
- Liver Function tests
- Urea, Creatinine, Electrolytes
- Serum ferritin

- ESR, LDH
- Chest X-ray
- Abdominal-pelvic Ultrasound
- Contrast-enhanced CT scan imaging of primary disease site and either side of the diaphragm for staging (anatomically whole region from base of skull to mid-thigh + primary disease site)
- HIV test and CD4 count if positive.
- Bilateral Bone marrow aspiration and trephine biopsies for advanced disease stage (stage III and IV) or presence of B symptoms

Staging – uses the Ann-Arbor-derived Lugano classification with Cotswold modifications:

Stage	Disease involvement
I	One lymph node region (i.e., one node or a group of adjacent nodes)
II	Two or more lymph node regions on the same side of the diaphragm alone
III	Lymph node regions on both sides of the diaphragm
IV	Non-contiguous extra-lymphatic organ or site, regardless of lymphatic involvement (most commonly lung, liver, and bone or bone marrow)
B symptoms	
A	Absent
B -	Present
Bulky disease%	
Present	
Absent	
Extra-nodal extension	
E	• Limited extra-nodal extension in patients with stage I or stage II disease (e.g., mediastinal mass extending to the sternum, chest wall, lung or pericardium) • Diffuse or disseminated foci, with or without associated lymphatic involvement is regarded as stage IV disease

%Abdominal lymph node ≥ 10 cm, mediastinal mass ≥ 10 cm (CT scan) or higher than one-third of the internal thoracic transverse diameter, nodal conglomerate ≥ 6 cm



Treatment

The choice of treatment is determined by the stage of the disease. It consists of a combination of radiotherapy and chemotherapy.

- Low Stage (I & II, no Bulky disease, no B symptoms): ABVD every 4 weeks X 4 cycles Doxorubicin 25mg/m² D1 & 15 IV
- Actinomycin
- Bleomycin 10 units/m² D1 & 15 IV

- Vinblastine 6mg/m² D1 & 15 IV
- Dacarbazine 375mg/m² D1 & 15 IV Repeat every 28 days.
- Patients will be evaluated for response 4 -6 weeks after completing all chemotherapy cycles.
- Patients with a complete response (CR) will not receive radiation therapy after chemotherapy
- Patients without CR receive low-dose involved field Radiotherapy (LD-IFRT)

High stage or adverse features (III & IV, Bulky disease, B symptoms): ABVD X 6 cycles every 4 weeks OR OEPA/COPDac X 6cycles every three weeks

- Patients will be evaluated for response 4 -6 weeks after completing all chemotherapy cycles.
- Patients with complete response (CR) will not receive radiation therapy after chemotherapy.
- Patients without CR receive LD-IFRT

Chemotherapy ABVD regimen as indicted above.

- OEPA Regimen X 2 cycles
- Oncovin (vincristine) 1.5 mg/ m² Days 1, 8, 15
- Etoposide 125mg/m² Days 3-6
- Prednisolone 60 mg/m² Days 1-14
- Adriamycin (doxorubicin) 40mg/m² D1, 15

COPDac Regimen X 4 cycles

- Cyclophosphamide 500mg/m² D1, 8
- Oncovin (Vincristine) 1.5mg/m² D1, 8
- Prednisolone 60mg/m² D1-14
- Dacarbazine 250mg/m² D1-3

Non-Hodgkin Lymphoma (NHL)



Description

This is a heterogeneous group of lymphoreticular malignancies. These lymphomas may be associated with HIV/ AIDS and other immune deficiency states which increase the risk 100-fold in immune deficient individuals compared to matched controls.

They may be low-grade (indolent) slow growing or high-grade (fast growing) Most NHLs in children present as aggressive (high grade) disseminated disease. There is reported a male predominance epidemiologically and is uncommon below age 5 years.



Investigations

- FBC, Urea, creatinine, electrolytes, liver function tests and liver enzymes
- Markers – ESR, LDH

- Lumbar puncture for CSF cytology
- Excisional Lymph node biopsy or extra-nodal mass excisional/incisional/core needle biopsy for histology, immunohistochemistry/flow cytometry and cytogenetic studies where possible
- Bilateral (pelvic bones) bone marrow aspiration and biopsies
- Imaging
- CXR and abdominal-pelvic ultrasound in centres without CT scan
- Contrast-enhanced CT scan imaging of primary disease site and either side of the diaphragm for staging (anatomically whole region from base of skull to mid-thigh + primary disease site)
- Baseline ECG and Echocardiogram



Treatment

Paediatric Lymphoblastic lymphoma will be treated with the same regimens as low and high risk acute lymphoblastic leukaemia outlined in this guideline.

For detailed Treatment guidelines refer to Zambian Paediatric protocols



Description

BL is a form of high-grade Non-Hodgkin Lymphoma accounting for up to 40% of NHL paediatric cases. NHL as a group account for 60% of lymphomas in children less than 15 years old. It arises from transformation of germinal center B cells that leads to uncontrolled proliferation and is associated with pathognomonic chromosomal translocations involving the MYC on 8q24 and a number of Immunoglobulin (Ig) translocation partners as shown in the table above.

It is classified as

- Endemic
- Sporadic (the type found in non-malarial areas)
- Immunodeficiency-related



Signs and Symptoms

Feature	Endemic	Sporadic	Immunodeficiency-related
Clinical Features	Peak : 4 – 7 yr Males > Females	Peak: 6 – 12yr Males > females	Any
Primary Tumour Sites	Jaw or facial bone > Abdomen	Abdomen > jaw or facial bone	• Lymph nodes • Bone marrow • Central Nervous System

Feature	Endemic	Sporadic	Immunodeficiency-related
Metastatic sites	• Cerebrospinal Fluid/meninges • Breasts • Mesentery • Ovary/testis • Kidney • Bone marrow	• Central Nervous system • Bone marrow	• Gastrointestinal • Liver • Lung • CNS



Investigations

As for NHL above.



Treatment

Chemotherapy regimens below with number of cycles according to disease stage: Either B3 regimen or CODOX-M/ IVAC regimen. B3 Regimen for all stages of BL as initial therapy. Patients with CNS involvement from diagnosis should preferably be treated with the CODOX-M/IVC regimen or those with relapsed following initial therapy or progressive disease on B3 regimen.

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Table 69: Chemotherapy regimens with number of cycles

Week	B3 Regimen
1	• Vincristine 1.5mg/m² (max 2.0mg) IV push Day 1 • Cyclophosphamide 1200mg/m²(max 2.4g) IV infusion over 1 hour with mesna as above • Prednisolone 60mg/m² day 1 – 5 • IT MTX day 1
2	• Vincristine 1.5 mg/m² • Doxorubicin 60mg/m² Cyclophosphamide 1800mg/m² Methotrexate IT
3	• Vincristine 1.5mg/m² (max 2.0mg) IV push Day 1 • Cyclophosphamide 1800mg/m²(max 2.4g) IV infusion over 1 hour with MESNA as above • IT MTX day 1
4	• Vincristine 1.5mg/m² (max 2.0mg) IV push Day 1 • Cyclophosphamide 1800mg/m²(max 2.4g) IV infusion over 1 hour with MESNA as above • Etoposide 150mg IVI over 1 hr Days 1-2 • IT MTX day 1
5	• Vincristine 1.5mg/m² (max 2.0mg) IV push Day 1 • Cyclophosphamide 1800mg/m²(max 2.4g) IV infusion over 1 hour with MESNA as above • Etoposide 150mg IVI over 1 hr Days 1-2 • IT MTX day 1

Week	B3 Regimen
6	- Vincristine 1.5mg/m² (max 2.0mg) IV push Day 1 No IT

Response assessment after 6 weeks of chemotherapy.

CODOX-M/IVAC regimen

Patients with localised disease receive 3 cycles of CODOX-M, while those with multiple site involvements are treated with CODOX-M alternating with IVAC and intrathecal therapy for 3 cycles each, total 6 cycles.

CODOX-M

- Cyclophosphamide 800mg/m² in 125ml/m² NS IV over 1hr Day 1 and 200mg/m² in 125ml/m² NS IV over 1hr Day 2 – 5
- Vincristine 1.5mg/m² Day 1 IV push over 5min (max 2mg)
- Doxorubicin 40mg/m² in 125ml/m² NS IV over 1hr Day 1 & 8 (increase duration of administration to 2hrs for children > 10 years and in adults)
- Methotrexate 1.2g/m² is added to either dextrose/water or 0.9% saline (125ml/m² /hour) IV infusion over 3 – 4 hours on Day 10, methotrexate infusion is started only after alkalinisation of urine, and urine pH is 7 or above.
- Alkalinisation of urine – 5% dextrose water or half strength darrows with 30ml of 4% NaHCO₃ added per 1L at a rate of 3L/m² /24 hours, 4 hours before commencing methotrexate infusion and continued for another 48 hours. A urine output of ≥ 3ml/kg/hour must be achieved. Urine dipstick with each voided urine, and maintain pH 7 and above.
- Folinic Acid 15 – 25mg IV 6 hourly X 10 doses starting 24 hours from the start of Methotrexate infusion.
- Granulocyte-Colony Stimulating Factor support at 5µg/kg/d SC starting 24 hours after the last chemotherapy until granulocyte count is above 1.0 X 10⁹/L.

CNS prophylaxis

- Cytarabine (< 13 months 20mg; 13 months to < 25 months 30mg; 25 months to < 36 months 50mg; > 36 months 70mg) IT Day 1 & 3
- Methotrexate (1 yr to < 2 yrs 8mg; 2 yrs to 3 yrs 10mg; > 3 yrs to 9 yrs 12mg; > 9 years 15mg) IT Day 15
- Hydrocortisone 20mg/m² on Day 1, 3 and 15
- Folinic Acid 15 - 25mg IV stat 24 hours after IT methotrexate

IVAC

- Ifosfamide 1.5g/m² IV infusion over 1 hour Day 1 - 5 with MESNA at 360mg/m²/dose at 0 hr, 4 hour, 8 hour of ifosfamide infusion.
- Etoposide 60mg/m² IV infusion over 1 hour Day 1 - 5
- Cytarabine 2g/m² IV infusion over 1 – 2 hours every 12 hrs for Day 1 and Day 2
- Filgrastim at 5 micrograms/kg/d SC start on Day 7 till absolute granulocyte count is over 1 X 10⁹/L.
- CNS prophylaxis: Methotrexate 12mg/ m² IT on Day 5ss

Supportive care:

- Anti-emetics: dexamethasone 0.15mg/kg single dose /day and ondansetron 0.15mg/kg 8 hourly for 2 - 3 days after chemotherapy administration.
- Patients with BL are prone to tumour lysis syndrome so ensure the following are done:
- IV fluids with DNS at 3L/Daily for the first 5 – 7 days starting 24 hrs before initiation of chemotherapy
- Monitor Urine output.
- Monitor electrolytes 12 hourly for the first 5 days
- Allopurinol at 10 – 20mg/kg in two divided doses starting 24 hrs before initiation of chemotherapy and continue for 7 days
- MESNA 360mg/m² IV starting with cyclophosphamide infusion and then at 4 & 8 hours later for total of 3 doses
- Granulocyte colony-stimulating factor (Neupogen, filgrastim) 5 micrograms/kg subcutaneously Once daily for at least one week

4.8.3. Rhabdomyosarcoma (RMS)



Description

Embryonal malignancy derived from primitive (embryonic) mesenchymal cells same as that from which striated muscle is derived. It belongs to the group of small round cell tumours based on light microscopic appearance. RMS accounts for about 50% of all soft tissue sarcomas in paediatrics. Two-thirds of cases occur in children <6 years of age. It is slightly more common in males.

The 2013 World Health Organization classification system based on histology for RMS includes four subgroups:

- Embryonal rhabdomyosarcoma (ERMS)
- Alveolar rhabdomyosarcoma (ARMS)
- Pleomorphic RMS (PRMS)
- Spindle cell/sclerosing RMS (SRMS)

Note that extremities are associated with the worst prognosis. About 60% of patients with ARMS have chromosomal translocations of PAX3-FOXO1, t (2;13), another 20% have PAX7-FOXO1 fusions, t (1;13), and the remainder harbour rare translocations or are fusion-negative tumours. ERMS is fusion negative.

Anatomical distribution and dissemination of RMS

Primary site		Frequency	Metastases
Head and neck		34%	
	Orbit	8%	
	Non-Parameningeal	8%	
	Meningeal	18%	CNS

Primary site		Frequency	Metastases
Genitourinary		25%	
	Paratestis/vagina/uterus	12%	Lymphatic
	Bladder/prostate	11%	
Extremity		15%	Lymphatic Haematogenous
Other		25%	

CNS: Central nervous system; GU: Genitourinary; NPM: Non-parameningeal; PM: Parameningeal



Investigations

Imaging

- MRI scan of the primary site and lymph node region
- CT scan of the primary site and lymph node region
- CT scan of the chest
- PET scan or bone scan or skeletal survey for staging

Biopsy and other tests:

- Biopsy of the primary tumour for histology and immunohistochemistry tests for – **MyoD 1, Desmin, Myogenin, muscle-specific actin (MSA)**
- Bilateral bone marrow aspirate/biopsy for staging
- Patients with PM/paraspinal tumours undergo a lumbar puncture for CSF cytology - CNS assessment
- Reverse transcriptase-polymerase chain reaction (RT-PCR) and fluorescence in situ hybridization (FISH) using a FOXO1 probe on biopsy specimen can detect PAX-FOXO1 translocations
- FBC, Liver function tests, urea, creatinine



Treatment

Treatment is risk –adapted:

Chemotherapy (VAC regimen) and VDC alternating with IE for up to 39 weeks (13 VDC/IE cycles).

VAC regimen

- Vincristine 1.5mg/m² IV push Day 1 only
- ActinomycinD 0.05mg/Kg IV push Day 1 only
- Cyclophosphamide 1200mg/m² IV infusion in normal saline over at least 30 minutes with MESNA at 20% of the cyclophosphamide dose given IV in three doses 4 hourly starting with the cyclophosphamide infusion

VDC regimen

Table 70: VDC regimen

Drug	Dose	Route	Frequency	Schedule
Vincristine	1.5 mg/m ²	IV	OD	Day 1,8,15
Doxorubicin	30 mg/m ²	IV	OD	Day 1, 2
Cyclophosphamide	600 mg/m ²	IV	OD	Day 1,2

IE regimen

Table 71: IE regimen

Drug	Dose	Route	Frequency	Schedule
Ifosfamide	1800 mg/m ²	IV	OD	Day 1, 2, 3, 4, 5
MESNA	20% Total dose of Ifosfamide	IV	4 hrly X 3 starting time 0 of Ifosfamide infusion	Day 1, 2, 3, 4, 5
Etoposide	100 mg/m ²	IV	OD	Day 1, 2, 3, 4, 5
Filgrastim	5 mcg/kg/d	SC	OD	Day 7 - 14

Palliative Oral Metronomic Chemotherapy (for 12 cycles)

- Oral Etoposide 50mg/m² daily for three weeks followed by 7-10 days rest
- Oral Cyclophosphamide 2.5mg/Kg daily for three weeks followed by 7-10 days rest

4.8.4. Retinoblastoma



Description

Most common intraocular malignant tumour of the retina that may arise from single or multiple foci in one or both eyes, caused by biallelic inactivation of the retinoblastoma gene RB1. - A child with leukocoria and any other signs and symptoms above must be referred to an ophthalmologist for examination under anaesthesia for diagnosis and disease classification for vision prognosis.



Signs and Symptoms

- Leukocoria (white pupillary reflex)
- Strabismus
- Red painful eye
- Eye tumour mass
- Creamy-pink mass projecting into vitreous

- A white avascular tumour
- Retinal detachment
- Vitreous haemorrhage
- Clouding of the anterior chamber
- Local Pain
- Loss of vision
- Anaemia
- CNS disease- seizures, altered consciousness
- Buphthalmos, glaucoma, and periorbital cellulitis are features of advanced disease. Extraocular manifestations involve proptosis, lymph node swelling, and distant metastases - brain, bone and bone marrow commonly and other sites.



Investigations

Investigations for Staging of Retinoblastoma

- The intraocular extent of disease
- Indirect ophthalmoscopy
- Ultrasonography of globe
- The orbital extent of disease
 - Plain X-ray of the optic foramen, orbit, and skull
 - CT scan of the orbit
- Metastatic evaluation
 - Lumbar Puncture: CSF for cytology, Full blood count
 - Liver function tests, ferritin and Neurone-Specific Enolase
 - Bilateral Bone Marrow aspiration and biopsy
 - Abdominal US (Liver/Spleen)
 - CT scan of brain, head and Abdomen, Bone Scan, Biopsy of extraocular masses
 - Globe and optic nerve stump histopathology (if enucleation is done)
- Added investigation
 - Genetic testing for RB1 mutation in the proband and family members using Genetic sequencing
 - Fluorescent in-situ hybridisation (FISH)
 - Methylation studies for epigenetic changes
 - Multiplex ligation-dependent probe amplification.



Treatment

Treatment goal is to save life but secondarily save vision whenever possible.

- Metastatic disease outside of the CNS (bone, bone marrow, liver) can be cured with platinum-based regimens followed by autologous haematopoietic stem cell transplantation, and irradiation, Patients with CNS metastases have a dismal prognosis.

Treatment Approach based on Laterality of Disease

Table 72: Treatment Approach based on Laterality of Disease

Extent of Disease	Features	Recommend treatments
Unilateral or bilateral Retinoblastoma; each eye is grouped and staged independently and treated as given here	Group A, B, C	Eye-conserving therapy (done in institutions performing sequential chemotherapy combined with laser, cryotherapy, and/or RT)
	Group D, E (Ocular Stage) without bulphthalmos	Non-eye conserving therapy as below
	Pathologic finding of post laminar invasion, or invasion of the surgical margins of the optic nerve, or extension through the sclera into the orbital tissues	Theses pathological features require treatment with 6 x VJE after enucleation
	When Bulphthalmos present	2 cycles of VJE followed by enucleation then 4 cycles of VJE
	Orbital retinoblastoma only with MRI or CT findings of optic nerve or extrascleral invasion	2-3 cycles of VJE followed by enucleation then 5-6 cycles of VJE (Total of 8 cycles) + RT to the orbital region
	Overt Orbital-Metastatic retinoblastoma -Stage III-IV IRSS	Palliative treatment: - Standard dose chemotherapy VJE - Metronomic therapy with intention of life prolongation. - Consider palliative RT

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Drug Regimen: VJE

Table 73: Drug Regimen: VJE

Drug Name	Administer every 3-4wks for 6-12 cycles depending on the stage of disease Drug doses	
	Patient age ≥ 3 yrs/ >10 kg Body weight	Patient age <3 yrs/ <10 kg Body weight
Vincristine	1.5mg/m ² IV push over 5 min day 1	0.05mg /kg IV push over 5 -10min day1
Etoposide	150mg/m ² IV infusion over 1 hr day 1, day 2	5mg /kg IV infusion over 1hr day1, day 2
Carboplatin	600mg/m ² IV infusion over 1hr day 1	18.6mg/kg IV infusion over 1 hour day 1

4.8.5. Nephroblastoma (Wilms' Tumour)



Description

This is the commonest malignant renal tumour of childhood, with peak age among 2-5 years old. It is an embryonal neoplasm of the kidney cells and may arise in one kidney in over 90% of cases or in both kidneys.

Occurs with equal frequency in both girls and boys and may be associated with congenital anomalies or syndromes. *A child with an abdominal mass should promptly be referred to the next level of for imaging and if a renal mass is confirmed, suspicious for wilms tumour, should be referred to a paediatric surgeon or urologist for biopsy or removal of the mass.*



Signs and Symptoms

Commonly presents as a painless palpable mass in the abdomen. Other symptoms and signs include any of the following:

- Hypertension
- Hematuria, gross or microscopic in 12 -25% cases
- constipation
- Weight loss
- Dysuria

Others: nausea, vomiting, abdominal pain, cardiac insufficiency, pleural effusion, polycythemia, hydrocephalus, acquired von Willebrand disease



Investigations

- FBC, U/E + Creatinine, LFT, Coagulation profile
- ECG and echocardiogram
- Abdominal Ultrasound
- IVU
- CXR
- Contrast-enhanced CT scan of chest, abdomen and pelvis
- Needle biopsy is not advised as it leads to tumour spillage and disease up-staging, except for unusual clinical presentation or findings on imaging.



Treatment

Multimodal approach that is based on stage and risk, combining surgery, chemotherapy and radiation therapy.

Pre-surgery chemotherapy for tumours where upfront surgery is not possible (inoperable tumours):

- Localised disease: 4 weeks of VA regimen
- Metastatic disease: 6 – 9 weeks of VAD regimen
- Bilateral wilm's tumour: Reassess at 4, 6, 7, 10 weeks of chemotherapy. Continue if good response up to maximum of 12 weeks of VAD or VA regimen.

Table 74: Localised Disease: VA regimen

Drug	Week				
	1	2	3	4	
Vincristine 1.5mg/m ² IV push over 5min (0.05mg/kg if <10kg BWT or BSA <0.6m ²)	*	*	*	*	Reassess radiologically and consult Surgery
Actinomycin D 0.05mg/kg IV push over 5-10min (adjust dose for infants)	*		*		

Table 75: Bilateral Disease: VA regimen

Drug	Week					Week				Week				
	1	2	3	4		5	6	7		8	9	10	11	12
Vincristine 1.5mg/m ² IV push over 5min (0.05mg/kg if <10kg BWT or BSA <0.6m ²)	*	*	*	*	Stop and reassess. If good response, continue	*	*	*	If ongoing good response, may continue chemotherapy				*	
Actinomycin D 0.05mg/kg IV push over 5-10min (adjust dose for infants)	*		*			*							*	

Table 76: Metastatic Disease/Bilateral Disease: VAD regimen

Drug	Week							Week			
	1	2	3	4	5	6		7	8	9	
Vincristine 1.5mg/m ² IV push over 5min (0.05mg/kg if <10kg BWT or BSA <0.6m ²)	*	*	*	*	*	*	Chest X Ray. If no metastases evident, consult paediatric surgeons for nephrectomy If metastases evident on chest X Ray, give 3 more cycles				Consult Surgery
Actinomycin D 0.05mg/kg IV push over 5-10min (adjust dose for infants)	*		*		*			*		*	
Doxorubicin 50mg/m ² in 0.9% saline IV over 1-2 hours	*				*					*	

Surgery

Operable upfront or after neoadjuvant chemotherapy: Radical Nephrectomy + Lymph Node sampling/
Nephron-sparing surgery in bilateral cases

Radiotherapy

When indicated should be given within 2 to 6 weeks of surgery (nephrectomy), therefore patient should promptly be referred to a centre with radiotherapy services at this point.

Post-surgery adjuvant treatment based on risk stratification (SIOP or COG)

4.8.6. Low Grade Gliomas (LGG)



Description

Tumours of the central nervous system (CNS) are a diverse group of tumours (low grade gliomas, high grade gliomas, ependymomas, embryonal tumours, pineal region tumours, etc.) and constitute the second most common paediatric cancer worldwide after acute lymphoblastic leukaemia. They rank 10th in Zambia (Globocan, 2020). Low grade gliomas (LGGs) are a heterogeneous spectrum of neoplasms comprising the majority of brain tumours in childhood. The posterior fossa is the most common site of involvement (15-25%) followed by the cerebral hemispheres (10-15%) and the optic pathways (OP). Majority arise sporadically, while some arise within cancer-predisposition syndromes, such as neurofibromatosis type 1 (pilocytic astrocytoma) and Tuberous sclerosis complex (subependymal giant cell astrocytoma). They are generally slow evolving, with relatively benign histological appearance. In general, high rates of long-term survival are characteristic as well, despite low but steady rates of disease progression even 10 years from diagnosis.

Table 77: Classification According to Histology and WHO Grading System

Type	Grade I	Grade II
Astrocytic tumours	• Pilocystic astrocytoma • Subependymal giant cell astrocytoma	• Difuse astrocytoma • Pilomyxoid astrocytoma • Pleomorphic xanthoastrocytoma
Oligodendroglial tumours		• Oligodendroglioma
Neuronal and mixed neuronal & neuronal-glial tumours (mixed oligoneuronogial features)	• Ganglioglioma • Gangliocytoma • Desmoplastic ganglioglioma • Dysembryoplastic neuroepithelial tumour	• Oligoastrocytoma



Signs and Symptoms

Generalizing symptoms and signs: due to increased intracranial pressure from obstruction of the ventricles and include headaches nausea, vomiting (particularly in the morning), and lethargy. Older children also display abnormal pupil to accommodation, sixth cranial nerve palsies, and papilledema. Infants and young children -

irritability, anorexia, failure to thrive, and developmental delay or regression, macrocephaly and separation of the cranial sutures, tense or bulging anterior fontanelle associated with a shrill, neurogenic cry, or setting-sun eye sign. Funduscopic may reveal only optic pallor but no evidence of papilledema.

Specific symptoms and signs: Localizing symptoms are dictated by tumour location. The presentation of tumours of the cerebral hemisphere depends upon affected lobe and may include seizures, hemiparesis, and behavioral changes. Optic pathway gliomas may arise anywhere along the visual pathway. Children with OPTs can present with decreased visual acuity, optic nerve atrophy, proptosis, or strabismus. Lower cranial nerve deficits with dysphagia, dysarthria, abnormal breathing and long tract signs (hemiparesis, spasticity, hyperreflexia, Babinski's sign) with brainstem tumours.



Investigations

Radiological imaging is a cornerstone in the diagnosis of paediatric brain tumours.

- CT should include both pre and post contrast views.
- MRI- Brain (with and without contrast). If possible, an initial spinal MRI should be performed to rule out spinal metastases which may occur in 10% of affected children.
- Biopsy should be considered for children with unresectable low-grade gliomas where there is a doubt with regard to diagnosis.
- Optic pathway tumours (OPTs) are generally low-grade glial neoplasms that are not routinely biopsied
- Certain gliomas may be reliably diagnosed on imaging alone. But where diagnosis is uncertain, it is vital that there is a reliable pathological service to ensure accurate diagnosis.



Treatment

Supportive

- The mainstay of treatment is surgical except for tumours in the deep midline supratentorial region, optic pathway/hypothalamus, and brain stem.
- Consideration should be given to referral of these children to a regional or national centre with more expertise as this may offer a survival and outcome advantage
- For tumors located in areas where gross total resection is possible, surgery is the most effective treatment. If >95% resection, monitor with scans every 4-month Scans for 3 years then extend review interval thereafter to what is convenient for the family.
- Review treatment plan if patient clinically worsening or tumour size increases.
- Treatment options for tumours that are not amenable to surgical resection are chemotherapy, radiotherapy or observation alone
- Small tumours, and especially for children with NF1, is observation closely with magnetic resonance imaging (MRI) scans.
- Chemotherapy: children younger than 3 years (for whom delay of radiation therapy is desirable to avoid long-term neuropsychological and neuroendocrine deficits), tumours in the deep locations or sensitive structures, and progressive disease after radiation therapy.

- Radiation therapy is used for inoperable, recurrent or progressive tumours. It is also used in children older than 3 years with progressive or significant visual compromise. It is not recommended for OPT (vascular and neuroendocrine effects especially with NF1).

Pharmacological

The CbV Chemotherapy regimen for paediatric LGG:

Induction Phase

Ten-week induction course consisting of: 8 doses of

- IV carboplatin 175 mg/m² infused over 1 hour in normal saline X 8 doses
- Vincristine 1.5 mg/m², (maximum 2 mg per dose) weekly by IV push over 5 -10 minutes X 10 doses

Maintenance Phase

If objective response to treatment, or stable disease, maintenance for up to 8 cycles of the same two drugs above as for the induction phase (begins 2 weeks after last cycle of induction)

4.8.7. Medulloblastoma



Description

Medulloblastoma is a primitive cerebellar tumour of neuroectodermal origin that is the most common posterior fossa malignant tumour in children. It accounts for 20% of paediatric brain. A child suspected to have a brain tumour with symptoms below should promptly be referred to the next level of care that has imaging (MRI or CT scan) and neurosurgical services.



Signs and Symptoms

- Headache
- Vomiting
- Convulsions
- Ataxia
- Cranial nerve palsies
- Coma and unconsciousness
- BP and pulse



Investigations

- History and physical examination
- CSF cytology
- MRI or CT scan of the brain and whole spine

- FBC, U/Es
- Audiometry
- Histological confirmation is done after craniotomy and complete resection of the tumour



Treatment

Depends on the risk category:

- *Average Risk:* children older than 3 years, no metastasis, near to total resection, with less than 1.5cm² residual disease on early postoperative imaging (24-48hrs)
- *High Risk:* overt metastatic disease based on CSF cytology or imaging > 1.5cm² residual disease, and all children < 3 years of age.

Surgery:

- Maximal judicious surgical resection is the most important step. However, the aggressiveness of surgery is sometimes associated with the posterior fossa syndrome in up to 15% of children post-operatively (difficulty swallowing, truncal ataxia, mutism and less often respiratory failure).

Radiation Therapy:

- Average Risk Medulloblastoma
 - The standard of care for average-risk medulloblastoma is either Cranial Spinal Irradiation (CSI) to 23.4Gy with platinum-based chemotherapy, OR CSI to 35 Gy without chemotherapy with a boost in both situations of the posterior fossa to a total dose of 54 - SSG y in both situations
- High-Risk Medulloblastoma:
 - Post-operative irradiation is given first followed by chemotherapy as a preferred sequence.
 - However, pre-irradiation chemotherapy is sometimes utilized in some centers with a risk of disease progression.

Chemotherapy - regimens repeated every 4-6weeks:

- Vincristine 1.5mg/m² D1 weekly for 3 consecutive weeks
- Lomustine (CCNU) 75mg/m² orally D1, Cisplatin 75mg/m² IV

4.9 INFECTIOUS DISEASES

4.9.1. Typhoid (Enteric Fever)



Description

Acute systemic illness resulting from Salmonella typhi or Salmonella paratyphi infection.



Signs and Symptoms

High grade fever, coated tongue, anorexia, vomiting, hepatomegaly, diarrhoea, toxicity, abdominal pain, pallor, splenomegaly, constipation, headache, jaundice, obtundation, ileus, intestinal perforation. *Mainstay of diagnosis is clinical evaluation.*

Any high fever of >72 hours duration (with features), especially with no localizing upper respiratory signs or signs of meningitis or malaria must be suspected of typhoid and managed accordingly.



Investigations

Blood culture

Ideally:

- 1st week of symptoms - Blood culture
- 2nd week of symptoms - Urine culture
- 3rd week of symptoms - Stool culture

NB: As most patients present late, all three cultures should be taken on admissions.

Widal test

- A single Widal test may be positive in only 50% cases in endemic areas.
- Serial tests may be required.

Full Blood count (White cell count)

- Leucopenia ($WCC < 4 \times 10^9/\text{litre}$) with a left shift in neutrophils may be seen. Young infants may also commonly present with leukocytosis



Treatment

- Early diagnosis and instituting appropriate supportive measures and specific antibiotic therapy is the key to appropriate management
- Adequate rest, hydration, correction of fluid-electrolytes and nutrition
- Anti-pyretic therapy for fever $> 39^\circ\text{C}$.
- Antibiotic therapy
 - o 1st line therapy- **Ciprofloxacin 15mg/kg /day in two divided doses for 10-14 days.**
 - o 2nd line (drug resistant) – **Imipenem 25mg/kg/day QID for 10-14 days.**

Alternative:

- o **Ceftriaxone 50mg/kg/day for 10-14 days.**
- o **Azithromycin 10mg/kg/day oral for 5 days in uncomplicated cases.**



Complications

- Intestinal perforation (0.5- 1%), Peritonitis and Intestinal hemorrhage (<1%)
- Presents as a sudden increase in abdominal pain with associated tachycardia, tachypnea, hypotension, hyperpyrexia and obtundation.
- Examination reveals marked abdominal tenderness with guarding, and subsequent abdominal rigidity.
- Urgent Plain –X-ray abdomen and consultation to surgery required.
- A rising white blood cell count with a left shift and free air on abdominal radiographs may be seen in such cases.

4.9.2. Dysentery



Description

Intestinal disorders caused by microorganisms such as bacteria, amoebas or viruses spread through contaminated food and water resulting in diarrhoea containing pus and blood. There are two main types: amoebic and bacillary dysentery. Bacillary dysentery occurs due to infection by *Shigella*, *Salmonella*, *Campylobacter* and *E coli*. *Shigella* is responsible for approximately 50% of cases while amoebic dysentery is caused by the parasite *Entamoeba Histolytica*.

PAEDIATRIC



Signs and Symptoms

- Abdominal pain and cramps
- Fever
- Tenesmus
- Nausea
- Vomiting
- Bloody diarrhoea



Investigations

- Stool microscopy and culture.
- FBC/DC
- Serum Electrolytes.



Treatment

Supportive

- Supportive care with adequate rehydration and pain control.
- Adequate nutrition.
- Zinc supplementation.

Pharmacological

- Bacillary dysentery
 - Ciprofloxacin 7.5mg/kg/day for 7-10 days. Maximum dose 500mg per dose.
 - Ceftriaxone 50mg/kg/day for 7-10 days. Maximum dose 2g.
- Amoebic dysentery
 - Metronidazole 7.5mg/kg/day Orally 8 hourly for 5 days.
 - Tinidazole 50mg/kg once daily for 3 days. Maximum dose 2g per day.

4.9.3. Parasitic Infections

Schistosomiasis



Description

- Schistosomiasis is an acute or chronic parasitic disease caused by blood flukes (trematode worms) of the genus *Schistosoma*.
- Infection larval forms of the parasite released by freshwater snails penetrate the skin during contact with infested water.

There are 2 major forms of schistosomiasis that are caused by 5 main species of blood fluke:

- *Intestinal*: *Schistosoma mansoni*, *Schistosoma japonicum*, *Schistosoma mekongi* and *Schistosoma intercalatum*
- *Urogenital*: *Schistosoma haematobium*.



Signs and Symptoms

In the acute infection, mild, maculopapular skin lesions may develop within hours after exposure.

- *Intestinal schistosomiasis*
 - Acute: Abdominal pain, diarrhoea, blood in the stool, fatigue.
 - Chronic: hepatomegaly, splenomegaly ascites, portal, and pulmonary hypertension.

- *Urogenital Schistosomiasis*
 - o Acute: Haematuria, dysuria, urinary frequency.
 - o Chronic: Fibrosis of the bladder and ureter, kidney dysfunction, bladder cancer (later stages).
 - o Adolescent girls: genital lesions, vaginal bleeding, dyspareunia nodules in the vulva.
 - o Adolescent boys: pathology of the seminal vesicles, prostate, and other organs.



Investigations

- Stool/Urine M/C/S for blood and Schistosoma ova.
- FBC, DC-Eosinophilia.
- Urea, Electrolytes, LFTs.
- Chest x-ray
- Plain abdominal x rays
- Abdominal ultrasound
- Blood culture
- Rectal Snip



Treatment

- Praziquantel is the treatment of choice for all forms of Schistosomiasis (children >2 years and adults: 40mg/kg as a single dose). Consider steroid therapy if very severe disease.
- Adverse effects of praziquantel include dizziness, headache, nausea, vomiting, diarrhea, abdominal discomfort, bloody stool, urticaria, and fever following initiation of treatment. These are usually mild and last about 24 hours.
- *Prevention:* Praziquantel 40/mg/kg as a single dose.

Taeniasis/Cystercercosis



Description

Intestinal infection with tapeworm acquired from eating raw or not-well cooked food. Causative organisms include; *Taenia saginata* (beef tapeworm), *Taenia solium* (pork tapeworm), *Diphyllobothrium latum* (fish tapeworm) and *Hymenolepis nana* (faecal oral contamination from human and dogs) leading to chronic malnutrition (Taeniasis) or infection of tissues with larval parasites (Cystercercosis). The larvae (cysticerci) are most often located in subcutaneous and intramuscular tissue, followed by the eye and brain. The CNS is involved in 60-90% of patients resulting in neurocystercosis.



Signs and Symptoms

Taeniasis

- Colicky abdominal pain
- Body Weakness
- Loss of or increased appetite
- Constipation or diarrhea
- Pruritus ani or hyperexcitability

Neurocystercosis

- Seizures
- Intracranial hypertension: Headache, nausea, vomiting, vertigo, and papilledema.
- Personality and mental status changes (Neuropsychiatric changes).
- Behavioural changes and learning disabilities.



Investigations

- Stool M/C/S- Evidence of characteristic ova, proglottides or scolex in the wet mount stool examination tissues.
- Brain CT scan or MRI

NB: Refer the patient to high centers for further investigation and expertise.



Treatment

- *Taeniasis A*: Praziquantel (PO) 5–10mg/kg single dose.
- *Neurocystercosis*: Albendazole 15mg/kg/day for 15 days in 2 divided doses plus corticosteroids- prednisolone 1-2mg/kg/day or dexamethasone
- Praziquantel 50mg/kg /day for 15 days
- Surgical removal of cysts depending on site of infection e.g eyes, spine, or subcutaneous tissue.

Albendazole or praziquantel should not be used to treat ocular or spine cysts as resulting inflammation may cause permanent damage.

Further treatment:

- Anti-epileptic drugs if seizure occur. Carbamazepine, phenobarbitone or sodium valproate. Treatment is recommended until the patient has been seizure free for 2 years.
- Osmotic diuretics for Intracranial hypertension.
- Ventricle- peritoneal shunt placement for hydrocephalus.

4.9.4. Tuberculosis (TB) in Children

**Description**

TB in children is an indicator of recent and ongoing transmission of *M. tuberculosis* in the community, as majority of children will develop tuberculosis disease within 1 year after infection.

Pulmonary TB is the commonest type of TB in children but extrapulmonary disease is also common estimated to be around 30-40% of cases.

Most immunocompetent children with TB disease present with nonspecific symptoms of a chronic disease. In infants the presentation may be more acute and can present as acute severe, recurrent, or persistent pneumonia. TB should be suspected when there is a poor response to appropriate conventional antibiotics.

Key risk factors for TB in children:

- Household contact with a newly diagnosed smear positive case.
- Age < 5 years
- HIV infection
- Severe malnutrition

**Signs and Symptoms*****Pulmonary TB***

- Cough
- Fever
- Loss of appetite
- Weight loss or failure to thrive.
- Decreased activity.

Other symptoms will depend on the anatomical site of tuberculosis disease.

Extrapulmonary TB.

- Gibbus- Spinal TB, especially of recent onset.

- Non-painful enlarged cervical lymphadenopathy, with or without fistula formation- TB Lymphadenitis.
- Pleural effusion
- Pericardial effusion
- Distended abdomen with ascites- TB abdomen.
- Non painful enlarged joints- Osteoarticular TB.
- Meningitis not responding to antibiotic treatment - TB meningitis.



Investigations

- Careful history (including history of TB contact and symptoms consistent with TB).
- Clinical examination (including growth assessment).
- Bacteriological confirmation with Xpert MTB/RIF or culture or smear microscopy).
- Chest X-ray
- Tuberculin skin testing
- Urinary lateral flow lipoarabinomannan (LAM) for HIV infected children or presumed severe TB disease.
- Investigations relevant for suspected extra-pulmonary TB.
- HIV testing

Appropriate specimens should be obtained for Xpert MTB/RIF testing, staining and microscopy, culture (and histopathological examination in extrapulmonary TB).

For pulmonary TB

- Samples for Xpert MTB/RIF or culture testing should be obtained using any the following methods depending on the age of the child;
 - o Gastric lavage
 - o Sputum induction
 - o Nasopharyngeal aspiration
 - o Expecterated sputum

For extrapulmonary TB

- *Pleural fluid*: Xpert MTB/RIF, biochemistry, cell count and culture.
- *Pericardial fluid*: Xpert MTB/RIF, biochemistry, cell count and culture.
- Lymph node biopsy or Fine-needle aspiration of enlarged lymph glands: Xpert MTB/RIF, ZN staining, culture and histology.
- *CSF*: Biochemistry, cell count, Xpert MTB/RIF.
- In addition, appropriate imaging studies such as abdominal ultrasound, Echocardiogram, CT and MRI should be used depending of the site of disease of extrapulmonary disease.



Treatment

Table 78: Recommended TB treatment regimens in children

TB disease category	Recommended regimen	
	Intensive phase	Continuation phase
All non-severe forms of PTB and EPTB	2 (HRZE)	4 (HR)
Severe forms - TB meningitis, Osteo-articular TB, Spinal TB, Miliary TB, other severe forms of TB	2 (HRZE)	10 (HR)

Table 79: TB drug dosing

Weight bands	Number of Tablets		
	Intensive Phase		Continuation Phase
	RHZ (75/ 50/150 mg)	E* (100 mg)	RH (75/50 mg)
4-7 kg	1	1	1
8-11kg	2	2	2
12 – 15 kg	3	3	3
16- 24 kg	4	4	4
25 and above	Use adult doses		

PAEDIATRIC

Rifampicin (R) – 15 mg/kg (range 10 – 20 mg/kg); maximum dose 600 mg/kg, Isoniazid (H) –10 mg/kg (range 7 – 15 mg/kg); maximum dose 300 mg/kg, Pyrazinamide (Z) – 35 mg/kg (30 – 40 mg/kg) and Ethambutol (E) – 20 mg/kg (15 – 25 mg/kg)

Use of corticosteroids

Corticosteroids are indicated in the management of some complicated forms of TB such as:

- TB meningitis.
- Complications of airway obstruction by TB lymph glands.
- Pericardial TB.

Prednisolone: is recommended at a dose of 2mg/kg daily, increased to 4 mg/kg daily in the case of the most seriously ill children, with a maximum dosage of 60 mg/day for 4 weeks. The dose should then be gradually tapered over 1–2 weeks before stopping.

Pyridoxine supplementation

Isoniazid may cause symptomatic pyridoxine deficiency, which presents as neuropathy, particularly in severely malnourished children and HIV-positive children on antiretroviral therapy (ART). Supplemental pyridoxine (5–10 mg/day) is recommended in HIV-positive or malnourished children being treated for TB.

Drug resistant tuberculosis in children.

Drug-resistant TB (DR TB) should be suspected under the following conditions:

- Close contact with a person known to have DR-TB including household and other contacts.
- Close contact with patient that died from TB, failed or is not adherent to TB treatment.
- History of previous TB treatment (in the past 6-12 months).
- Not improving after 2-3 months of first line TB treatment, including persistence of positive smear or culture, persistence of symptoms and failure to gain weight (radiological improvement is frequently delayed).
- A child who develops active TB while on Isoniazid (INH) prophylaxis.

Appropriate samples should be obtained in any suspected case of DR-TB. These should include the following:

- Xpert MTB-RIF
- Mycobacterial culture
- Drug susceptibility testing (DST)
- Line-probe assays (LPA)

Indications to initiate MDR TB regimen in children.

- Confirmed MDR TB by DST or LPA.
- RR on Xpert MTB/RIF.
- Smear positive case with confirmed MDR contact.
- Child with TB and unconfirmed DST resulting who is not responding to standard TB therapy and is a known contact of an MDR TB case.

For treatment of DR TB refer to the Guidelines for the Programmatic Management of Drug Resistant Tuberculosis.

Indications for Tuberculosis preventive therapy (TBT) in children

TB preventive therapy is recommended for the following at risk groups of children.

- Asymptomatic HIV negative children aged <5 years who are household contacts of bacteriologically confirmed tuberculosis in whom active TB disease has been excluded.
- All HIV infected children aged, regardless of TB contact status, in who are considered unlikely to have active TB disease. For HIV infected infants preventive therapy is provided only when child has established TB contact.

Table 80: Recommended and dosing options for TBT in children

Drug regimen	Dose per kg body weight	Maximum dose
Isoniazid daily for 6 – 9 months	H 10 mg (range, 7 – 15 mg)	300 mg
isoniazid plus rifampicin daily for 3 – 4 months	H 10 mg (range, 7 – 15 mg) R 15 mg (range, 10 – 20 mg)	H – 300 mg R – 600 mg
Rifapentine plus isoniazid Weekly for 3 months (12 doses)	H: Age ≥ 12 years: 15 mg/kg, H: Age 2 – 11 years: H 25 mg/kg Rifapentine 10.0 – 14.0 kg = 300 mg 14.1 – 25.0 kg = 450 mg 25.1 – 32.0 kg = 600 mg 32.1 – 49.9 kg = 750 mg ≥ 50.0 kg = 900mg	H 900 mg Rifapentine, 900 mg

4.9.5. Paediatric Human Immunodeficiency Virus (HIV) And Acquired Immune Deficiency Syndrome (AIDS)



Description

Human Immunodeficiency Virus (HIV) is a retrovirus that attacks the body's immune system, primarily CD4 T-lymphocytes. If HIV is not treated, it can lead to acquired immunodeficiency syndrome (AIDS) which is characterized by loss of host's immune system to fight infections, severe damage to organs, opportunistic infections, and malignancies. Mother to Children transmission (vertical) is the common cause of HIV infection in children. However, others get HIV by horizontal Transmission through Sexual transmission i.e. Rape, defilement and high-risk survival sex



Signs and Symptoms

The signs and symptoms of HIV are classified in stages. In Zambia WHO clinical staging is used. It is also used to determine the severity of HIV infection based on the presenting HIV related conditions in a confirmed HIV infected individual. (WHO staging refer to Zambia Consolidated guidelines)



Investigations

The entry point to HIV care is HTS which should be offered to all children attending health services in all health facilities (both public and private) in Zambia. Those testing positive should be linked to care and treatment. Conversely, adolescents who test negative for HIV should be linked to combination HIV prevention services.

Comprehensive guidelines are available for antiretroviral therapy and care of children living with HIV in the Zambia Consolidated Guidelines for Treatment and Prevention of HIV Infection (ZCGs)

4.9.6. Malaria

Refer to Malaria under Adult Conditions Section 5.1.



REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH

5.0

ADULTS CONDITIONS

5.1 MALARIA



Description

Malaria is a life-threatening infection of red blood cells by a parasite micro-organism called Plasmodium. The parasites are usually transmitted to humans by the bite of an infected female anopheles' mosquito. In Zambia, *P. falciparum* accounts for 95% of all malaria cases, 3% in mixed infection with either *P. ovale* or *P. malariae* while mono-infection with *P. ovale* and *P. malaria* contribute 2%. the most common and the most dangerous of the malaria species.

Uncomplicated Malaria: Symptomatic infection with malaria parasitaemia without signs of severity and/or evidence of vital organ dysfunction.

Complicated Malaria is the presence of asexual malaria parasites with evidence of major clinical or laboratory major organ dysfunction in the absence of any other alternative diagnosis. Inappropriate treatment or delay in diagnosis—especially in infants, children, and nonimmune adults—leads to rapid deterioration which may lead to disability or death. Patients with complicated malaria should, therefore, be managed by the administration of antimalarial medicine for complicated malaria and the management of organ dysfunction. The table below shows the features of complicated malaria and its management.



Signs and Symptoms

- Fever rigor
- Chills
- Headache
- Myalgia
- Arthralgia
- Anorexia
- Nausea
- Dry cough
- Flu-like symptoms
- Joint pains
- Abdominal discomfort/pain
- Vomiting

Severe disease may present with one or more of the following additional clinical features as described under complicated malaria section.



Investigations

- Microscopy (MPS)
- Malaria RDT



Treatment

5.1.1. Uncomplicated Malaria

All confirmed uncomplicated malaria cases should be promptly treated with effective, recommended first-line antimalarial medicines. Currently, the recommended drug therapy for uncomplicated malaria for the general population—including women in all trimesters of pregnancy—is Artemether-Lumefantrine (AL). AL should be given twice day for three (3) days, with the doses 8 hours apart on day one (1) and then 12 hours apart on days two (2) and three (3). The dose is weight dependent, as outlined in Table 1.

Table 81: Dosage schedule for Artemether-Lumefantrine (AL)

Body weight (kg)	AL dosage (mg), 2x/day for 3 days (first day 8 hr. apart and then 12 hr. apart)	Number of tablets
< 15	20 + 120	1
15 to < 25	40 + 240	2
25 to < 35	60 + 360	3
≥ 35	80 + 480	4

To reduce malaria transmission in Health Facility catchment Areas (HFCAs) with annual malaria incidences under 125 per 1,000 of the population, the recommendation is to give a single low dose of Primaquine (0.25-mg per kg of body weight) plus AL to all patients with *P. falciparum* malaria (except pregnant women, infants under 6 months old, and women breastfeeding infants under 6 months old). Glucose-6-phosphate dehydrogenase (G6PD) testing is not required.

Mixed Plasmodium infection

For all mixed or non-*P. falciparum* infections, the recommended treatment is a full 3-day drug regimen of AL. In people with G6PD deficiency, relapse can be prevented by giving 0.75 mg of Primaquine per kg of body weight once weekly for eight weeks, with close medical supervision for potential Primaquine-induced haemolysis. Primaquine should not be given to women who are pregnant or breastfeeding until delivery and breastfeeding are completed (after which, based on G6PD status, they can be treated with Primaquine to prevent future relapse).

5.1.2. Complicated Malaria

Table 82: Management of specific underlying complications of Malaria

Manifestation/complication	Management	Evaluation/investigation
Coma (cerebral malaria): impaired consciousness (or a Glasgow coma score < 11 in adults or a Blantyre coma score < 3 in children)	- Maintain airway; intubate, if necessary. - Place the patient on their side. - Check for hypoglycemia and manage it if present. - Give recommended empirical parental antibiotic for bacterial meningitis. - Ensure proper nursing care to prevent aspiration and bed sores. - Catheterize and record fluid input and urine output.	- Blood slide, random blood sugar, full blood count, serum urea/bicarbonate +/- LP - Glasgow and Blantyre coma score monitoring
Convulsions (multiple convulsions): more than two episodes in 24 hr.	Maintain airway <i>In children:</i> - Treat promptly with diazepam (0.3 mg/kg by IV or 0.5 mg/kg rectally), which can be repeated twice, and then shift to phenobarbitone - Administer phenobarbitone (20 mg/kg IM loading dose over 20 min.) with respiratory support; if convulsions persist, give a maintenance dose of 5 mg/kg/day in two divided doses. Commence maintenance dose 24 hours after loading dose. <i>In adults:</i> - Give a slow bolus of IV diazepam 5–10 mg - If convulsions continue, give a second dose. - If they persist, give phenobarbitone 20 mg/kg (IM or IV) over 20 min. as a loading dose (max. 100 mg); if convulsions persist, repeat phenobarbitone at 6 mg/kg after a 20-min. interval. - For both children and adults, ensure the patient has received glucose and that body temperature is controlled	Fit chart Urine for urinalysis to rule out eclampsia in pregnant women
Severe malarial anemia: hemoglobin concentration ≤ 5 g/dL or a hematocrit of $\leq 15\%$ in children under 12 years old (< 7 g/dL and $< 20\%$, respectively, in adults), with a parasite count $> 10,000/\mu$	Administer oxygen (2.5 L/mm) to improve oxygen delivery Prop up the patient with pillows or clothing Collect blood for cross match and hemoglobin estimations and transfuse, as appropriate Give packed cells at 10 ml/kg and whole blood at 20 ml/kg in cases of hypovolemic shock; give IV start (bolus) dose of a loop diuretic (e.g., furosemide) at 1–2 mg/kg (provided the blood pressure is not low) during blood transfusion to avoid circulatory overload	Monitoring for transfusion reactions

Manifestation/ complication	Management	Evaluation/investigation
Pulmonary edema: radiologically confirmed or oxygen saturation < 92% on room air with a respiratory rate > 30/min, often with chest indrawing and crepitation's on auscultation	Prop up the patient and administer oxygen Give a diuretic (furosemide at 1 mg/kg IV bolus in children and 40 mg IV stat in adults) Stop IV fluids Intubate, where necessary	Monitoring oxygen saturation, respiratory rate, and breathing difficulties Catheterization and monitoring of fluid input and urine output Chest x-ray
Acute kidney injury: urine output < 400 ml / 24 hr. (< 1 ml/kg in children) with a plasma or serum creatinine > 265 μ mol/L (3 mg/ dL) or blood urea > 20 mmol/L	Check for and correct dehydration Exclude heart failure Avoid herbal medication and nonsteroidal anti-inflammatory and nephrotoxic drugs (e.g., Gentamicin) Quickly refer patient to next level	Blood draw for urea and creatinine Monitoring of fluid input and urine output
Hypoglycemia: blood glucose < 2.2 mmol/L or < 40 mg/dL	Check blood glucose Correct hypoglycemia ($\leq$ 3 mmol/L) with glucose (IV or oral); ensure adequate caloric intake (nutritional support) thereafter Immediately give 5 ml/kg of 10% dextrose through a peripheral line Continue with a slow IV infusion of 5 ml/kg/ hr of 10% or 10 ml/kg/hr. of 5% to prevent the recurrence of hypoglycemia	Monitoring of blood sugar levels and general condition
Shock: <i>compensated</i> (capillary refill $\geq$ 3 sec. or temperature gradient on leg [mid to proximal limb] but no hypotension) or <i>decompensated</i> (systolic blood pressure < 70 mm Hg in children or < 90 mm Hg in adults, with evidence of impaired perfusion [cool peripheries or prolonged capillary refill])	Administer IV saline or Ringer's lactate solution if serum lactate is normal Administer blood transfusion if the patient has associated anemia Give a third-generation cephalosporin or benzyl penicillin with Gentamicin to cover for bacteremia	Monitoring of the central venous pressure while infusing the fluids, keeping it at 0–5 cm of H ₂ O to avoid fluid overload Blood samples for culture
Spontaneous bleeding and coagulopathy	Transfuse with screened fresh whole blood (cryoprecipitate, fresh frozen plasma, and platelets, if available) Give vitamin K injection (1 mg IM stat in children, 30 mg IM stat in adults)	Monitoring for bleeding and transfusion reactions
Metabolic acidosis: symptomology of rapid, deep, labored breathing with a base deficit of > 8 mEq/L or a plasma bicarbonate level of < 15 mmol/L or venous plasma lactate of $\geq$ 5 mmol/L or pH of < 7.35	Exclude or treat hypoglycemia. Correct hypovolemia Treat septicemia with a third-generation cephalosporin If severe, consider hemofiltration or hemodialysis, or refer if these facilities are not available	Close monitoring of vitals Blood samples for random blood sugar, culture, lactate, and bicarbonate

Manifestation/complication	Management	Evaluation/investigation
Hemoglobinuria: passing of dark, cola-colored urine	Continue appropriate antimalarial treatment. Transfuse screened fresh blood, if necessary If oliguria develops and blood urea and serum creatinine levels rise (i.e., if acute renal injury occurs), consider renal replacement therapy If possible, refer the patient to a dialysis unit or center	Monitoring of input and output Full blood count, urea, creatinine, and electrolytes Blood group match/save

Injectable artesunate is the drug of choice for the general population (children, adults, and pregnant women in all trimesters) with severe malaria.

- The recommended dosing schedule for artesunate is as follows:
- On admission (time = 0).
- After 12 hours.
- 24 hours after the initial dose.
- Once daily thereafter for a maximum of 6 days if the patient can still not tolerate oral medication.

The dosage is for artesunate is 3mg/kg for patient below 20kg and 2.4mg/kg for those 20kg and above.

After administering the initial parenteral treatment for a minimum of 24 hours, and once the patient regains consciousness and can take medications orally, discontinue parenteral therapy and commence the full course of an oral ACT. There should be an interval of at least 8 hours between the last dose of Artesunate and the first dose of an oral ACT.

Concomitant use of antibiotics

Septicemia and severe malaria may occur concurrently, particularly in children. Thus, broad-spectrum antibiotic treatment should be given with antimalarial drugs until bacterial infection is ruled out. Antibiotic treatment should be based on bacterial culture and sensitivity results or, if not available, follow local antibiotic sensitivity patterns.



Referral Criteria

Complicated malaria should always be referred after initial management to a higher facility.

5.1.3. Treatment Failure

Treatment failure is defined as the inability to clear malaria parasite or prevent recrudescence after administration of the therapeutic regimen of an antimalarial drug, regardless of clinical symptoms. Treatment failure is not synonymous with drug resistance.

The following are the causes of treatment failure:

- Unusual pharmacokinetic properties in an individual.
- Poor drug quality.
- Parasite resistance to antimalarials.

Treatment failure should be confirmed by microscopy examination of malaria blood slides. In facilities without microscopy services, patients with suspected treatment failure should be referred to centers with such services. To manage treatment failure:

- Evaluate for causes of nonresponse to treatment, such as vomiting, non-adherence, failure to complete treatment, and inadequate dosage. If these are present, repeat a full course of AL and provide sufficient counselling to the patient.
- Seek a potential alternative diagnosis and adequately manage it.
- In cases of confirmed treatment failure, provide oral or parenteral quinine treatment (the recommended therapy for treatment failure in Zambia) and contact the National Malaria Elimination Centre.
- Where there is development of symptoms 21 days after initiation of treatment after prior clearance of symptoms, treat as new infection using AL, as treatment failure is unlikely.

5.2 TUBERCULOSIS



Description

Tuberculosis is an infectious disease that is caused by the tubercle bacillus, *Mycobacterium tuberculosis*. The principal route of infection is the respiratory tract through the inhalation of contaminated air droplet nuclei from a patient and the environment.

Infection may rarely occur through the gastrointestinal tract from the ingestion of infected unpasteurized milk. The most common type being pulmonary tuberculosis.

Exposure to *mycobacterium tuberculosis* may lead to latent TB infection. The lifetime risk of subsequent progression to active disease in people with a latent infection and an intact immune system is approximately 5%. Progression of a latent infection occurs at a higher rate in individuals with immunosuppression especially those with Human Immunodeficiency Virus (HIV). In HIV-infected patients with advanced immunosuppression, extra pulmonary tuberculosis is the most common form of tuberculosis.

5.2.1. Pulmonary Tuberculosis



Signs and Symptoms

- Cough of more than two weeks which is usually productive (In HIV-positive adolescents and adults, a cough of any duration.)
- Hemoptysis (Sputum with blood stain)
- Fever
- Chest pain

- Excessive night sweats and
- Loss of weight

5.2.2. Extra Pulmonary Tuberculosis

Extra- pulmonary tuberculosis may involve many sites of the body such as the pleura, pericardium, lymph nodes, meninges, bones, gastrointestinal tract, genitourinary system, epididymis, eyes and skin.

- ***Pleural tuberculosis:***
 - o Cough which may be non-productive
 - o Pleuritic chest pain (Pain when breathing in)
 - o Fever
 - o Night sweats.
- ***Pericardial tuberculosis:***
 - o Chest pain
 - o Low pulse volume
 - o Cardiac tamponade (difficulties in breathing, tachycardia, hypotension, blood pressure decreasing with inhalation, and sudden collapse of the patient)
- ***Lymph node tuberculosis:***
 - o Lymph node tuberculosis may affect any site though it is more common in the cervical region.
 - o Lymph nodes are usually painless.
 - o Where caseation with liquefaction and sinus formation occurs, they may be painful.
- ***Meningeal tuberculosis:***
 - o Headache (insidious)
 - o Neck stiffness,
 - o Vomiting
 - o Change in mentation (Confusion, drowsiness)
 - o Convulsions
 - o Paralysis
- ***Bone tuberculosis:***
 - o Bone deformity (Most common ones - gibbus formation due to vertebral collapse and may result in paraplegias)
 - o Osteomyelitis
 - o Arthritis (Swelling, Pain)
 - o Cold abscess formation may also occur.
- ***Gastrointestinal tuberculosis:***
 - o Chronic diarrhea,
 - o Malabsorption,
 - o Intestinal obstruction.
 - o Abdominal distention (Ascites, lymph adenopathy)
 - o Pelvic abscesses.

- **Genito-urinary tuberculosis:**
 - o Renal tuberculosis may be asymptomatic, causing symptoms such as:
 - o Hematuria (blood in urine)
 - o Sterile pyuria with extensive renal involvement.
 - o Genital – Tuberculosis may cause symptoms such as:
 - o Infertility
 - o Salpingitis
 - o Tubal abscess are presentations of infection of the fallopian tubes while epididymal tuberculosis may present as painless swellings.
 - o Ocular tuberculosis
 - o Hylectenular conjunctivitis,
 - o Iritis
 - o Choroiditis.
- **Dermal tuberculosis:**
 - o Dermal tuberculosis may include lupus vulgaris
 - o Erythema nodosum (painful nodules under the skin).
- **Adrenal tuberculosis:**
 - o Adrenal tuberculosis may cause adrenal insufficiency (Low BP, Weight loss, dizziness and palm sweating and fainting).



Investigations

A diagnosis of TB can be made based on bacteriological confirmation and/or clinical evaluation (signs, symptoms and radiology). All presumptive TB patients should be subjected to laboratory investigations for TB and appropriate baseline investigations. If a negative result is obtained but a clinician suspects TB, radiological and clinical evaluation can be used to guide diagnosis.

- **Laboratory Tuberculosis investigations**
 - o GeneXpert® MTB/RIF or Ultra (Cepheid)
 - o Truenat™ (Molbio Diagnostics)
 - o TB loop-mediated isothermal amplification (LAMP)
 - o Smear microscopy
 - o Lateral flow urine lipoarabinomannan assay (LF-LAM)
 - o Line probe assay (LPA)
 - o Solid and liquid culture
- **Baseline Investigations**
 - o Full blood count
 - o CRP/ESR
 - o Urea and Creatinine
 - o Liver Enzymes (AST and ALT)
 - o Albumin

- **Radiological Investigations**

- o X – ray
- o CT Scan
- o MRI
- o Ultra Sound

- **Other Investigations**

- o Biopsy
- o Electrolytes
- o CSF analysis
- o Radiological changes that occur in Pulmonary Tuberculosis include:
 - o Millitary
 - o Cavitation
 - o Lobar consolidation
 - o Pleural effusion
 - o Parenchymal infiltrates
 - o Hilar lymphadenopathy
 - o Sometimes Chest X-rays may not show any abnormality
 - o Radiological findings in HIV-infected individuals depend on the degree of immunosuppression

Rx **Treatment**

- Treatment of tuberculosis is divided into two phases:
 - o Initial/Intensive Phase
 - o Continuation Phase
- Treatment involves the use of combination of Tuberculosis Drugs.

NB: There is no place for the use of monotherapy in the treatment of tuberculosis nor for a trial of treatment.

Table 83: Adult Standard TB Regimens

TB disease category	Recommended regimen	
Treatment phase	Intensive phase	Continuation phase
All forms of TB (non-severe)	2RHZE	4RH
Miliary TB	2RHZE	4 RH (when the meninges are affected then treatment should be for 12 months).
TB meningitis, tuberculoma, osteoarticular, ocular, and spinal TB	2RHZE	10RH

Abbreviations: RHZE (rifampicin/isoniazid/pyrazinamide/ethambutol), TB (tuberculosis).

The total duration of treatment is 12 months for TB meningitis and tuberculomas because of serious risk of disability and mortality; and for osteoarticular/spinal TB and ocular TB because of difficulties of assessing response to treatment.

Indications for steroids in the treatment of tuberculosis in adults:

- TB meningitis
- TB pericarditis
- TB Immune Reconstitution Inflammatory Syndrome
- Severe hypersensitivity reactions to anti-TB drugs
- Hypoadrenalism
- Renal tract TB (to prevent ureteric scarring)
- TB laryngitis with life-threatening airway obstruction

Note: Steroids doses must be tapered, and not be stopped abruptly.

Recommended doses of adjuvant steroid therapy

Table 84: Recommended doses of adjuvant steroid therapy (drug of choice is prednisolone)

TB meningitis	1–2 mg/kg (max 60 mg) for 2 weeks, then taper off by 10mg every week over 6 weeks
TB pericarditis	1–2 mg (max 60 mg) for 4 weeks, then half for 4 weeks (max 30 mg/day), then taper off by 10mg every week over 6 weeks

Table 85: Weight bands for dosing of anti-tuberculous drugs (adults)

Body weight (kg)	Intensive phase (RHZE 150/75/400/275)	Continuation phase (RH 150/75)
25–37	2	2
38–54	3	3
55–70	4	4
71 and above	5	5

Children Standard TB medicines and recommended regimens

TB treatment in children and adolescents includes a 2-month intensive phase followed by a continuation phase of 2–4 months.

Children and adolescents aged between 3 months and 16 years with non-severe TB are treated with a 4-month treatment course.

Table 86: Children Standard TB Regimens

TB disease category	Recommended regimen	
	Intensive phase	Continuation phase
Non-severe Forms of TB in 3 months to 16 years-old	2 (RHZE)	2 (RH)
Non- Severe Forms of TB in Less Than 3 months and above 16 years old	2 (RHZE)	4 (RH)
Other forms of PTB and EPTB	2 (RHZE)	4 (RH)
Severe forms: TB meningitis; osteo-articular, spinal, and military TB; other	2 (RHZE)	10 (RH)

Abbreviations: EPTB (Extrapulmonary Tuberculosis) PTB (Pulmonary Tuberculosis) TB (Tuberculosis) RH (Rifampicin/isoniazid)

Table 87: Classification of non-severe and severe TB

Non-Severe TB	Severe TB
Multiple Peripheral lymph node TB Intrathoracic lymph node TB with airway obstruction. Complicated TB pleural effusion Gene Xpert High or Microscopy diagnosed TB Cavitary disease. More than one lobe of the lungs, and without a Miliary pattern. This excludes all Severe forms TB.	TB of the bone TB spine TB meningitis TB pericarditis Miliary TB

Table 88: Weight bands for dosing of anti-tuberculous drugs in children

Drug	Daily dosage in mg per kg (range)	Maximum dose
Isoniazid (H)	10 mg/kg (7–15 mg)	300 mg/day
Rifampicin (R)	15 mg/kg (10–20 mg)	600 mg/day
Pyrazinamide (Z)	35 mg/kg (30–40 mg)	1500 mg/day
Ethambutol (E)	20 mg/kg (15–25 mg)	1200 mg/day

Table 89: Weight bands for dosing of anti-tuberculous drugs in children

Weight band	Intensive phase	Continuation phase	
	RHZ (75/50/150 mg)	E (100 mg)	RH (75/50 mg)
	Number of tablets		
4–7 kg	1	1	1
8–11kg	2	2	2
12–15 kg	3	3	3
16–24 kg	4	4	4
>25 kg	Use adult dosages and formulations (RHZE 150/75/400/275, 2 tablets)		

Indications for steroids in the treatment of tuberculosis in children:

- TB meningitis
- TB pericarditis
- TB Immune Reconstitution Inflammatory Syndrome
- Massive pleural effusion
- Massive lymphadenopathy with pressure effects
- Severe hypersensitivity reactions to anti-TB drugs
- Hypoadrenalism
- Renal tract TB (to prevent ureteric scarring)
- TB laryngitis with life-threatening airway obstruction

Steroids doses must be tapered, and not be stopped abruptly

The doses for Prednisolone, the steroid of choice in TB treatment, are as follows:

- TB meningitis 1–2 mg/kg (max 60 mg) for 2 weeks, then taper off over 6 weeks
- TB pericarditis 1–2 mg (max 60 mg) for 4 weeks, then half for 4 weeks (max 30 mg/day), then taper off over several weeks
- TB pleural effusion (severe)/or IRIS and others 0.5 to 1 mg (max 30 mg) for 1–2 weeks, then taper off over several weeks

5.2.3. Multi-drug Resistant Tuberculosis (MDR-TB)



Description

DR-TB is caused by TB organism that is resistant to one or more anti-TB medicines confirmed by microbiological tests. MDR-TB is mycobacterium resistant to isoniazid and Rifampicin (Pre-XDR)

Table 90: DR definitions

Term	Abbreviation	Definition (based on key drugs)
Isoniazid monoresistance	HR-TB	MTB strain that is resistant to isoniazid and susceptible to rifampicin
Multidrug resistant/ rifampicin resistant TB	MDR/RR-TB	MTB strain that is resistant to both rifampicin and isoniazid (or rifampicin alone which is rifampicin monoresistance)
Pre-extensively drug-resistant TB	Pre-XDR-TB	MTB strain that fulfils criteria for MDR but has additional resistance to fluoroquinolones (moxifloxacin or levofloxacin)
Extensively drug-resistant TB	XDR-TB	MTB strain that fulfils criteria for Pre-XDR but has additional resistance to one or both group A drugs (either bedaquiline or linezolid or both)



Signs and Symptoms

The clinical features of a patient with DR-TB are not different from those of DS-TB patients (both PTB and EPTB).



Investigations

- Microbiological diagnosis of Drug-Resistant TB
- GeneXpert MTB/RIF and Ultra
- Trunat MTB/RIF
- LPA
- Culture (solid and liquid) and DST
- WGS



Treatment

DR-TB treatment regimens

There are two main treatment regimens currently recommended for use in Zambia; both are oral-based regimens.

- All oral shorter regimen
- All oral longer regimen

Use of the second-line injectable regimen is no longer recommended.

5.2.4. Grouping of second-line drugs

Second line drugs are grouped as shown in Table below

Table 91: Second line drugs

Group A Select all 3 if there are no contraindications	Levofloxacin(Lfx)/Moxifloxacin (Mfx) Bedaquiline (Bdq) Linezolid (Lzd)
Group B Select 1 if 3 drugs from group A can be safely used OR select 2 if only 2 can be used from group A	Clofazimine (Cfz) Cycloserine (Cs)/Terizidone (Trd)

Group C Add to complete the regimen and when medicines from Groups A and B cannot be used	Ethambutol (E) Delamanid (Dlm) Pyrazinamide (Z) Imipenem-cilastatin (Ipm-Cln)/ Meropenem (Mpm) Amikacin (Am)/Streptomycin (S) Ethionamide (Eto)/Prothionamide (Pto) p-aminosalicylic acid (PAS)

Pretomanid is a new drug that has not yet been assigned to a group

Shorter regimen for MDR/RR-TB and Pre-XDR-TB

The Preferred oral shorter regimen has a duration of 6 months, consisting of **Bedaquiline (Bdq)**, **Pretomanid (Pa)**, **Linezolid (Lzd)** and **Moxifloxacin (Mfx)** (BPALM) for patients with MDR/RR TB and BPAL for patients with **Pre-XDR**

Table 92: Eligibility criteria for Pretomanid

Eligible	Not Eligible
ALL Patients with RR-TB based on GeneXpert/Trunat results awaiting further susceptibility testing/results, regardless of HIV status	Children under the age of 15
Extrapulmonary TB including Pleural Effusions and Lymphadenopathy	TB Meningitis, Miliary TB, Abdominal TB and Osteoarticular TB
Missed days are made up by extending Rx duration by No. days missed (MUST NOT > 35 days)	Pregnant and Breast-Feeding Women
There might be need to extend to 9 months in some circumstances	Patients with confirmed resistance to BDQ or LZD

Patient eligibility

Patients with moxifloxacin resistance should be prescribed **BPAL** instead of BPALM

The alternative shorter regimen is a 9-month regimen preferred in adults, children and pregnant women

Table 93: Intensive and continuation phases for shorter regimen

Intensive phase	Duration	Continuation phase	Duration
Bedaquiline (Bdq)	6 months		
Levofloxacin (Lfx)/Moxifloxacin (Mfx)	4-6 months	Levofloxacin (Lfx)/Moxifloxacin (Mfx)	5 months
Linezolid (Lzd)	2 months		
Ethambutol (E)	4-6 months	Ethambutol (E)	5 months
Isoniazid high dose (Hhd)	4-6 months		
Pyrazinamide (Z)	4-6 months	Pyrazinamide (Z)	5 months
Clofazimine (Cfz)	4-6 months	Clofazimine (Cfz)	5 months

NB: Initial phase: 4-6 Bdq [6]-Lfx [Mfx]-Lzd [2]-E-Z-Hh-Cfz then Continuation phase 5 Lfx [Mfx]-Cfz-Z-E

Refer to dosing chart below in Table 95

All oral longer treatment regimen

Patients who do not qualify for all oral shorter regimen receive 18-20 months all oral longer regimen based on WHO drug grouping as follows:

Initial phase: 6Bdq-Lzd-Cfz-Lfx (Mfx) then

Continuation phase: 12Lzd-Cfz-Lfx (Mfx)

Table 94: Intensive and continuation phases for longer regimen

Intensive phase	Duration	Continuation phase	Duration
Bedaquiline (Bdq)	6 months		
Levofloxacin (Lfx)/ Moxifloxacin (Mfx)	6 months	Levofloxacin (Lfx)/ Moxifloxacin (Mfx)	12 months
Linezolid (Lzd)	6 months	Linezolid (Lzd)	12 months
Clofazimine (Cfz)	6 months	Clofazimine (Cfz)	12 months

Refer to dosing chart below in Table 95

5.2.5. DR-TB treatment in special populations

All these patient categories MUST be discussed at provincial and/or national DR-TB CEC meetings.

Table 95: DR TB treatment in special populations

Condition	Preferred regimen	Alternative regimen
Liver Disease	9-12 Bdq + Mfx + Lzd + Cfz Cs can be used as well	6 Bdq +Mfx +Lzd +Cfz / 12 Mfx +Cfz +Lzd Cs can be used as well
FQ resistance (Pre-XDR) Only patients aged above 14 years and weighing 35kg are eligible. Pregnant patients are not eligible	6BPaL	Individualized based on full DST profile
Pregnancy and Breast feeding	Bdq (4-6) +Lfx or Mfx (6) +Lzd (2) +E +Z +Hh +Cfz (6) / then Lfx or Mfx +Cfz+Z+E (5)	Cfz + Cs +Hh (if sensitive or low- level resistance) + ethambutol + PZ Introduced FLQ, Bdq and Dlm after delivery
Kidney Failure	6 Bdq + Lfx+ Lzd +Cfz/ 12 Lfx +Lzd +Cfz Or substitute Mfx for Lfx or Cs for Cfz	Lfx should be given at 750-1,000 mg/dose 3 times a week Cs 250 mg once daily or 500 mg/ dose 3 times per week No need to adjust dose of the other drugs

Condition	Preferred regimen	Alternative regimen
Diabetes mellitus	9-11 Bdq +Mfx +Lzd +Cfz	Use ethionamide sparingly
Pre-existing heart disease	9-11 Lzd +Lfx + Cs + Cfz + Z+E and Hh if sensitive or low-level resistance)	Avoid Bdq and Dlm; use of these drugs should be in consultation with CEC
Seizure disorder		Avoid Cs and H
Peripheral neuropathy, severe anemia, and optic neuritis	6 Bdq + Lfx or Mfx + Cfz + Cs / 12 Lfx or Mfx + Cfz + Cs	

For abbreviations refer to Table 90 second line drug grouping; Pretomanid is abbreviated Pa, Hh indicates high-dose isoniazid

Note:

- All treatments for these patients should be guided by DR CEC (district, provincial or national)
- An individualized regimen can be designed for a patient when pDST results are available. The regimen should compose of at least 5 effective drugs This must be done in conjunction with the national CEC
- There is more than one possible combination for the longer regimen
- All patients on DRTB treatment must be followed up monthly with sputum culture/DST
- All patients on DRTB drugs must be monitored closely for adverse drug reactions and Grade 3-4 adverse reaction reported to the CEC and ZAMRA
- Ambulatory model of care is preferred over the inpatient model of care unless there are compelling indications for patient admission

Tuberculosis and Immunocompromised Patients

- Immunocompromised patients may develop tuberculosis owing to reactivation of previously latent disease or due to new infection. All TB diagnosed patients should be counselled and tested for HIV. The infection may be caused by other mycobacteria e.g. M. avium complex in which case specialist advice is needed.

Management of TB/HIV co-infected patients

- TB treatment should be initiated first, followed by ART as soon as the patient can tolerate ART, preferably within the first 2 weeks of TB treatment, except for TB meningitis (start after 8 weeks).
- All TB patients with HIV should start ART regardless of CD4 count.
- Modifications to the ARV regimen should be made to avoid overlapping toxicities and drug-drug interactions between ART and TB medications (ART guidelines).
- Co-infected patients have an increased risk of drug toxicity and TB Immune Reconstitution Inflammatory Syndrome (IRIS).
- Prednisolone 40 mg twice daily for 2 weeks then 20 mg once daily for 2 weeks for TB IRIS Prevention.

Extensively Drug-Resistant Tuberculosis (XDR-TB)

- Recognized earlier in 2006 in South Africa, extensively drug-resistant TB (XDR-TB) is MDR-TB that is also resistant to three or more of the six classes of second-line drugs.

Monitoring

- Required monitoring and frequency

Table 96: Monitoring Chart

Parameters	Month of treatment																				
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Clinical evaluation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sputum-smear	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DST	If culture is positive																				
FBC/DC	V						✓						V						✓		✓
LFTs	✓			✓			✓			✓			✓			✓			✓		✓
Na ²⁺ , K ²⁺ , u , Creatine	✓	✓	✓	✓	✓	✓	✓			✓	I	I	I	I	I	I	I	I	I	I	I
TSH/free T-4	✓			✓			✓			✓			✓			✓			✓		✓
Pregnancy test	✓																				
HIV test	✓			✓			✓			✓			✓			✓			✓		
Audiometry	✓	✓	✓	✓	✓	✓	✓														
CXR	✓						✓						✓								✓
ECG	✓	✓	✓	✓	✓	✓	✓	I	I	I	I	I	I								
Albumin	✓			✓			✓			✓			✓			✓			✓		

Since Isoniazid and Rifampicin are associated with liver toxicity, the hepatic function should be checked before and during treatment with these drugs. Patients on dual treatment of HIV and TB are likely to have liver/renal toxicity and should therefore be monitored closely.

Supportive

- The following supportive strategies should be part of package of care
- Adherence,
- Nutritional support
- Tracing
- Home based care



Complications

- Pneumothorax
- Empyema or pyopneumothorax and laryngitis with advanced disease.
- Respiratory failure and right ventricular failure may develop as a late complication due to extensive pulmonary destruction and fibrosis.
- Colonization of cavities with *Aspergillus fumigatus* may occur resulting in haemoptysis.
- Post TB lung disease is common.

- Disability manifesting as exertional dyspnea is now becoming common.
- Constrictive pericarditis is a complication of TB pericarditis.
- Meningeal tuberculosis can result in hydrocephalus and focal deficits.
- TB of the spine may result in permanent neurological deficits.
- Gastrointestinal tuberculosis may lead to the development of ascites and malabsorption.



Referral Criteria

- The patients with following features should be referred:
- Poor vitals such low oxygenation and Hypotension (Low blood pressure)
- Cardiac tamponade
- Drug induced liver injury (worsening liver enzymes)
- Difficulties in breathing
- Stroke and Paralysis
- Hydrocephalus

TB Preventive Therapy (TPT)

- The most effective method of preventing the spread of tuberculosis is the detection and effective treatment of infectious cases, i.e. the bacteriologically confirmed cases. Poor hygiene, malnutrition and overcrowding in places such as prisons, orphanages, facilitate the spread of tuberculosis.
- TPT is recommended for the following at risk groups:
 - **Adults and adolescents living with HIV**
 - Adults and adolescents (10 years and older) living with HIV (PLHIV) regardless of immune status, previous TB treatment or ART status
 - **Infants and Children who are living with HIV**
 - Infants (aged < 12 months) living with HIV who are in contact with a case of TB.
 - Children (aged ≥ 12 months to 10yrs) living with HIV unlikely to have TB disease on symptomatic screening with or without history of TB contact
 - **HIV negative Infants and children who are contacts of bacteriologically confirmed pulmonary TB**
 - **Other HIV-negative at-risk individuals**
 - Miners and ex-miners with silicosis
 - Close and household contacts of bacteriologically confirmed pulmonary TB patients
 - Patients receiving immunosuppressive treatment
 - Patients with Chronic Kidney Disease.
 - Undernourished Individuals
 - Incarcerated populations (Inmates) who are in close contact with bacteriologically confirmed pulmonary TB
 - **Health Care workers who meet the criteria of having additional risks for TB s.a HIV, diabetes**

NB: Before giving TPT always rule out the possibility of active TB in the individual

TB Preventive Therapy Options

There are three regimens that are recommended for treatment of TBI in Zambia. The treatment regimen depends on the patient category. These include 6 months, 3 months and 1 month regimens.

Table 97: TB preventive regimens, dosing, and cautions

Drug regimen	Patient category	Dose per kg body weight	Maximum dose	Frequency	Duration	Cautions
Isoniazid (H)	PLHIV, other risk groups	Adults: 5 mg Children: 10 mg (range: 7–15 mg)	300 mg	Once daily	6–9 months	Isoniazid-containing regimens must be given with pyridoxine (B6)
Rifapentine plus isoniazid (3HP)	PLHIV, Other risk groups	Isoniazid Individuals aged ≥12 years: 15mg Individuals aged 2–11 years: 25 mg Rifapentine 10.0–14.0 kg = 300 mg 14.1–25.0 kg = 450 mg 25.1–32.0 kg = 600 mg 32.1–49.9 kg = 750 mg ≥ 50.0 kg = 900mg	Isoniazid: 900 mg Rifapentine: 900 mg	Once weekly	3 months	Isoniazid-containing regimens must be given with pyridoxine (B6)
Isoniazid plus Rifampicin (RH)	Other risk groups, PLHIV	Isoniazid Adults: 5 mg Children: 10 mg (range: 7–15 mg) Rifampicin Adults: 10 mg Children: 15 mg (range: 10–20 mg)	Isoniazid: 300 mg Rifampicin: 600 mg	Once daily	3–4 months	Isoniazid-containing regimens must be given with pyridoxine (B6)
Rifapentine plus isoniazid (1HP)	HIV negative household contacts above 13 years Incarcerated Populations PLHIV	Isoniazid: 5mg Rifapentine: 10mg	Isoniazid: 300 mg Rifapentine: 600 mg	Once daily	1 month	Isoniazid-containing regimens must be given with pyridoxine (B6) 25 mg daily

5.3 LEPROSY



Description

Leprosy is a chronic infectious disease of man caused by an acid-fast bacilli called *Mycobacterium Leprae*. It primarily affects the **peripheral nerves**, the **skin** and other organs. It can spread through nasal discharge in multi bacillary infected patients. It has been associated with the Armadillo animal as the zoonotic demonstrated transmission

According to World Health Organisation (WHO), patients with leprosy are classified as having either **Multi Bacillary (MB)** or **Paucibacillary (PB)** If there is doubt about the classification, the patient should be classified as MB and be treated accordingly.



Signs and Symptoms

- Losses of sensation to cotton wool touch/needle prick on a hypopigmented skin patch.
- Enlargement of the peripheral nerves.



Investigations

- Presence of acid-fast bacilli in a slit-skin smear. (confirmatory test)



Treatment

Treatment uses the multi-drug therapy consisting of rifampicin, dapsone and clofazimine, *the duration of treatment for PB leprosy is 6 months and 12 months for MB leprosy.*

Table 98: Treatment regimens

Age group	Drug	Dosage and frequency	Duration	
			MB	PB
Adult	Rifampicin	600 mg once a month	12 months	6 months
	Clofazimine	300 mg once a month and 50 mg daily		
	Dapsone	100 mg daily		

Age group	Drug	Dosage and frequency	Duration	
			MB	PB
Children (10–14 years)	Rifampicin	450 mg once a month	12 months	6 months
	Clofazimine	150 mg once a month and 50 mg daily		
	Dapsone	50 mg daily		
Children <10 years old or <40 kg	Rifampicin	10 mg/kg once month	12 months	6 months
	Clofazimine	100 mg once a month, 50 mg twice weekly		
	Dapsone	2 mg/kg daily		

Prevention

These guidelines recommend the use of single-dose rifampicin (SDR) as preventive treatment for adult and child (2 years of age and above) contacts of leprosy patients, after excluding leprosy and tuberculosis (TB) disease and in the absence of other contraindications.

Before giving prophylaxis to the contacts, ensure that you try and get consent of the index case to disclose his/her disease to the contacts.

Rifampicin is the drug of choice. Recommended dosage schedules for Single Dose Rifampicin (SDR) are given in Table below.

Table 99: Dosage schedules for Single Dose Rifampicin (SDR)

Age/weight	Rifampicin single dose
15 years and above	600 mg
10 – 14 years	450 mg
Children 6 – 9 years (weight ≥ 20 kg)	300 mg
Children <20 kg (≥ 2 years)	10 – 15 mg/kg



Complications

The following are some complications leprosy

- Blindness
- Infections (abscess around the nerves and limbs)
- Bone stress
- Neuritis (painful neuropathy)



Referral Criteria

- Eyes symptoms worsening on treatment
- A patient with severe erythema nodosum leprosum (ENL) reactions that affects the eyes and nerves during treatment

5.4

HUMAN IMMUNODEFICIENCY VIRUS (HIV)

5.4.1. HIV Testing Services



Description

HIV testing services (HTS) include the full range of services that should be provided together with HIV testing which include counselling (pre-test information and post-test counselling); linkage to appropriate HIV prevention, treatment and care services, and other clinical and support services; and coordination with laboratory services to support quality assurance and the delivery of correct results.

HTS should be done at all health service delivery points within the facility, as well as in the community, as an efficient and effective way to identify people living with HIV (PLHIV), including the priority and key populations.

Early Infant Diagnosis

For children < 24 months old who are breast-feeding, the mother should be tested first. If she is HIV-positive, perform a Nucleic Acid Test (NAT) which can be done on the HIV-Exposed Infant (HEI), regardless of age. NAT can be performed on either a Dried Blood Spot (DBS) which is sent to the laboratory or fresh blood sample using a Point-of-Care (POC) machine. The advantage of POC technologies is that they are available at the point of service delivery and offer same-day results. Infants who have HIV detectable by NAT at birth are likely to have been infected in-utero. These infants will progress to disease rapidly, and, in the absence of treatment, will experience high mortality in the first few months of life. Infants infected at or around delivery may not have the virus detectable by NAT for several days to weeks. The ability of NAT to detect the virus in the blood may be affected by ARV drugs taken by the mother or infant for postnatal prophylaxis, resulting in false-negative results. This includes drugs present in breast milk because of maternal ART during breast-feeding.

5.4.2. HIV Prevention Services

HIV prevention is the cornerstone of HIV epidemic control. Abstinence from risky sexual activities is the bedrock of HIV prevention. Substantial risk sexual activities include multiple sexual partners, transactional sex, sexual intercourse without a condom and sexual activities among key populations such as transgender population and men who have sex with men. HIV Prevention programs should be targeted towards high-risk groups especially adolescent girls, young women, and young men with preventative modalities such as condom distribution, VMMC, and ARV based Prevention such as PrEP, PEP, PMTCT and ART.

Linkage to HIV Treatment and Support Services

Linkage to care is a process of actions and activities that support people testing for HIV and those diagnosed with HIV to engage with prevention, treatment, and care services as appropriate for their HIV status. Linkage to care and treatment is the period beginning with HIV diagnosis and ending with a person being initiated on ART.

For clients who test HIV-negative, it is necessary to link them to prevention services including condoms, VMMC, PrEP, and others depending on their individual risk factors. Linkage to treatment is a vital bridge between diagnosis and treatment initiation. All identified positives should be linked to care, treatment, and supportive services

Condom and Lubricant

Condom and lubricant programming are highly effective in preventing sexual transmission of HIV. The consistent and correct use of the male condom significantly reduces HIV during vaginal (80%) and anal sex (70%). Female condoms can provide protection by approximately 97%.

5.4.2.1. Pre-Exposure Prophylaxis (PrEP)

Pre-Exposure Prophylaxis, or PrEP is a daily course of antiretroviral drugs (ARVs) taken by HIV-negative people to protect themselves from HIV infection. Trials of oral PrEP have shown that, when taken consistently and correctly, PrEP is highly effective and reduces the chances of HIV infection. When someone is exposed to HIV through sex or injection drug use, these medicines can work to keep the virus from establishing a permanent infection. The effectiveness of PrEP is intricately linked to adherence. It is important that any programme offering PrEP provides it as part of a combination package of prevention initiatives based on an individual's circumstances with support and advice on the importance of PrEP adherence.

PrEP involves the use of antiretroviral (ARV) drugs before HIV exposure by people who are not infected with HIV to block the acquisition of HIV. Twelve trials on the effectiveness of oral PrEP have been conducted among sero-discordant couples, heterosexual men, women, men who have sex with men, people who inject drugs, transgender people. Where adherence has been high, significant levels of efficacy have been achieved, showing the value of this intervention as part of combination prevention approaches. Oral PrEP containing Tenofovir Disoproxil Fumarate (TDF) or alternatively Tenofovir alafenamide (TAF) with either Emtricitabine (FTC) or Lamivudine (3TC) should be offered as an additional prevention choice for people at substantial risk of HIV acquisition as part of combination HIV prevention approaches.

Oral Pre-Exposure Prophylaxis

Oral Pre-Exposure Prophylaxis is a daily course of antiretroviral drugs (ARVs) taken by HIV-negative people to protect themselves from HIV infection. Oral PrEP containing Tenofovir Disoproxil Fumarate (TDF) or alternatively Tenofovir alafenamide (TAF) with either Emtricitabine (FTC) or Lamivudine (3TC) should

be offered as an additional prevention choice for people at substantial risk of HIV acquisition as part of combination HIV prevention approaches.

Eligibility Criteria

- All HIV negative clients with a perceived risk of HIV acquisition willing to be adherent
- No suspicion of acute HIV infection
- Able to attend regular 3-months reviews and HIV testing
- Able to concomitantly apply other prevention methods such as barriers to prevent the transmission of other STIs
- Willing to stop taking PrEP when no longer eligible

And: at substantial risk for HIV infection, defined as engaging in one or more of the following activities within the **last six months**:

- Vaginal/anal intercourse without condoms with more than one partner
- Sexually active with a partner who is known to be HIV positive or at substantial risk of being HIV positive
- Sexually active with an HIV-positive partner who is not on effective treatment (defined as on ART for < 6 months or not virally suppressed)
- History of STI (based on lab test, syndromic STI treatment, self-report)
- History of Post-Exposure Prophylaxis (PEP) use
- Sharing injection material or equipment

Long-Acting Injectable Cabotegravir for Pre-Exposure Prophylaxis (PrEP)

Long-acting injectable Cabotegravir (CAB-LA) is an Integrase Strand-transfer Inhibitor (INSTI). It is given at a dose of 600mg, intramuscularly, four weeks apart for the first two injections and every eight weeks thereafter for HIV Prevention. Potential barriers to the uptake and effective use of oral PrEP, such as not wanting to take an oral pill regularly, may be overcome with a long-acting injectable option. Offering additional PrEP choices has the potential to increase its uptake and effective use, and HIV prevention overall, as it allows people to choose a method that they prefer.

In Zambia, CAB-LA should be offered as an additional prevention choice for people at substantial risk of HIV infection, as part of combination prevention approaches. Even though Zambia has a generalized HIV epidemic, there are populations and places which have a disproportionately higher incidence of HIV, and these should be prioritized for CAB-LA. These include adolescent girls and young women, marginalized populations such as FSW, MSMs, PWIDs, prisoners and migrant populations.

As with oral PrEP, HIV testing using routine national standard testing algorithms is required before offering CAB-LA and should also be done before each injection while using CAB-LA and ideally, regularly after CAB-LA discontinuation.

Dapivirine Vaginal Ring for Pre-Exposure Prophylaxis (PrEP)

The PrEP ring may be offered as an additional prevention choice for women at substantial risk of HIV infection as part of combination HIV prevention strategy. It is a flexible silicone vaginal ring that slowly releases the antiretroviral drug Dapivirine, which is a non-nucleoside reverse transcriptase inhibitor (NNRTI), into the vaginal mucosa over the course of one month. The ring must be in place for at least 24 hours before it is maximally effective. The ring may be offered as an option for people assigned female at birth (AFAB) who

wish to prevent HIV acquisition through receptive vaginal sex and are unable or do not want to use other PrEP options, or when other PrEP options are not available. The ring must be inserted correctly into the vagina and worn for one month without removal.

The PrEP ring has a shelf life of five years. It should be stored at room temperature away from direct light and out of reach of children. Offering the ring in community settings would increase access to HIV prevention options, especially for those who are not currently accessing PrEP services in clinical settings.

If a client wishes to discontinue use of the ring, they can remove it. Ideally, clients who are discontinuing PrEP use will alert their providers and receive support to use other HIV prevention practices if they are still having ongoing exposure to HIV.

5.4.2.2. Post - Exposure Prophylaxis (PEP)

Post-Exposure Prophylaxis (PEP) is the use of ARVs to prevent HIV transmission. Non-occupational exposure to HIV in children and adolescents is mostly attributed to sexual abuse. In adults, exposure to HIV is mostly associated with occupational injuries. The risk of acquiring HIV infection after occupational exposure to HIV-infected blood is low (1:300 after percutaneous exposure to < 1:1,000 after mucocutaneous exposure). Preferred ARV choice is TDF or TAF + XTC + DTG and alternative are TDF or TAF + FTC + DRV-r or TDF or TAF + XTC + LPV-r

There is no risk of transmission when the skin is intact. Factors associated with an increased risk include deep injury, visible blood on the device that caused the injury, injury with a large bore needle from artery or vein, and unsuppressed HIV viral load in source patient. Body fluids and materials that pose a risk of HIV transmission are amniotic fluid, cerebrospinal fluid, human breast milk, pericardial fluid, peritoneal fluid, pleural fluid, saliva in association with dentistry, synovial fluid, unfixed human tissues and organs, vaginal secretions, semen, any other visibly blood-stained fluid, and fluid from burns or skin lesions. Other blood-borne infections are Hepatitis B and Hepatitis C viruses which pose a heightened risk of HIV infection. Thus, all HCWs should receive HBV vaccination.

Non-Occupational Post-Exposure Prophylaxis (nPEP) is the provision of ARVs to individuals with significant exposure to HIV within 72 hours. This should be given especially to individuals who have been sexually assaulted where the HIV status of the assailant is unknown or in any other circumstance where there is significant exposure to HIV contaminated body fluid.

Clients who come for non-Occupational PEP should be evaluated for substantial risk behaviour for HIV acquisition. Those with substantial risk or repeated requests for non-Occupational PEP must be counselled for PrEP.

The drugs for nPEP are the same as those for PEP due to occupational exposure as shown above.

5.4.2.3. Elimination of mother to child transmission of HIV (EMTCT)

Globally mother to child transmission of HIV is a significant contributor (9%) of paediatric HIV infections. In Africa more than 95% of paediatric HIV infections are due to mother to child transmission of HIV. The goal is to eliminate MTCT of HIV, Syphilis and HBV (Triple EMTCT).

The implementation of this triple elimination of HIV, Syphilis and Hepatitis B is outlined in the following Tables 100 and 102.

Table 100: Pre-Pregnancy and Adolescents

Specific Population	Description	Child-bearing Female with Negative HIV Test Result	Child-bearing Female with Positive HIV Test Result
Pre-Pregnancy/ Adolescents	Family Planning/ Contraception	Counsel on family planning and offer dual method of contraception with either of the following: Progestogen-only contraceptive methods without restriction Copper-bearing Intrauterine Devices (Cu-IUDs) and LNG-IUDs without restriction Combined hormonal contraceptive methods without restriction	Counsel on family planning and offer dual method of contraception with either of the following: Progestogen-only contraceptive methods without restriction Copper-bearing Intrauterine Devices (Cu-IUDs) and LNG-IUDs without restriction Combined hormonal contraceptive methods without restriction
	Co-morbidity	Screen for Hep B and Syphilis: If positive treat client plus partner	Screen for Hep B, Syphilis and OIs, if positive treat client plus partner
	HIV Prevention	Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention Retest for HIV every 3 months	Counsel and continue/Initiate ART Positive Health Dignity and Prevention (PHDP)
		Counsel and Initiate PrEP if eligible	Provide condoms or information on where to access condoms, including female condoms

Table 101: Pregnancy

Specific Population	Description	Child-bearing Female with Negative HIV Test Result*	Child-bearing Female with Positive HIV Test Result*
Pregnancy	1st Trimester	Screen for Hep B and Syphilis. If positive treat client plus partner	Counsel and continue/Initiate ART
		Counsel and Initiate PrEP if eligible (see for eligibility criteria)	Screen for Hep B, Syphilis and OIs If positive treat client plus partner
			At ANC1, for known positives on ART, check if VL was done: if > 3 months retest, and thereafter every 3 months For those who initiate ART in ANC do VL at 3 months, thereafter, retest every 3 months
		Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention Retest for HIV every 3 months	Provide condoms or information on where to access condoms, including female condoms
	2nd Trimester	Screen for Hep B and Syphilis. If positive treat client plus partner	Counsel and continue/Initiate ART
		Counsel and initiate PrEP if eligible	Screen for Hep B, Syphilis and OIs, if positive treat client plus partner
		Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention Retest for HIV every 3 months	At ANC1, for known positives on ART, check if VL was done: if > 3 months retest, and thereafter every 3 months For those who initiate ART in ANC do VL at 3 months, thereafter, retest every 3 months

Specific Population	Description	Child-bearing Female with Negative HIV Test Result*	Child-bearing Female with Positive HIV Test Result*
			Provide condoms or information on where to access condoms, including female condoms
	3rd Trimester	Screen for Hep B and Syphilis. If positive treat client plus partner	Counsel and continue/Initiate ART
		Counsel and Initiate PrEP if eligible	Screen for Hep B, Syphilis and OIs, if positive treat client plus partner
			Check if VL was done/do if not done and if > 3 months repeat Repeat viral load 1-4 weeks before delivery
		Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention Retest for HIV every 3 months	Provide condoms or information on where to access condoms, including female condoms
	Labour and delivery	Do HIV test if done > 6 weeks	Counsel and continue /Initiate ART

ANC1 = First antenatal visit; OIs = Opportunistic Infections

*Duo HIV/Syphilis Test kits should be used to test for both HIV and Syphilis in pregnant women and their sexual partners.

Table 102: Infants and Children

Specific Population	Description	Child-bearing Female with Negative HIV Test Result	Child-bearing Female with Positive HIV Test Result		
Children	Birth	Do HIV test if done > 6 weeks Counsel and Initiate PrEP if eligible Counsel client and partner on HIV combination prevention	HIV Exposed Infant/Child		Mother
			Send DBS or fresh blood for NAT Send blood for Syphilis (RPR) where indicated Scheduled immunization		Adherence Counselling and continue/ Initiate ART Infant Feeding Counselling
	6 weeks		Positive NAT	Negative NAT	
			Term infants; Initiate treatment AZT+3TC+NVP until 4 weeks old and weight ≥ 3kg. Thereafter change to the ABC+3TC+DTG Preterm infants; Initiate treatment AZT+3TC+NVP until 40+4weeks old and weight ≥ 3kg. Thereafter change to the ABC+3TC+DTG Send fresh DBS or blood for confirmatory NAT Treat for congenital Syphilis as in Negative NAT infants	Initiate AZT+3TC+NVP prophylaxis for 12 weeks. Treat for congenital Syphilis if Infant has clinical symptoms of congenital Syphilis Infant has tested positive for Syphilis Mother has Syphilis but was not treated, or inadequately treated (< 30 days before delivery), or treated with non-penicillin drugs during pregnancy	
	6 weeks	Do HIV test if done > 6 weeks Counsel and Initiate PrEP if eligible Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention	Positive NAT	Negative NAT	Adherence Counselling and continue/Initiate ART Infant Feeding Counselling
			Start Co-trimoxazole Continue ART Scheduled immunization Newly diagnosed and weight ≥ 3kg initiate on ABC+3TC+DTG Continue adherence counselling	Start Co-trimoxazole Send DBS or fresh blood for NAT Continue AZT+3TC+NVP prophylaxis BUT if never breastfed, stop the AZT+3TC+NVP prophylaxis Scheduled immunization	

Specific Population	Description	Child-bearing Female with Negative HIV Test Result	Child-bearing Female with Positive HIV Test Result		
	10 weeks	Do HIV test if done > 6 weeks Counsel and Initiate PrEP if eligible Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention	Positive NAT Continue Co-trimoxazole Continue ART Continue adherence counselling Scheduled immunization Initiate any newly diagnosed to ABC+3TC+DTG	Negative NAT Continue Co-trimoxazole Continue AZT+3TC+NVP Scheduled immunization	Viral Load Testing in the mother Adherence Counselling and continue/Initiate ART Infant Feeding Counselling
	14 weeks	Do HIV test if done > 6 weeks Counsel and initiate PrEP if eligible Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention	Positive NAT Continue Co-trimoxazole Continue ART Continue adherence counselling Scheduled immunization Initiate any newly diagnosed to ABC+3TC+DTG	Negative NAT If mother virally suppressed stop AZT+3TC+NVP Mother not virally suppressed continue AZT+3TC+NVP Scheduled immunization	If mother virally suppressed continue same regimen If mother not virally suppressed, take action to ensure she is on more efficacious regimen
	6 months	Do HIV test if done > 6 weeks Counsel and Initiate PrEP if eligible Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention	HIV Exposed Infant/Child Positive NAT Continue Co-trimoxazole Continue ART Continue adherence counselling Scheduled immunization Initiate any newly diagnosed to ABC+3TC+DTG	Mother Positive NAT Continue Co-trimoxazole Continue ART Continue adherence counselling Scheduled immunization Initiate any newly diagnosed to ABC+3TC+DTG	Viral load Adherence counselling Continue ART Review in 2-4 weeks with results of viral load [within or at time of next child visit]

Specific Population	Description	Child-bearing Female with Negative HIV Test Result	Child-bearing Female with Positive HIV Test Result		
	9 months	Do HIV test if done > 6 weeks Counsel and Initiate PrEP if eligible Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention	Positive NAT	Negative NAT	Viral load Adherence counselling Continue ART Review in 2-4 weeks with results of viral load [within or at time of next child visit]
			Continue Co-trimoxazole. Continue ART Continue adherence counselling Scheduled immunization Initiate any newly diagnosed to ABC+3TC+DTG	Send DBS or fresh blood for NAT At next child visit, Stop AZT+3TC+NVP prophylaxis if mother suppressed Continue AZT+3TC+NVP if mother not suppressed If NAT positive start ABC+3TC+DTG Scheduled immunization	
	12 months	Do HIV test if done > 6 weeks Counsel and Initiate PrEP if eligible Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention	Positive NAT	Negative NAT	Viral load Adherence counselling Continue ART Review in 2-4 weeks with results of viral load. [within or at time of next child visit]
			Continue Co-trimoxazole Continue ART Continue adherence counselling Scheduled immunization Initiate any newly diagnosed to ABC+3TC+DTG	Do serology test if positive send DBS or fresh blood for NAT At next child visit, Stop AZT+3TC+NVP prophylaxis if mother suppressed Continue AZT+3TC+NVP if mother not suppressed If NAT positive start ABC+3TC+DTG Scheduled immunization	
	18 months	Do HIV test if done > 6 weeks Counsel and Initiate PrEP if eligible Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention	HIV Positive (Serology then NAT)	HIV Negative	Viral load Adherence counselling Continue ART Review in 2-4 weeks with results of viral load. [within or at time of next child visit]
			Continue Co-trimoxazole Continue ART Continue adherence counselling Scheduled immunization Initiate any newly diagnosed to ABC+3TC+DTG	Do serology test if positive send DBS or fresh blood for NAT At next child visit, Stop AZT+3TC+NVP prophylaxis if mother suppressed. Continue AZT+3TC+NVP if mother not suppressed If NAT positive start ABC+3TC+DTG Scheduled immunization	

Specific Population	Description	Child-bearing Female with Negative HIV Test Result	Child-bearing Female with Positive HIV Test Result		
	24 months	Do HIV test if done > 6 weeks Counsel and Initiate PrEP if eligible Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention	HIV Positive (Serology then NAT) Continue Co-trimoxazole Continue ART Continue adherence counselling Scheduled immunization Initiate any newly diagnosed to ABC+3TC+DTG	HIV Negative Do serology test if positive send DBS or fresh blood for NAT At next child visit, Stop AZT+3TC+NVP prophylaxis if mother suppressed Continue AZT+3TC+NVP if mother not suppressed If NAT positive start ABC+3TC+DTG Scheduled immunization	Viral load Adherence counselling Continue ART Review in 2-4 weeks with results of viral load. [within or at time of next child visit]

Infant Prophylaxis Dosing



Treatment

Management of an HIV-Exposed Infant (HEI) and Extended Prophylaxis

All HEI should receive prophylaxis for at least 12 weeks with AZT + 3TC plus NVP to be stopped when there is a documented suppressed Viral Load in the mother at 3 months postnatally. See Tables X and X for the weight-based dosing

In a situation where the Viral Load of the mother is unsuppressed (or the mother not on ART), the prophylaxis should be documented while closely monitoring for side effects in the baby. This prophylaxis should be extended until the mother is suppressed or one-week post-breast-feeding cessation

Where the mother refuses to be on treatment, continued counselling should be done, and ART initiated as soon as possible while the baby is on extended prophylaxis

Table 103: Simplified Infant Prophylaxis Dosing

Weight Band	NVP 10mg/ mL	AZT/3TC 60/30mg tablet dissolved in 6mL of water (10mg/5mg/mL)
Birth weight < 2kg	0.8mL OD	0.8mL BD
Birth weight 2 – 2.499kg	1mL OD	1mL BD
Birth weight > 2.5kg	1.5mL OD	1.5mL BD

Weight Band	NVP 10mg/ mL	AZT/3TC 60/30mg tablet dissolved in 6mL of water (10mg/5mg/mL)
6 weeks to < 6 months old	2mL OD	Use treatment dose based on infant's weight (Table xx)
6 months to 9 months old	3mL OD	Use treatment dose based on infant's weight (Table xx)
9 months old to 1 week after cessation of breast-feeding	4mL OD	Use treatment dose based on infant's weight (Table xx)

Table 104: Simplified Dosing Chart for AZT/3TC Prophylaxis

Weight Band	Strength of AZT/3TC Tablet	AZT/3TC Dosage for Prophylaxis
3 – 5.9kg	60/30mg	1 tablet BD
6 – 9.9kg	60/30mg	1.5 tablets BD
10 – 13.9kg	60/30mg	2 tablets BD
14 – 19.9kg	60/30mg	2.5 tablets BD

NOTE: AZT/3TC is a dispersible tablet containing AZT = 60mg and 3TC = 30mg:

- Dissolve one dispersible tablet into 6mL of water; 1mL of the suspension will contain 10mg of AZT and 5mg of 3TC
- Take NOTE that the suspension made should be kept in a cool place! Daily reconstitution is recommended to assure stability of the suspension
- Shake the suspension before use
- Care givers should be educated by the pharmacists and clinicians on how to reconstitute the AZT/3TC dispersible tablets. Care givers should demonstrate to the pharmacists on how they are reconstituting these formulations.
- Care givers should demonstrate to the pharmacist on how they are reconstituting these formulations
- Infants weighing < 2kg should receive 2mg/kg NVP once daily and 2mg/kg once daily calculated based on the AZT in the AZT/3TC
- For complicated cases e.g., severe AZT induced anaemia, consult a medical officer with appropriate training or **call 7040**

5.4.3. Management of HIV-Infected Populations



Treatment

Treatment of HIV Infected Populations

- To improve ART initiation and adherence, counselling must be done so that the individual (or caregiver) understands its benefits. The benefits of starting ART earlier include:
- Reduced rates of HIV-related morbidity and mortality
- Reduced MTCT (in pregnant and breast-feeding women)

- Potential reductions in the incidence and severity of chronic conditions (e.g., renal disease, liver disease, certain cancers, and neurocognitive disorders)
- Reduction in infectious complications (e.g., TB)
- Reduced sexual transmission
- High levels of adherence to ART are needed to attain these objectives

Table 105: Eligibility Criteria for ART Initiation in Children, Adolescents, Pregnant and Breast-feeding Women and Adults

Specific populations	Description
Pregnant & Breast-feeding Women	Treat irrespective of WHO clinical stage or CD4 count
Children (0 to < 10 years old)	
Adolescents (10 to ≤ 19 years old)	
Adults	

Under these new guidelines: Treat ALL, the assessment through WHO Clinical Staging (Table XX) guides the evaluation and management of HIV; however, initiating ART does not require a CD4 count

First-Line ART

Providing optimized, fixed-dose ART regimens in all populations have consistently demonstrated that there are better clinical and laboratory outcomes if HIV treatment is initiated early. Reduce the time between HIV diagnosis and ART initiation. This is based on an assessment of the person's readiness, and it is preferred that initiation is done immediately or within 7 days.

Table 106: Preferred First-Line ART and Alternative Regimens by Specific Populations

Specific Populations	Description	Preferred 1st line ART	Alternative Regimen
Children (0-4 weeks)	All	AZT + 3TC + NVP	Get Expert Opinion or call 7040 for advice
Children (≥ 4weeks), adolescents and adults	3 – 24.9kg	ABC + 3TC + pDTG*	ABC + 3TC + LPV-r
	≥ 25kg	TAF + XTC + DTG	ABC + 3TC + DTG
	≥ 30kg	TDF + XTC + DTG**	TDF + XTC + DRV-r*** ABC + 3TC + DTG TDF + XTC + LPV-r
		TAF + XTC + DTG	
Children, adolescents, and adults Co-infected with TB	3 – 29.9kg	ABC + 3TC + DTG	ABC + 3TC + AZT ABC + 3TC + LPV-r
	≥ 30kg	TDF + XTC + DTG Increase the frequency of DTG to 50mg twice daily if on Rifampicin-based ATT (continue DTG bd for extra 2 weeks after ATT completion)	ABC + 3TC + DTG TDF + XTC + DRV-r***

* pDTG 10mg is available for children weighing 3 – 19.9kg. Children and adults weighing ≥ 20kg, DTG 50mg is available and should be given once daily

** For children and adolescents who have their weight ≥ 30kg, the preferred 1st line regimen should be TafED

*** DRV-r should be given to children aged ≥ 12 years and ≥ 40kg, otherwise consult Expert opinion or call 7040. Avoid if on Rifampicin-based ATT

Advanced HIV Disease (AHD)



Description

For adults and adolescents, and children older than five years, AHD is defined as CD4 count < 200 cells/mm³ or WHO stage 3 or 4 event. All children younger than five years old with HIV are considered as having AHD. To reduce HIV associated mortality, it is recommended that the following categories of HIV+ patients are reflexively screened for advanced HIV disease using a CD4 count test or WHO Clinical Staging where the CD4 count test is not available. These include:

- Those newly diagnosed with HIV
- Those reinitiating into care following treatment interruption
- Those with a high viral load
- Those hospitalized with a serious illness defined as respiratory rate ≥ 30 breaths per minute; Heart Rate ≥ 120 beats per minute, temperature $\geq 39^{\circ}\text{C}$, or unable to walk unaided



Treatment

Package of Care for People With AHD

Table 107: Screenig, Diagnosis, Prophylaxis and Pre-emptive Treatment

	Intervention	CD4 Cell Count	Adults	Adolescents	Children
Screening & Diagnosis	Sputum Xpert MTB/RIF as the first test for TB diagnosis among symptomatic people	Any	Yes	Yes	Yes
	LF-LAM for TB diagnosis among people with symptoms and signs of TB	≤ 200 cells/mm ³ or at any CD4 count if seriously ill	Yes	Yes	Yes (limited data for children)
	Cryptococcal antigen screening	≤ 200 cells/mm ³	Yes	Yes	No
Prophylaxis and Pre-emptive Treatment	Co-trimoxazole prophylaxis	≤ 350 cells/mm ³ or clinical stage 3 or 4	Yes	Yes	Yes (regardless of CD4 for under 5)
	TB preventive treatment	Any	Yes	Yes	Yes
	Fluconazole pre-emptive therapy for cryptococcal antigen-positive people without evidence of meningitis	< 200 cells/mm ³	Yes	Yes	Not applicable (Screening not advised)

	Intervention	CD4 Cell Count	Adults	Adolescents	Children
	Defer initiation if clinical symptoms suggest TB or Cryptococcal meningitis	Any	Yes	Yes	Yes
ART initiation	Rapid ART initiation	Any	Yes	Yes	Yes
	Defer initiation if clinical symptoms suggest TB or Cryptococcal meningitis	Any	Yes	Yes	Yes
Individualised Adherence Support	Tailored counselling to ensure optimal adherence to the AHD package, including home visits if feasible	< 200 cells/mm ³	Yes	Yes	Yes

Table 108: Common ART Toxicities and recommended substitutes

ARV drug	Common Associated Toxicity	Recommended ARV Substitute
ABC	Hypersensitivity reaction	TAF (if CrCl $\geq$ 30mL/min and weight $\geq$ 25kg), or TDF (if normal Creatinine Clearance or if child $\geq$ 30kg), or AZT (if child < 25kg)
AZT	Severe anaemia or neutropenia, severe gastrointestinal intolerance, lactic acidosis	Substitute TDF or ABC
DTG	Hepatotoxicity, hypersensitivity reactions	Substitute another therapeutic class: EFV or boosted PIs
	Insomnia, body weight gain or obesity**	Consider morning dose or substitute EFV or boosted PI Monitor body weight and promote anti-obesity measures (such as diet and physical exercise). If significant increase despite measures, consider substituting EFV or boosted PI
EFV	Persistent CNS toxicity (e.g., dizziness, insomnia and abnormal dreams) or mental symptoms (anxiety, depression and mental confusion) or convulsions	Substitute DTG or boosted PIs
	Hepatotoxicity, Severe skin and hypersensitivity reactions, gynaecomastia	For severe hepatotoxicity or hypersensitivity reactions, substitute another therapeutic class (INSTIs or boosted PIs)

ARV drug	Common Associated Toxicity	Recommended ARV Substitute
LPV-r	Hepatotoxicity (common if underlying hepatic disease, coinfection with hepatitis B or C)	Substitute another therapeutic class (INSTIs) or boosted PIs
	Pancreatitis (in Advanced HIV Disease, alcohol abuse)	
	Dyslipidemia (Cardiovascular risk factors such as obesity and diabetes)	
	Diarrhoea (Risk factors unknown)	
DRV-r	Hepatotoxicity, Severe skin and hypersensitivity reactions	Substitute with LPV-r. When it is used in third line ART, limited options are available For hypersensitivity reactions, substitute another therapeutic class
NVP (or EFV)	Rash, Stevens Johnson Syndrome, hepatitis	DTG or LPV-r
TAF	Dyslipidemia and Body weight gain (common in female sex, concomitant use of DTG)	Monitor body weight and promote anti-obesity measures (such as diet, physical exercise). If significant increase despite measures, consider substituting EFV or boosted PI
TDF	Chronic kidney disease and Acute kidney injury, Fanconi syndrome, Decreases in bone mineral density, Lactic acidosis or severe hepatomegaly with steatosis	Substitute with another ARV, except for ROC with HBV/HIV co-infection who need TDF to be maintained on adjusted doses or switch to Entecavir TAF may be used if CrCl ≥ 30 mL/min DTG is an option if HIV-1 RNA $< 500,000$ copies/mL, no HBV, and if there are no contraindications (in consultation with an HIV and/or renal expert) Refer to tertiary level of care if unable to monitor ROC with CKD or if deterioration in CrCl falling below 30 mL/min

Monitoring HIV-Infected Populations on ART

Clinical and Laboratory Monitoring

- Monitoring consists of two components: Clinical and Laboratory
- Clinical monitoring includes history and examination, as well as evaluation of adherence, side effects and relevant drug toxicities
- Laboratory tests need to be conducted routinely and as needed. It includes CD4 count, viral load and toxicity monitoring
- The purpose of monitoring includes:
 - Evaluation of treatment response and diagnose treatment failure early
 - Evaluation of adherence

- Screening for Pulmonary tuberculosis
- Detection of toxicity to ARV drugs
- Viral load is recommended as the preferred monitoring approach to determine the performance of ART in an individual prophylaxis for at least 12 weeks, there should be a current suppressed viral load result before stopping the HIV prophylaxis.

Monitoring Drug Side Effects and Toxicities

Serious adverse reactions due to ART are uncommon. Therapy should only be switched in the presence of Grade 3 or 4 adverse drug reactions. Changing an ARV drug should only be done after careful review of adherence. The indication for changing needs to be addressed.

Table XX: Common ART Toxicities and Recommended Substitutes (For All Populations)

*Hyperbilirubinaemia and icterus do not reflect hepatic disease and are not contraindications to continued therapy. Only substitute ATV-r if the condition is intolerable to the ROC.

**For ROC with weight gain, a patient centred approach must be taken considering a patient's concerns, the level of BMI (> 30) and the proportion of change (> 10%). A healthy lifestyle must be promoted. Consider monitoring for serum glucose level, BP and serum lipid level.

5.4.4. Management of Treatment Failure

Monitoring people on ART is important to ensure successful treatment, identify adherence problems and determine whether ART regimens should be switched in case of treatment failure. Compared with clinical or immunological monitoring, viral load testing provides an early and more accurate indication of treatment failure and the need to switch from first line to second-line drugs, reducing the accumulation of drug resistance mutations and improving clinical outcomes. Measuring viral load also helps to discriminate between treatment failure and non-adherence, following enhanced adherence support. Further, viral load testing gives clients a measure of understanding, control and motivation to adhere to treatment and understand their HIV infection. Viral load testing has been strongly recommended as the preferred approach to monitor treatment among people living with HIV.

Table 109: Different Types of Treatment Failure (WHO Definitions)

Failure	Definition	Comments
Clinical failure	Adults and adolescents New or recurrent clinical event indicating severe immunodeficiency (WHO clinical stage 4 condition) after six months of effective Treatment Children New or recurrent clinical event indicating advanced or severe immunodeficiency (WHO clinical stage 3 and 4 clinical conditions except for TB) after six months of effective treatment	The condition must be differentiated from immune reconstitution inflammatory syndrome occurring after initiating ART. For adults, certain WHO clinical stage 3 conditions (pulmonary TB and severe bacterial infections) may also indicate treatment failure

Failure	Definition	Comments
Immunologic failure	Adults and adolescents CD4 count at 250 cells/mm ³ following clinical failure or Persistent CD4 count < 100 cells/mm ³	Without concomitant or recent infection to cause a transient decline in the CD4 count Current WHO clinical and immunologic criteria have low sensitivity and positive predictive value for identifying individuals with virologic failure. There is currently no proposed alternative definition of treatment failure and no validated alternative definition of immunologic failure
	Children <i>Younger than 5 years</i> Persistent CD4 count < 200 cells/mm ³ <i>Older than five years</i> Persistent CD4 count < 100 cells/mm ³	
Virologic failure	Viral load > 1,000 cp/mL based on two consecutive viral load measurements three months apart, with adherence support following the first viral load test. ART switch after first viral load > 1,000 cp/mL for those receiving NNRTI-based regimens	An individual must be taking ART for six months before it can be determined that a regimen has failed Individuals with viral load > 20 to < 1,000 cp/mL, maintain ARV regimen, EAC may be considered and repeat viral load testing after three months

Table 110: Recommended Second-Line ART Regimens by Specific Populations

Specific populations	Description	1st line ART used	Preferred 2nd line ART	Alternative 2nd line ART
Children (0 – 4 weeks)	All	AZT + 3TC + NVP		
Children (≥ 4 weeks), Adolescents and Adults	3 – 24.9kg	ABC + 3TC + DTG	AZT + 3TC + LPV-r	Consult Expert Opinion or call 7040
		ABC + 3TC + LPV-r	AZT + 3TC + DTG	
	≥ 25kg	TAF + FTC + DTG ²	AZT + 3TC + LPV-r	
	≥ 30kg	TDF + 3TC + DTG	AZT + 3TC + DRV-r ³	AZT + 3TC + LPV-r TDF + XTC + DRV-r ³
		TAF + FTC + DTG ²		
		TDF + XTC + EFV	TDF + 3TC + DTG ¹	AZT + 3TC + DRV-r ³ AZT + 3TC + DTG AZT + 3TC + LPV-r TDF + XTC + DRV-r ³
			TAF + FTC + DTG ²	

- Emerging evidence indicates the backbone of TDF + XTC can be maintained or recycled even if used in First-Line
- Note that evidence not sufficient/conclusive for use of TAF in patients co-infected with TB on Rifampicin-based ATT, therefore avoid use in such patients.
- DRV-r 400/50mg should be used in those who are ≥ 12 years and ≥ 40kg, otherwise consult Expert opinion or call 7040. Avoid if on Rifampicin-based ATT

Table 111: Summary of Preferred Second-Line ART Regimens for Adults and Adolescents with TB and Hepatitis B Co-Infection

Specific Conditions	Description	1st line ART used	Preferred 2nd line ART	Alternative 2nd line ART
HIV and HBV Co-infection in Adolescents and Adults	All	TDF + XTC + EFV	TDF + 3TC + DTG	Consult expert opinion
		TDF + 3TC + DTG	AZT + 3TC + LPV-r + TDF*	
		TAF + FTC + DTG		
Children, Adolescents, and Adults Co-infected with TB	3 – 29.9kg	ABC + 3TC + DTG	AZT + 3TC + LPV-r	
	≥ 30kg	TDF + 3TC + DTG		

TDF + XTC should always be part of the combination in HBV/HIV co-infections. Since stand-alone TDF is currently not available, use TDF + XTC in consultation with expert or call 7040.

People re-engaging with care after treatment interruption or treatment failure

People re-engaging with care after treatment interruption should be provided with positive messages or welcome and should be offered comprehensive clinical assessment for AHD. The package should be given to people who are re-engaging with care after a period of ART interruption or when ART fails, and they have developed AHD. Such people are likely to benefit from the same set of interventions as ART-naïve people with AHD.

People interrupting treatment on a NNRTI-containing regimen are at risk of drug resistance and may require more intensive virological monitoring, and consideration should be given to restarting ART using DTG-containing regimen with a goal of re-establishing viral suppression.

For people presenting with diagnosis consistent with clinical failure (defined as a new or recurrent clinical event indicating severe immunodeficiency), WHO recommends viral load testing. CD4 count testing is no longer recommended for ART monitoring for people receiving ART who are clinically stable where viral load monitoring is available. However, CD4 count testing should be specifically prompted for people with a viral load exceeding 1,000 copies/mL and for everyone whose clinical presentation suggests AHD regardless of ART exposure. For people with suspected treatment failure and AHD, CD4 count, and viral load should be carried out in parallel.

People presenting with AHD because of treatment failure should also benefit from the advanced HIV disease package. If they are severely ill, an expedited switch to a more efficacious regimen should be considered.

When to consider stopping ART

Recipients of Care may choose to postpone or stop therapy, and providers on a case-by-case basis, may select to defer or stop therapy on the basis of clinical and/or psychosocial factors.

The following are indications for stopping ART:

- Patient's inability to tolerate all available ARV medications
- Patient's request to stop after appropriate counselling

- Non-adherence despite repeated counselling: treatment should be stopped to avoid continued toxicity, continued evolution of drug resistance, and transmitting drug resistant HIV
- Unreliable caregiver
- For children, the caregiver is instrumental in ART adherence. Any factors that affect the capability for the caregiver to give medications consistently may be an indication to stop ART in an HIV-infected child
- Serious drug toxicity or interactions
- Intervening illness or surgery that precludes oral intake
- ARV non-availability

Treatment Failure with No Further Treatment Options

Continue the failing ART regimen unless there are intolerable toxicities or drug interactions. Even with treatment failure, the regimen is likely to have some residual antiviral activity. Stopping therapy in the setting of virologic failure can be associated with rapid falls in CD4 counts and development of OIs.



Referral Criteria

When to Consult or Refer to the Next Level

The following criteria are indications to consult or refer to the next level:

- Suspected hepatotoxicity not responding to standard management (e.g., TB/HIV co-infection treatment, ALT/AST > 3-fold of upper limit of normal with symptoms and > 5-fold upper limit of normal without symptoms)
- Second-Line treatment failure or inability to tolerate Second-Line therapy
- Complications on PI-based regimen
- Severe or life-threatening adverse reactions
- Inability to tolerate therapy despite change in regimen
- HIV-HBV co-infection with renal insufficiency

5.4.5. Prophylaxis

Tuberculosis Preventive Therapy (TPT)

These guidelines focus on key interventions branded as the THREE I's (Intensive case finding, Isoniazid prophylaxis therapy and Infection control for TB) for HIV-TB activities that reduce TB-related morbidity and mortality in HIV-infected individuals. Another key intervention is the provision of ART.

Daily TPT can prevent TB in people who are at a high risk for developing TB, including HIV-infected individuals.

Screen all patients for TB at any opportunity that presents (see Figure XX)

Screen all pregnant and breast-feeding women, regardless of HIV status, for TB at every contact as it is part of Focused ANC

Screen all children for TB at every contact

Give TPT to the following:

- HIV-infected children < 12 months old with TB contact and after ruling out active TB
- Newly HIV-infected pregnant and breast-feeding women, children $\geq$ 12 months old, adolescents, and adults after ruling out active TB
- TPT should be given every 3 years in HIV-infected adults, adolescents and children $\geq$ 12 months old

NB: Do not give TPT to a patient who has any signs suggestive of active TB. This patient needs full investigation for TB and combination TB treatment if confirmed to avoid TB drug resistance

Standard TB screening questions include:

- Current cough: any duration, productive or non-productive
- Unexplained weight loss (adults)
- Failure to thrive and/or malnutrition (children)
- Fever or night sweats



Treatment

Drugs for TPT

Daily Isoniazid with Pyridoxine (Vit B6) for 6 months

Daily Isoniazid with Rifampicin (RIFINA) for 3 months (DRV-r and ATV-r cannot be used with RIF)

Weekly High Dose Isoniazid (600 – 900mg) with Rifapentine (3HP) for 3 months (DTG does not require dose adjustment for 3HP)

Daily Isoniazid (300mg) with Rifapentine (1HP)

Shown to be as effective as 9 months of INH for TB prevention in PLHIV

Associated with increased completion of treatment compared to standard of care with INH for 6-9months

Proportion with adverse events is shown to be lower than reported in the months of Isoniazid.

Can be taken by HIV positive on or not on ART though the effect is higher in those who are on ART. There may be viral blips noticed during the month of taking 1HP but most patients don't develop treatment failure.

1HP is **currently not recommended in HIV positive pregnant women** or those with severe hepatic dysfunction or body weight less than 30kg

The dosing of the rifapentine is 300mg daily for weight of < 35kg, 450mg daily for those weighing 35 – 45kg and 600mg for weight above 45kg)

1HP is administered with a daily dose of Pyridoxine at 50mg

Reported adverse events include neutropenia, rashes, diarrhea which are minimal

Table 112: Summary of TPT Regimens

Regimens	Interval & Duration	Dosage	Toxicity
Isoniazid (300mg) - 6H	Daily for 6 months	300mg/day	Hepatotoxicity (more), peripheral neuropathy, rash, gastrointestinal (GI) upset
Isoniazid and Rifampicin (3HR)	Daily for 3 months	1 tab/day	Hypersensitivity reactions, hepatotoxicity (less), rash, GI upset, hypoprothrombinemia, orange discoloration of body fluids
Isoniazid (300mg) and Rifapentine (300mg) - 3HP (300mg/300mg) – Also referred as “ 12-dose regimen ”	Weekly for 3 months	3 tabs once per Week (for 12 weeks maximum)	Flu-like syndrome, hypersensitivity reactions, GI upset, orange discoloration of body fluids, rash, hepatotoxicity (less)
Isoniazid (300mg) and Rifapentine (600mg) - 1HP	Daily for 1 month	1 tab/day	

Contraindications and/or when to Stop TPT:

- Suspected or confirmed active TB (start ATT)
- Jaundice and/or icterus (yellow eyes) or active hepatitis
- Known or suspected hypersensitivity to INH or severe skin rash
- Confusion/convulsions
- Dizziness
- Low BMI < 18kg/m²
- Peripheral neuropathy i.e., Severe numbness/burning pain and muscular weakness of legs and/or arms
- Concomitant medication: Phenytoin, Carbamazepine, Warfarin, Theophylline, Selective Serotonin Re-uptake Inhibitor antidepressants (e.g., Fluoxetine, Paroxetine) oral Ketoconazole or Itraconazole

How to give TPT

- Educate patients on the side effects of TPT

Table 113: Dosage for Isoniazid preventive therapy, Co-trimoxazole prophylaxis and combination INH/CTX/VIT B6 drugs

Drug	Child tablet or oral suspension	Number of scoops or tablets by weight band					Adult tablet
		3 to < 6kg	6 to < 10kg	10 to < 14kg	14 to < 20kg	20 to < 25kg	
Isoniazid (INH)	100mg	0.5	1	1.5	2	2.5	300mg (1 tablet)
Co-trimoxazole (CTX)	Suspension 200/40mg per mL	2.5mL	5mL	5mL	10mL	10mL	—

Drug	Child tablet or oral suspension	Number of scoops or tablets by weight band					Adult tablet
	Tablet 100/80mg	1	2	2	4	4	—
	Tablet 400/80mg	NA*	1/2	1/2	1	1	400/80mg (2 tablets)
	Tablet 800/160mg	NA	NA	NA	1/2	1/2	800/160mg (1 tablet)
Pyridoxine (Vitamin B6)	Tablet 25mg	NA	NA	NA	1/2	1/2	25mg (1 tablet)
INH/CTX/Vit B6	Tablet 300/960/25mg	NA	NA	NA	1/2	1/2	300/960/25mg (1 tablet)

In HIV-infected individuals, TPT should be dispensed for the same duration as ART to avoid multiple hospital visits

Side effects must be assessed at 1, 3 and 6 months after starting TPT preferably via telephone or any other appropriate modalities

Give concomitant Pyridoxine (Vitamin B6) 1 tablet 25-50mg once daily to prevent side effects of Isoniazid in all populations taking TPT

Repeat TPT

In PLHIV, TPT should be given every 3 years as the protective effects wanes off with time

Table XX: Dosage for Isoniazid Preventative Therapy, Co-Trimoxazole Prophylaxis and Combination INH/CTX/VIT B6 Drugs

*NA = Not Applicable

Co-Trimoxazole Preventive Therapy (CPT)

CPT prevents Pneumocystis Jirovecii Pneumonia (PCP), toxoplasmosis, isosporiasis, malaria, and other HIV- and non-HIV related diseases and prolongs survival. CPT can be safely taken with ART and/or ATT and in pregnancy (Tables XX and XX). HIV-infected pregnant women on CPT should not be given Sulfadoxine-Pyrimethamine (SP; malaria prophylaxis in pregnancy)

All PLHIV with CD4 count < 350 cells/mm³ must be on CPT. CPT can be discontinued in adults after 2 consecutive CD4 counts that are > 350 cells/mm³

All HIV infected pregnant women and children below 5 years old (but greater than 6 weeks old) must be on CPT

Table 114 : Criteria for Initiating, Discontinuing and Monitoring Co-Trimoxazole Preventive Therapy

Specific populations	Whom to Start	When to Start	When to Stop*
Pregnant & Breast-feeding Women	Pregnant women	Start as early as possible. Do not give SP. If SP taken, start CTX after 14 days	Continue throughout pregnancy.
	Breast-feeding women	Continue if CD4 count < 350 cells/mm ³ or WCS II, II or IV	CD4 count ≥ 350 cells/mm ³ for two consecutive values at least 6 months apart while on ART.
Children (0 to < 5 years old)	HIV-Exposed (e.g., breastfed) child	At 6 weeks old or first contact	Confirmed HIV-uninfected after full cessation of breast-feeding.
	HIV-infected child ≤ 24 months old	Start regardless of WCS or CD4%	At 5 years old and CD4 count ≥ 350 cells/mm ³ and Stage I.
	HIV-infected child ≥ 24 months to < 5 years old	WCS II, III and IV or CD4 level < 25%	
	Presumptive HIV diagnosis < 24 months old	Start (or continue) regardless of WCS or CD4%	Stop if confirmed HIV negative; if infected, stop at 5 years old and CD4 level ≥ 350 cells/mm ³ and Stage I.
Children (5 to < 10 years old)	Child with a history of PCP	Start regardless of CD4 count or CD4%	At 5 years old and CD4 count ≥ 350 cells/mm ³ and Stage I If 5 to < 10 years old, stop based on adult criteria.
Adolescents	HIV-infected children ≥ 5 years old, adolescents, and adults	CD4 count < 350 cells/mm ³ or WCS II, III or IV	CD4 count ≥ 350 cells/mm ³ for two consecutive values at least 6 months apart while on ART
Adults			

Stop CTX if the person has Stevens-Johnson syndrome, severe liver disease, severe anaemia, severe pancytopenia, or HIV negative status

CPT contraindications: severe allergy to sulfa drugs; severe liver disease, severe renal disease, and glucose-6-phosphate dehydrogenase (G6PD) deficiency and in these conditions DO NOT re-challenge

SP = Sulfadoxine/Pyrimethamine

WCS = WHO Clinical Staging

5.5

CENTRAL NERVOUS SYSTEM
CONDITIONS

5.5.1. Psychiatric Conditions

Aggressive and Violent Patient



Description

Aggression is any form of behaviour directed towards the goal of harming or injuring another living being who is motivated to avoid such treatment. Violence is defined as the act that leads to physical harm or destruction. Aggression may or may not result in violence but all violence is aggression.



Treatment

Phases of dealing with aggression or violence:

- *Phase 1: De-escalation* - De-escalation is a process to defuse a potentially violent or aggressive situation without having to resort to physical restraint.
 - o Show concern or empathy
 - o Speak quietly but clearly and calmly
 - o Ensure safe environment
 - o Ensure safety of all members available
- *Phase 2: Physical Restraint* - The team leader to co-ordinate this phase as follows:
Obtain assistance of at least 4-6 other staff members
- *Phase 3: Sedation* - Diazepam (valium) 10mg – 20mg IV stat – give slowly and observe vital signs
 - o Administer Haloperidol 5mg-10mg IM stat which may be repeated using 5mg every hour to a maximum of 20mg
 - o **NOTE THAT** diazepam should not be administered to patients in alcohol intoxication to prevent respiratory and cardiac depression. It should only be given after 8 hours of the last intake of alcohol.
 - o Normal saline can be used for diazepam or benzodiazepine toxicity in the absence of Flumazenil (0.2mg I.V over 15-30 seconds, if resedation occurs, may repeat doses at 20-min intervals; not to exceed 1mg/dose or 3mg/hr)
- *Phase 4: Mechanical Restraint* - Restrain in a semi-prone position ensuring that the limbs are not contorted, to prevent aspiration and compression injury
- *Phase 5: Post Sedation/Seclusion/Transfer*
 - o Patient to be preferably nursed in a seclusion room by prescription of attending physician in accordance with the mental health act, 2019.

- o Patient in seclusion to be reviewed by physician at least twice a day and by the nurse every 30 minutes
Patient should not be secluded for more than 72 hours
- o **Seclusion is the involuntary confinement of a patient alone in a room from which s/he is prevented from leaving. Seclusion is used by mental health staff to manage a patient who is aggressive or violent due to his/her mental disorder**

Suicidal Patient



Description

Traditionally the term “**suicidal behavior**” refers to a suicide attempt, an episode of nonfatal self-harm, a suicide plan, and suicidal ideation due to a mental illness or a life crisis.

Risk factors:

- Elderly,
- Male individuals who are single.
- Divorced,
- Widowed,
- Unemployed
- Low socioeconomic support,
- Live alone and have poor social support.



Signs and Symptoms

The person will exhibit the following signs:

- Talking about death, threatening to commit or discussing suicide.
- Mentioning suicidal ideas and discusses different methods of suicide.
- Attempting any act of deliberate self-harm.
- Making goodbye gestures or communications, writing of will or other acts suggestive of a suicidal plan (purchasing of firearm, poison).
- Having suffered recent major loss of life or property.
- Verbalizing feelings of hopelessness.
- Severe agitation/anxiety



Investigations

- Previous suicide attempt or self-harm episodes
- Current suicide plan
- Access to lethal means
- History of psychiatric disease, including substance misuse



Treatment

Steps in Management of Suicide:

- Admit all patients who have made lethal attempts of deliberate self-harm or who have a suicide plan
- Do not seclude.
- Assess for underlining mental illness
- Keep away any objects, instruments, ropes, cables, pills including poisonous substances, belts, laces and other devices that can be used to self-harm
- Suicide watch
- Supervise the patient's medication

Anxiety Disorder Spectrum

Generalized Anxiety Disorder



Description

Generalized anxiety disorder is characterized by an excessive level of anxiety and worry almost all the time and the patient has great difficulties in controlling the worry for a period of at least 6 months.



Signs and Symptoms

- Restlessness
- Sweating, Anxious mood
- Tachycardia
- Tremors
- Excessive anxiety and worry
- Muscle tension (often reported as pain in various parts like neck, trunk or headaches)
- Restlessness or feeling on edge difficulty concentrating or mind going blank
- Irritability, sleep disturbance
- Palpitations



Investigations

- Prominent tension
- Worry
- Feelings of apprehension, about every-day events and problems

- FBC,
- D.O.A 6,
- TSH (T3, T4),
- Blood glucose,
- CXR,
- ECG,
- EEG,
- U&Es,
- LFT,
- RPR
- RVT

Four or more symptoms outlined in the Signs and Symptoms.



Treatment

Supportive

- Psychotherapy
- Exercise Healthy, balanced diet and hydration therapy. Limit caffeine containing food, alcohol and carbonated beverages

Pharmacological Therapy

Medication is a secondary treatment in the management of generalized anxiety.

Acute anxiety – Short term use

- First line Treatment
 - **Alprazolam:** Adults: 0.25mg (250 mcg) PO, BD or TDS
 - OR**
 - **Lorazepam:** Adults: 2mg PO, BD
 - OR**
 - Diazepam: Adults: 2-5 mg 12 hourly
 - Children: 1-12 years; 1.25-5 mg 6 hourly as needed

NOTE THAT the above treatment to be administered for 14 days and gradually tailed off over the next 2 weeks

Long term management:

- 1st Line Treatment
 - **Fluoxetine:** Adults: 20 mg (in the morning) PO, OD, then increase up to 40 mg daily if necessary
 - Children: 7-18 years; 10 mg daily, then increase to 20 mg after 1-2 weeks if necessary

OR

- o **Amitriptyline:** Adults: 25-50 mg OD PO (as a single evening dose), start at minimal dose and gradually increase
 - Children: > 12 years; 10 mg daily (as a single evening dose) max. 20 mg
- 2nd Line Treatment
 - o **Escitalopram:** Adults: 10mg PO, OD; may increase to 20mg OD after one week
 - Children: (Not indicated)

OR

- o **Sertraline:** Adults: 50 mg as a single oral evening dose; Then Increase by 25 mg at 1week intervals, if necessary, to a maximum of 200 mg
 - Children: 12-18 years; 50 mg PO, OD, 6-12 years; 25 mg PO, OD, < 6 years (not recommended)

OR

- o **Imipramine:** Adults: 25-50 mg PO, (as a single evening dose)
 - Children: Not recommended for this indication

For anxiety with prominent somatic complaints:

- Propranolol: Adults: 10-40 mg PO, OD 12 hourly



Referral Criteria

- Consultation/referral may necessary if severe anxiety lasts longer than **three months**.

Panic Disorder



Description

A panic attack is an unexpected, recurrent and discrete episode of intense discomfort or fear with no specific



Signs and Symptoms

- Tachycardia
- Tremors
- Sweating
- Fear of dying or going 'crazy'
- Palpitations, Trembling or shaking
- Sensation of shortness of breath, Chest pain or discomfort
- Feeling dizzy, unsteady or faint

- Numbness or tingling sensations
- Chills or hot flushes



Investigations

- Recurrent panic attacks

The panic attacks are not associated with marked exertion or with exposure to dangerous or life-threatening situations.

Not for diagnosis, however the following can be done to rule out other medical condition:

- D.O.A 6
- TSH (T3, T4)
- Blood glucose
- CXR
- ECG
- EEG
- U & Es
- LFTs
- RPR
- RVT



Treatment

Supportive

- Reassure the patient
- Relaxation therapy
- Psychotherapy, (psychoeducation, Cognitive Behavioural Therapy)

Pharmacological

- 1st Line Treatment:
 - o **Fluoxetine: Adults:** 20 mg OD, PO, then increase up to 40 mg daily if necessary
 - Children: 7-18 years; 10 mg OD, PO, then increase to 20 mg OD, PO after 1-2 weeks if necessary
 - OR
 - o **Amitriptyline:** Adults: 25-50 mg OD, PO (as a single evening dose), start at minimal dose of 25mg then slowly taper
 - Children > 12 years; 10 mg OD, PO (as a single evening dose) max. 20 mg
- 2nd Line Treatment
 - o **Escitalopram:** Adults: 10mg OD, PO; may increase to 20mg OD, PO after one week.
 - Children not indicated

OR

- o **Sertraline:** Adults: 50 mg OD, PO as a single oral evening dose.
Then Increase by 25 mg at 1-week intervals, if necessary, to a maximum of 200 mg
 - Children: < 6 years not recommended, 6-12 years 25 mg daily, 12-18 years 50 mg daily

OR

- o **Imipramine:** Adults: 25-50 mg OD, PO as a single evening dose)
 - Children: Not recommended for this indication

For panic attacks occurring three or more times daily consider the following pharmacological intervention:

- **Lorazepam:** Adults: 1mg OD, PO daily for 2 weeks -Can be increased by 1mg to a maximum of 4 mg.
 - o Children 2-18 years; 0.05 mg/kg OD, PO for 2 weeks

OR

- **Diazepam:** 5mg - 10mg OD, nocte, PO daily for a maximum of 2 weeks
- **Lorazepam:** Adults: 1-4 mg I.M stat. or 1mg PO
 - o Children 0.25-0.5 mg I.M stat.



Referral Criteria

- Consult other specialists for guidance if frequency of panic attack increases after **6 months** of initiation of treatment

ADULTS CONDITIONS

Post-Traumatic Stress Disorders



Description

Post-Traumatic Stress Disorders (PTSD) is caused by severe psychological trauma that overwhelms an individual's existing coping mechanisms.



Signs and Symptoms

- Re-experiencing the trauma
- Avoidance of all reminders of the events.
- Autonomic Hyperactivity



Investigations

- Persistently re-experiences the event.
- Feelings of detachment (emotional numbing), anhedonia, amnesia, restricted affect, or active avoidance of thoughts or activities that may be reminders of the trauma

- A general state of increased arousal which is characterized by poor concentration, hypervigilance, exaggerated startle response, insomnia, or irritability.
- Symptoms have been present for at least one month.

Not for diagnosis, however the following tests can be done to rule out other medical condition:

- U & Es
- LFTs
- D.O.A 6
- TSH (T3, T4)
- ECG
- EEG
- RPR
- RVT

Treatment

Supportive:

- Psychotherapy

Psychopharmacological:

The best approach is to choose a medication based on the more problematic target symptoms. This may require a combination of medications:

- *1st Line Treatment*
 - o **Fluoxetine:** Adults: 20 mg daily, then increase up to 40 mg PO daily if necessary
 - Children: 7-18 years: 10 mg daily; Then increase to 20 mg after 1-2 weeks if necessary
 - OR
 - o **Amitriptyline:** Adults: 50mg - 150mg PO (as a single evening dose or in divided doses)
 - Children: > 12 years; 10 mg daily (as a single evening dose) max. 20 mg
 - OR
 - o **Lorazepam:** Adults 1mg PO, OD for 2 weeks. Can be increased by 1mg to a max. of 4 mg.
 - Children 2-18 years; 0.05 mg/kg daily for 2 weeks
- *2nd Line Treatment*
 - o **Imipramine:** Adults: 25-50 mg daily (as a single evening dose)
 - Children: Not recommended for this indication
 - o **Escitalopram:** Adults: 10mg OD, PO; may increase to 20mg OD after one week
 - Children: Not recommended
 - OR
 - o **Sertraline:** Adults: 50 mg PO as a single oral evening dose; Then Increase by 25 mg at 1-week intervals, if necessary, to a maximum of 200 mg
 - Children: 12-18 years 50 mg daily, 6-12 years 25 mg daily, < 6 years not recommended

Beta blockers

- **Propranolol oral:** 10mg -20mg (titrate the dose) to decrease autonomic hyper arousal.

Mood Disorder Spectrum



Description

These are mood disturbances consisting of prolonged periods of excessive sadness (depressed) and excessive joyousness (hypomania/mania) or both. They occur in children, adolescents and adults.

Bipolar Mood Disorders

It can either present with manic/hypomanic symptoms or as depression alternating with mania/hypomania

Bipolar Type I Disorder

It is a subtype of bipolar spectrum disorders characterized by episodes of mania (lasting for at least 7 days or less if hospitalization is necessary) with alternating episodes of major depression.



Signs and Symptoms

NB: Hypomania is distinguished from mania as a milder form of the above signs and symptoms. (refer to Table 115)

Diagnosis (refer to Table 115)

Table 115: Signs and Symptoms of Mania vs Depression

Mania	Depression
Biological:	Biological:
High energy/hyperactivity	Low energy
Decreased need for sleep	Sleep disruption (increased/decreased)
High libido	Reduced libido/ amenorrhea in females
Weight loss (too busy to eat)	Disturbed appetite (increased/reduced)
	Weight changes (increased/reduced)
Sociological:	Sociological:
Overfamiliarity	Difficult to create rapport with
Flamboyant dressing (wearing bright colours)	Self-neglect
Infectious laughter	Loss of humour/ uncontrollable crying
Psychological:	Psychological:
Impulsivity (reckless spending)	Poor concentrating

Mania	Depression
Pressured speech	Reduced speech
Inflated self esteem	Low self-esteem/ guilt/helplessness
Grandiose ideas	Suicidal
Suicidal	



Investigations

- RBS
- HIV test
- RPR
- MRI
- FBC
- Electrolytes
- LFTs/KFTs
- Urea and creatinine
- Hormone profile (t3/t4)
- Lipid profile
- Doa6
- ECG
- EEG



Treatment

Supportive:

- Psychoeducation
- Psychotherapy occupational therapy
- Patients to avoid caffeine and alcoholic beverages

Pharmacological

Acute treatment (Pharmacotherapy): if patient is aggressive or violent (**refer to management of an aggressive patient**)

- **ADD** – if psychotic features are prominent
- **Haloperidol** 2.5mg-5mg PO OD, can increase to BD
- **Chlorpromazine** 50mg-100mg PO OD, can increase to BD
- **Risperidone** 1mg-2mg OD PO, can increase to BD

- **Carbamazepine** 200mg BD PO; can increase to 400mg BD PO
OR
- **Sodium valproate** 500mg-1g OD PO, can increase to BD PO
OR
- **Sodium divalproex** 500mg-1g OD PO, can increase to BD PO

**Tertiary specialised hospital consideration*

- Lithium 200mg – 1200mg per day

**Maintenance Treatment considerations*

- **Carbamazepine** 200mg BD PO; can increase to 400mg BD PO
OR
- **Sodium valproate** 500mg-1g OD PO, can increase to BD PO
OR
- **Sodium divalproex** 500mg-1g OD PO, can increase to BD PO

Wean off benzodiazepines and consider weaning off antipsychotics if possible (within 4 weeks). Monitor HB levels as carbamazepine causes anaemia. Check HB once every 2 months in the first 6 months, then once every 6 months after first 6 months.

Bipolar Type II Disorder



Description

It is a subtype of bipolar spectrum of disorders characterized by depressive periods (lasting for at least 14 days) alternating with presentations of elevated mood called hypomania (lasting at least 4 days).



Signs and Symptoms

Refer to the above listed symptoms for depression and hypomania.



Treatment

Supportive

- Psychoeducation
- Psychotherapy
- Patients to avoid caffeine and alcoholic beverages
- Occupational therapy

Pharmacological

- *Carbamazepine* 200mg OD PO; can increase to BD PO
- OR
- *Sodium valproate* 500mg-1g OD PO, can increase to BD PO
- OR
- *Lamotrigine* 25mg PO BD; dosage can be increased by 25 mg every three days to a maximum of 200mg/day

Depressive Disorders



Description

This is a spectrum of disorders characterized by a low or depressed mood.

Major Depressive Disorder

Major depressive disorder (MDD) is a mental disorder characterized by a pervasive and persistent low mood or a loss of interest or pleasure in normally enjoyable activities, for at least 2 weeks.



Signs and Symptoms

- Feelings of sadness, Loss of interest/Lack of pleasure, Feelings of guilt, Feeling of hopelessness/helplessness, Irritation, Tiredness, Memory Loss, Sleep disorders
- Crying uncontrollably, Reduced appetite and weight Loss and Suicidal ideas

The above symptoms should not be due to a physical disease, drugs or any other psychiatric condition.



Investigations

Full blood count, Becks depression inventory, EEG, Thyroid function test, HIV and DOA6



Treatment

Supportive:

Psychotherapy

- Consider Omega 3 fatty acids or foods rich in it

Pharmacological:

- Antidepressants take 2-6 weeks to achieve maximum effect.
- After 2-6 weeks of non-improvement, dosage can be titrated upwards.

- Choice of antidepressant depends on side-effect profile; comorbid states and risk of suicide (e.g. avoid TCA's patients with in cardiovascular disease.)
- Following remission, continue medication for at least another 6 months.
- When discontinuing medication, taper off slowly over 2 weeks to avoid withdrawals. If symptoms recur, restart medication at the same dose.
- Patients with 3 or more episodes require maintenance medication.

Antidepressants

- *1st line*
 - o Fluoxetine 20mg-40mg OD mane
- **OR**
- Amitriptyline 25mg OD PO, then if need be can titrate slowly by 25mg to 75mg nocte PO 2nd line
- Escitalopram 10mg OD PO for the first week, then increase to 20mg OD PO
- **OR**
- Imipramine 25mg OD PO, then if need be can titrate slowly by 25mg to 75mg nocte PO



Referral Criteria

- Decline in physical health and no improvement after 3-6 months or worsening of symptoms on medication
- Consider electroconvulsive therapy for treatment resistant depression

Substance-Induced Mood Disorder



Description

Substance-induced mood disorder refers to depression, or manic symptoms caused by chronic use of alcohol, medicines or illegal drugs.

Medications that can lead to mood disorders include Steroids, Marijuana, Alcohol, Cocaine, Amphetamines, Heroin, Efavirenz etc.



Signs and Symptoms

Refer to table of symptoms under bipolar disorders



Investigations

- FBC
- VDRL

- TSH
- LFT
- Toxicology Screen (DOA 6 /10)
- Hamilton depressive scale
- Becks depression inventory



Treatment

Refer to treatment of major depression or mania depending on presentation.

Schizophrenia Spectrum and Other Psychotic Disorders

Brief Psychotic Disorder



Description

Brief psychotic disorder is currently classified under schizophrenia spectrum and other psychotic disorders. It is differentiated from other related disorders by its sudden onset, its relatively short duration (≥ 1 day to < 1 month), and characterized by full return of normal functioning.



Signs and Symptoms

Brief psychotic disorder is characterized by the abrupt onset of 1 or more of the following symptoms:

- Delusions
- Hallucinations
- Bizarre behaviour
- Disorganized speech
- Affective symptoms
- Disorientation
- Impaired attention
- Catatonic behaviour

Schizophreniform Disorder



Description

Schizophreniform disorder is characterized by the presence of the symptoms of schizophrenia, but it is distinguished from that condition by its shorter duration, which is at least 1 month but less than 6 months.



Signs and Symptoms

The symptom profile of a schizophreniform disorder is identical to that of schizophrenia; however, the total duration of illness, including prodromal or residual phases, must be less than 6 months. Also, a deterioration in social or occupational functioning, which is required to make the diagnosis of schizophrenia, is **not** required for schizophreniform disorder.

Schizophrenia



Description

Schizophrenia is a brain disorder that affects how people think, feel, and perceive. The hallmark symptom of schizophrenia is psychosis



Signs and Symptoms

Positive symptoms:

- Hallucinations
- Delusions
- Disorganized speech and behaviour

Negative symptoms:

- Decrease in emotional range
- Poverty of speech
- Loss of interests and drive/low mood
- Cognitive symptoms deficits in verbal learning, reasoning and problem-solving
- Social cognition, attention, vigilance and working memory.



Investigations

Two or more of the following symptoms must be present for at least six months

- Hallucinations
- Delusions (can be either bizarre or non-bizarre)
- Disorganized speech (e.g. frequent derailment or incoherence)
- Grossly disorganized or catatonic behaviour
- Negative symptoms (e.g. affective flattening, alogia or avolition)

- Social or occupational dysfunction (or both) for significant portion of the time
- Tests to rule out organic causes of psychosis
- Baseline full blood count, blood sugar, lipids, liver and kidney function tests, for purposes of guiding treatment
- Fasting blood sugar, lipid profiles, liver and kidney function test are carried out at least twice a year.



Treatment

Supportive

- Supportive psychotherapy,
- Psychoeducation
- Occupational therapy

Pharmacological

Acute management:

- **Diazepam:**(for aggressive or very restless patients)
 - o Adults: 5-10 mg PO/IV 8-12 hourly, in the first 24 hours
 - Children: 12 -18 years 10 mg PO/IV 12 hourly; 5 - 12 years 5 mg 12 hourly in the first 24 hours

Note: Administer I.V slowly over 2-3 minutes as monitor vitals..

OR

- **Haloperidol:** Adults: 2-5 mg I.M stat. Then can repeat 6-8 hourly according to response, to maximum of 10 mg daily in the first 24 hours
 - o Children:
 - 6-12 years 1-3 mg 4-8 hourly as required in the first 24 hours, not exceeding 5mg
 - < 6 years (not recommended)

OR

- **Haloperidol:** Adults: 0.5-5 mg PO 8-12 hourly daily. Then can consider 5-10 mg 8-12 hourly (max. of 20 mg per day / in 24 hours)
 - o Children:
 - 12 years; 0.5-5 mg 8-12 hourly (max. of 10 mg per day / in 24hours),
 - 3-12 years or body weight 15-40 kg; 0.25-0.5 mg daily. Then: Increase by 0.5 mg daily every 5-7 days
 - < 3 years; not recommended

OR

- **Chlorpromazine:** Adults: 25-50 mg I.M/PO 6-8 hourly, adjusting to max. of 200 mg daily in the first 24 hours
 - o Children:
 - 12-18 year; 25-50 mg 6-8 hourly, adjusting to max. of 200 mg daily in the first 24 hours
 - 6-12 years; 500 microgram/kg 6-8 hourly to max. of 75 mg daily in the first 24 hours
 - 1-6 year; 500 microgram/kg 6-8 hourly to max. of 40 mg daily in the first 24 hours

Maintenance treatment

Pharmacotherapy: Medications used include the following:

- 1st line
 - o **Haloperidol:** Adults: 2-5mg OD PO, can increase if need be to BD; can adjust to a maximum daily dose of 10mg
 - Children: 12-18 years; 1-3 mg OD PO, adjusted to maximum daily dose of 10 mg
 - 3-12 years; 0.5mg OD PO, adjust up to a maximum of a daily dose of 5 mg
 - OR**
 - o **Chlorpromazine:** Adults: 25-50mg BD PO, adjust to a maximum daily dose of 200mg
 - Children:
 - 12-18 years; 25mg BD PO, adjust to a maximum daily dose of 150mg
 - < 12 years (not recommended)
- 2nd line
 - o **Risperidone:** Adults: 1-2mg BD PO (start at low dose and adjust according to patient response, observing for 2-4 weeks at each increment), can increase to a maximum of 4mg daily
 - o Children:
 - 12 years 5mg OD PO, then can increase to a maximum of 10 mg daily
 - < 12 years (not recommended)
 - OR**
 - o **Quetiapine** – Day 1: 25mg BD PO
 - Day 2 – 4: Increase dosage in increments of 25 – 50 mg every twelve hours aiming for a dose of 150-300mg observing for side effects; maximum daily dose of 500mg

Depot preparations

Can consider for patients with poor adherence to oral medication or with recurrent or chronic illness

- **Fluphenazine decanoate:** Adults: 25 mg I.M monthly; first administer a test dose of 12.5mg and observe for side effects before administering the 25mg dose
 - o Children: (not recommended)

*Can also consider if the patient requests it for convenience

Tertiary specialised psychiatric hospitals

- Olanzapine
- Clozapine
- Electroconvulsive therapy (ECT)



Referral Criteria

Consider need for referral to specialized mental health services in the following situations:

Nature of illness:

- Suicidal tendencies, Catatonic symptoms
- Persistent refusal to accept oral administration – food, fluids, medication

Nature of response to treatment

- Partial or no response to treatment – consultation
- Need to start modified electroconvulsive therapy
- Resistant presentation – need to start clozapine

Schizoaffective Disorder



Description

Schizoaffective is a mental disorder that has both features of schizophrenia (hallucinations, delusions) and features of a mood disorder (depression or mania).



Signs and Symptoms

- Manic type
- Depressive type
- An uninterrupted period of illness during which there is a major mood episode (major depressive or manic) concurrent with psychotic symptoms.
- Symptoms that meet the criteria for a major mood episode are present for the majority of the total duration of the active and residential portions of the illness.
- The disturbance is not attributable to the effects of a substance or another medical condition



Investigations

The diagnosis of schizoaffective disorder is made when the patient has features of both schizophrenia and a mood disorder

- Full Blood Count (CBC)
- Rapid plasma reagant (RPR)
- Thyroid-stimulating hormone (TSH) level or thyroid function tests
- Toxicology - Urine drug screen (DOA 6/10)
- Urine pregnancy test (females), Urinalysis, Lipid profile , HIV test;

Neural imaging can be considered if clinical presentation suggests a need.

- Computed tomography (CT) - Brain
- Magnetic resonance imaging (MRI) - Brain



Treatment

Supportive

- Psychotherapy
- Psycho-educational occupational therapy

Pharmacological

- In the depressive subtype, combinations of antidepressants plus an antipsychotic are used.
- In the manic subtype, combinations of mood stabilizers plus an antipsychotic are used.
- For dosages and medications refer to management of schizophrenia, Bipolar and depressive disorders..



Referral Criteria

- Persistent symptoms after 6 – 8 weeks at maximum recommended dosage of medications
- Intolerable side effects to drugs
- Prominent negative symptoms

Alcohol Related Disorders

Alcohol Use Disorder



Description

Alcohol use disorder (AUD) is a condition characterized by an impaired ability to control alcohol use despite adverse social, occupational, or health consequences occurring within a 12-month period.



Signs and Symptoms

- Taking alcohol in larger amounts over a longer period than was intended.
- Unsuccessful efforts to cut down or control alcohol use.
- Spending significant time to obtain alcohol or recovering from its effects
- Cravings, or a strong desire or urge to use alcohol.
- Continued alcohol use despite having persistent or recurrent social or interpersonal problems
- Giving up on social, occupational, or recreational activities for alcohol use



Investigations

- Blood alcohol content (BAC), DOA 6, Breathalyzer, LFTs, KFTs, HIV Test, RPR, Hepatitis B
- Thyroid function test (t3/t4)
- Alcohol use disorder identification test (AUDIT)
- CAGE Test (cut down, annoyed, guilt, eye-opener)

Alcohol Intoxication



Description

Clinically significant problematic behavioural or psychological changes (e.g. inappropriate sexual or aggressive behaviours, mood lability, impaired judgment) that develop during or shortly after alcohol ingestion.



Signs and Symptoms

- Slurred speech,
- Incoordination,
- Unsteady gait,
- Nystagmus, c
- Impairment in attention and memory, Stupor or coma



Investigations

- Blood alcohol content (BAC), DOA6, AUDIT, CAGE, RBS, LFTs, KFTs



Treatment

Supportive

- Nutritional: Feed to avoid hypoglycaemic shock due to sudden fall in the blood glucose level.

Pharmacological

- **Thiamine:** 100mg-200 mg PO twice daily up to a month.
- **Oral rehydration** if can take orally or intravenous fluids if can't rehydrate orally to prevent dehydration.

Alcohol Withdrawal Syndrome



Description

Alcohol withdrawal syndrome comprises a cluster of symptoms that develops on total or partial withdrawal of alcohol usually after repeated and/or high-dose use.



Signs and Symptoms

Minor: These appear 6hr to 48hrs of the last intake of alcohol and include

- Nausea,
- Vomiting
- Tremors/shaking
- Weakness
- Irritability,
- Insomnia,
- Anxiety

Major: Initial withdrawal symptoms can occur 24-72 hours after the last drink and last up to 10 days and include

- Tremors
- Heart palpitations
- Elevated blood pressure
- Restlessness
- Hallucinations (auditory, tactile. Visual)
- Illusions
- Rapid emotional changes

Withdrawal seizures

These can occur 72+ hours after the last drink. The classic symptoms during this timeframe are seizures (tonic-clonic).

Delirium tremers



Description

It is the most severe alcohol withdrawal syndrome which usually occurs within 2-4 days of complete or significant abstinence from heavy alcohol drinking.

It is a medical emergency with high morbidity and mortality thus should be urgently treated.



Signs and Symptoms

- Clouding of consciousness,
- Disorientation,
- Nystagmus,
- Photophobia,
- Fever
- vivid and frightening visual and auditory hallucinations
- Tactile hallucinations of insects crawling over the body may occur)
- Illusions, Acts of violence, Insomnia, Dehydration, Diaphoresis



Investigations

- Blood alcohol content, DOA6, AUDIT, LFTs, KFTs, Urea and creatinine, Electrolytes, Chest X-ray



Treatment

Pharmacological

- Chlordiazepoxide (oral)
 - o Adults
 - Day 1: 25mg 6 hourly
 - Day 2: 25mg 8 hourly
 - Day 3: 25mg 12 hourly
 - Day 4: 25mg at bedtime

*Can consider 50-100mg dose depending on severity; maximum of 300mg/day

OR

Option 2 – when option 1 is not available

- Diazepam, IV, (administer slowly-over 2-3 minutes, approximately 2.5 mg every 30 seconds); when able to take orally can administer orally
 - o Adults
 - Day 1: 10mg 6 hourly
 - Day 2: 10mg 8 hourly
 - Day 3: 10mg 12 hourly
 - Day 4: 5mg 8 hourly
 - Day 5: 5mg 12 hourly then stop

OR

Option 3 - when option 1 and 2 are not available

- Lorazepam, IV or oral,
 - o Adults
 - Days 1 to 3: 2-4 mg once daily
 - Days 4 and 5: 1-2 mg once daily

****Note:** It is best to give benzodiazepines as needed rather than on a fixed dose schedule, thus clinical acumen in certain incidents is important as may need to administer higher dosages within safe limits. If able to, consider using the CIWAR.

- Thiamine oral or IV, Adults (oral, IV) 100 mg daily for 3 days (before any IV Glucose load), then can continue orally for 14 days
- Folic Acid 5mg, oral, Adults 1 tablet daily as needed
- Dextrose saline (5% glucose in 0.9% saline)
- Multi vitamin 1 tablet O.D PO for 1 month
- Vitamin B complex 1 tablet O.D PO for 1 month

For patients with seizures not controlled by benzodiazepines alone, consider

- Phenobarbitone, slow IV or IM, Adults 0.5-1.5 mg/kg 12 hourly

Alternative

Detoxification - Benzodiazepines (**chlordiazepoxide, diazepam, Lorazepam**) are the drugs of choice for symptomatic detoxification.

Table 116: Detoxification using Benzodiazepines

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Drug	Time (Hrs)							
LORAZEPAM	06:00	1mg	1mg	0.5mg	0.5mg	0.5mg		
	12:00	1mg		0.5mg				
	14:00		1mg		0.5mg			
	18:00	1mg		0.5mg				
	22:00	1mg	1mg	0.5mg	0.5mg	0.5mg	0.5mg	
DIAZEPAM	06:00	20mg	10mg	10mg	10mg	5mg		
	12:00	20mg	10mg					
	14:00			10mg				
	18:00	20mg	10mg		10mg	5mg	5mg	
	22:00	20mg	10mg	10mg				
CHLORDIAZEPOXIDE	06:00	30mg	20mg	15mg	10mg	10mg	5mg	5mg
	12:00	30mg	20mg	15mg	10mg	5mg	5mg	
	14:00							
	18:00	30mg	20mg	15mg	10mg	5mg	5mg	5mg
	22:00	30mg	20mg	15mg	10mg	10mg	5mg	

Rehabilitation/Reorientation

After the detoxification process there is need for the intermediate to long term follow up which is mostly non-pharmacological. This can be done through various supportive psychological intervention, physiotherapy and occupational therapy.

- **Psychotherapy**
 - o Individual therapy – CBT
 - o Group therapy (AAs, CR)
 - o Family therapy
 - o Abstinence therapy
 - o Occupational therapy
- **Tertiary specialised psychiatric treatment ss**
 - o Antabuse / Aversive
 - o Disulfiram
 - o Anti-craving
 - o Naltrexone
 - o Acamprosate



Referral Criteria

- Refer patients to the next level of care whose symptoms are difficult to control within 3 days or who remain agitated.
- Refer patients to a psychiatrist or clinical psychologist for long term management.

Alcohol Induced Psychosis



Description

Alcohol induced psychosis is a complication of long term use of alcohol. The hallucinations and delusions are not as a result of Alcohol withdrawal syndrome. Physicians should rule out alcohol withdrawal syndrome.



Signs and Symptoms

- Hallucinations – seeing and hearing things without any stimuli
- Disorganized thoughts, Delusions - false beliefs
- Confusion, Irrelevant speech, Poor hygiene
- Becoming angry, upset or energized for no apparent reason.



Investigations

- FBC
- LFT
- KFT
- U/Es
- AUDIT
- CAGE
- CT or MRI brain



Treatment

Refer to treatment of Psychotic disorders

NOTE THAT alcohol reduces the seizure threshold. In view of this, the use of anti-psychotics should be done with caution. Very low doses of antipsychotics should be used.

Alcohol Induced Seizure Disorder



Description

Alcohol-induced seizures are defined as adult-onset seizures that occur in the setting of chronic alcohol use. The seizures persist despite cessation of alcohol use and are not as a result of alcohol withdrawal syndrome.



Signs and Symptoms

Include unprovoked tonic-clonic fits



Investigations

- EEG
- CT scan
- MRI
- LFTS
- KFTS

- U/E
- FBC
- DOA6

Differential diagnosis

- Adult-onset epilepsy
- Seizures due to other medical conditions

Treatment

Refer to treatment of Seizure disorders (Epilepsy)

Substance Use Disorders

Polysubstance Use Disorder

Description

Polysubstance Use Disorder occurs when a person abuses more than one substance (or drug) at a time. This includes when two or more substances/drugs are taken together in one incident or within a short time period, either intentionally or unintentionally.

Treatment

- Treatment for Polysubstance Use Disorder must be comprehensive and based on the individual's needs as guided by the clinical evaluation.
- Individuals should receive treatment for any and all substance use disorders beginning with a substance (drug) associated with significant risks or with severe symptoms.

Opioids Use Disorder

Description

Opioids are medications that are prescribed for pain relief, typically moderate to severe pain. Prescribed opioids include **codeine, fentanyl, morphine, pethidine, tramadol and oxycodone**. Commonly abused opioids include **codeine, heroin, pethidine and methadone**. Opioid abuse or opioid use disorder is a disorder which could involve opioids used without them being prescribed or at dosages higher than the prescribed dose, to a point where it becomes difficult to stop using them or reduce their use opioid intoxication



Signs and Symptoms

- Euphoria
- Confusion
- Increased sleepiness
- Nausea
- Constipation
- Pinpoint pupils and decreased pain

Opioid withdrawal symptoms include

- Abdominal cramps
- Uncontrollable craving
- Agitation
- Diarrhoea
- Anxiety
- Increased blood pressure
- Dilated pupils
- Sweating
- Sneezing
- running nose
- tearing
- Muscle pain
- Difficulty with sleep

Signs and Symptoms of opioid overdose

- Pinpoint pupils
- Hypotension
- Blue lips and fingernails due to lack of oxygen
- Vomiting
- Pale face
- Fatigued
- usually feeling tired
- Bradycardia
- Hypoventilation
- Slow breathing (less than 1 breath every 5 seconds)
- Unsteady gait
- Slurred speech

- Gasping, gurgling or snoring
- Sedation/Coma, Passing out



Investigations

- Opioid Risk Tool (ORT)
- BSTAD (Brief Screener for Alcohol, Tobacco and other Drugs)
- Functional analysis, DOA6, FBC, HIV, RPR, LFT, KFT



Treatment

Supportive:

- Psychotherapy Brief intervention
- Group therapy
- The opioid anonymous group
- Family therapy
- Rehabilitation

Pharmacological

- Immediate management:
 - o Detoxification: Non-opioid based detoxification.

Table 117: Non-opioid based detoxification

Opioid Withdrawal Signs and Symptoms	Medication	Dosage
Adrenergic symptoms such as dilated pupils, excessive tearing, runny nose	Alpha – adrenergic agonists NB; Blood pressure monitoring is mandatory	Clonidine (tapered dosage) 300µg QID ×3days 150µg TDS ×3days 75µg BD ×3days
Lack of sleep (Insomnia) Anxiety	Benzodiazepines Diazepam (tapered dosage)	10mgs QID × 3days 10mgs TDS x 3days 10mgs BD x 3days 10mgs OD x 3days
Vomiting Antiemetics	Metoclopramide	10mgs PRN
Pain and Body temperature dysregulation (fever or chills)	Analgesics/Antipyretics	Non-steroidal anti-inflammatory Drugs (NSAIDS) – Ibuprofen 400mg PRN or Paracetamol 1g PRN

Opioid Withdrawal Signs and Symptoms	Medication	Dosage
Colic pains (cramps)	Antispasmodics Hyoscine	Butylbromide 10 mg PRN
Tachycardia & Palpitations	Beta blockers	Propranolol 40mg PRN
Muscle spasms(cramps)	Muscle relaxants	Baclofen PRN
Diarrhoea	Antidiarrhoea	Loperamide hydrochloride 2mg PRN
Fluid and electrolytes imbalance due to Diarrhoea/vomiting	Oral or Intravenous Fluids	Water, ORS Normal Saline PRN
Co-morbid psychiatric disorders –restlessness, irritability, low moods, depression	Manage; accordingly, Antidepressants	TCA – Imipramine SSRI - Fluoxetine

For opioid based detoxification, consult or refer to a specialist

- **Naloxone:** For intoxication 2mg/0.4 MI injection, auto-injector

Long-term management

- **Naltrexone:** Ensure that the patient is off opioids for at least 72 hours before Naltrexone is prescribed - initial dose of 25mg, then observe (for rebound withdrawals) for one hour

Note: If withdrawals occur, stop the medication, and treat the withdrawals first. Then start **Naltrexone** 7 days later.

Stimulant Use Disorders



Description

Stimulant use disorder includes a range of issues associated with the use of different stimulant drugs which include cocaine, amphetamines, methylenedioxymethamphetamine (MDMA), methylphenidate, caffeine and nicotine.

Signs of stimulant use:

- Anxiety,
- confusion,
- paranoia,
- decreased sexual function,
- poor judgement,
- increased appetite
- weight loss

Long term effects

Aggression, hallucinations, tooth decay, skin sores, weight loss, social isolation, dramatic behaviour changes, gastro-intestinal problems, cognitive deficits, poor judgement, loss of short-term memory, muscular weakness.



Signs and Symptoms

- Weight gain
- Dysphoric (sad) mood
- Dehydration
- Mental or physical fatigue and lassitude, Depression and suicidal ideation
- Persistent and intense drug craving
- Dulled sensorium
- Anxiety and irritability
- Psychomotor lethargy and retardation
- Agitation
- Hunger
- Chills
- Insomnia followed by hypersomnia
- Interpersonal withdrawal
- Intense and vivid drug-related dreams
- Impaired memory
- Anhedonia



Investigations

- BSTAD (Brief Screener for Alcohol, Tobacco and other Drugs),
- Functional Test DOA6, FBC, HIV, RPR, LFT, KFT, Urea, electrolytes, creatinine



Treatment

Supportive:

- Psychotherapy
- Contingency Management
- Cognitive-Behavioural Therapy
- Motivational Interviewing

Pharmacological

- Symptomatic management

Child and Adolescent Mental Health Disorders

Depression in Children And Adolescents



Description

Depression can show up in children and adolescents as prolonged periods of unhappiness or irritability that is persistent and interferes with the normal social activities, interests, schoolwork or family life. It is quite common among older children and teenagers, but often goes unrecognized.



Signs and Symptoms

- Sadness, or a low mood that does not go away
- Being irritable or grumpy all the time
- Not being interested in things they used to enjoy
- Feeling tired and exhausted a lot of the time
- Have trouble sleeping or sleep more than usual
- Not be able to concentrate
- Interact less with friends and family
- Be indecisive
- Not have much confidence
- Eat less than usual or overeat
- Have big changes in weight
- Seem unable to relax or be more lethargic than usual
- Talk about feeling guilty or worthless
- Feel empty or unable to feel emotions (numb)
- Have thoughts about suicide or self-harming
- Actual self-harm, for example, cutting their skin or taking an overdose

DSM-5 criteria for diagnosing depression in the paediatric population:

- The presence of at least 5 of the following items in the same 2-week period with having a change in the level of function. At least 1 of the items is either a depressed mood or loss of interest or pleasure. It is important to note that other medical conditions can not explain symptoms.
- Depressed or irritable mood most of the day, almost every day, as demonstrated by either subjective report, for example, the patient feels sad, empty, or hopeless, or observation made by others, for example, the patient appears sad.

- A significant decrease in interest or pleasure in activities most of the day, nearly every day as indicated by self-reporting or observation
- Failure to make expected weight gain or remarkable weight loss when not dieting or a remarkable weight gain, or decrease or increase in daily appetite
- Lack of sleep or excessive sleeping almost every day
- Psychomotor unrest or retardation almost every day (observable by others, not merely subjective feelings of restlessness).
- Lack of energy nearly every day
- Feelings of worthlessness or inappropriate guilt (possibly delusional) nearly every day (not merely self-reported or guilt for being sick)
- Decrease capacity to think or concentrate or indecisiveness, almost every day (either by self-report or as observed by others)
- Repeated thoughts of death (not just fear of dying), recurrent suicidal ideation without specific plans; suicide attempt; or a definite plan to commit suicide
- The illness causes clinically remarkable distress or impairment in social, occupational, or other important areas of functioning.
- The episode is not due to the physiological effects of a substance or another medical condition
- The occurrence of the major depressive episode cannot be explained by schizoaffective disorder, schizophrenia, schizophreniform disorder, delusional disorder, or other specified and unspecified schizophrenia spectrum and other psychotic disorders
- Had no manic or hypomanic episodes



Investigations

- Full blood count (FBC) and vitamin B-12 levels
- Renal function tests including magnesium, calcium, and phosphate.
- Thyroid function tests (T3, T4 and TSH)
- Liver function tests,
- urine toxicology screen
- HIV test,
- dexamethasone suppression test, and an ACTH stimulation test.



Treatment

Treatment should aim for recovery, achieving full remission of symptoms, and returning to the premorbid level of functioning. In children treatment often starts with psychosocial interventions.

Supportive:

Psychosocial Interventions Involving the Child and Parents

Psychosocial interventions are the first-line treatment in case of mild-to-moderate depression.

- Psycho-education including education about the illness, the importance of having a good sleep, and good nutrition
- Exercising for at least 30 minutes a day
- Cognitive and behavioral therapy to help the depressed child and adolescents with problem-solving skills, and to use behavioral activation techniques
- Interpersonal therapy aimed to decrease interpersonal conflicts by helping depressed individual learning interpersonal problem-solving skills and changing dysfunctional communication and relational patterns
- Family therapy: this could be of help to the depressed individual and family in ensuring that the family know how to support the children and the children feel supported

Pharmacological

Child 5–17 years: Fluoxetine Initially 10 mg daily, increased if necessary up to 20 mg daily, dose to be increased after 1–2 weeks of initial dose, daily dose may be administered as a single or divided dose.

Anxiety Disorders in Children and Adolescents



Description

Many children have fears and worries from time to time. Strong fears may appear at different times during development. For example, toddlers are often very distressed about being away from their parents, even if they are safe and cared for. Although fears and worries are typical in children, persistent or extreme forms of fear could be due to anxiety. When a child does not outgrow the fears and worries that are typical in young children, or when there are so many fears and worries that they interfere with school, home, or play activities, the child may have an anxiety disorder.



Signs and Symptoms

- Finding it hard to concentrate
- Not sleeping, or waking up in the night with bad dreams
- Eating more or less than usual
- Quickly getting angry or irritable, and being out of control during outbursts
- Constantly worrying or having negative thoughts
- Feeling tense and fidgety, or using the toilet often
- Always crying
- Being clingy, especially in young children
- Complaining of tummy aches and feeling unwell
- physiological symptoms such as palpitations, chest tightness, nausea, faintness, chills, and muscle tightness
- Avoidance of or reluctance to engage in certain activities or with certain objects or individuals
- Tantrums

DSM-5 criteria for generalized anxiety disorder in children

- Excessive anxiety and worry (apprehensive expectation), occurring more days than not for at least 6 months, about a number of events or activities (such as work or school performance).
- The anxiety and worry are associated with one (or more) of the following six symptoms (with at least some symptoms having been present for more days than not for the past 6 months):
- Restlessness or feeling keyed up or on edge
- Being easily fatigued
- Difficulty concentrating or mind going blank
- Irritability
- Muscle tension
- Sleep disturbance (difficulty falling or staying asleep, or restlessness, unsatisfying sleep)
- The anxiety, worry, or physical symptoms cause clinically significant distress or impairment in social, family, school or other important areas of functioning.
- The disturbance is not attributable to the physiological effects of a substance (e.g., a drug of abuse, a medication) or another medical condition (e.g., hyperthyroidism).
- The disturbance is not better explained by another mental disorder.



Treatment

Supportive

- **Psychoeducation:** Children and adolescents need to know that some feelings of anxiety are normal, and that their cause or intensity should not be ignored or discounted. They can learn that feelings of uneasiness are common and nameable (as a 'worry', 'anxiety', or 'scary thing'). Discussing and explaining the physical and psychological manifestations of anxiety using age- and developmentally appropriate language can help children, adolescents, and families recognize what they are feeling, and why
- **Parental counselling:** Counsel parents that while empathic responses to children's anxiety are needed, helping children to face their fears is a key parenting goal. By modelling and supporting adaptive coping strategies for life stressors, a parent can help children to stop avoiding things that may, at first, appear overwhelming.
- Cognitive behavioural therapy is a mainstay of psychotherapeutic treatment for anxiety, based on the premise that thoughts influence feelings and behaviours.
- **Art Therapy:** plays a huge role as it helps the children and adolescents to express how they are feeling on paper, something that may be difficult for them to verbalise.
- Exposure therapy such as systemic desensitization

Pharmacological

- Recommended for children with severe symptoms and for children who do not respond to non-pharmacological therapy alone. Should always be used in combination with non-pharmacological therapy.
- **Children > 6 years:** fluoxetine initially 10mg once daily in the morning which can be increased to a maximum of 20mg once daily in the morning after 1-2 weeks.

Substance Use Disorders in Children and Adolescents



Description

Substance use disorders (SUD) are chronic conditions resulting from the complex interaction between psychoactive substances and brain circuitry. Commonly used substances include alcohol, cannabis (marijuana), nicotine and opioids. Mental health disorders and substance use disorders often occur together. Adolescents with depression, anxiety, or attention deficit hyperactivity disorder (ADHD) are more likely to use substances and develop substance use disorders than their peers.



Signs and Symptoms

There are behavioral and physical signs that a child may be using drugs, other substances, or both.

- Erratic behavior
- Depression or mood swings, change in attitude
- Acting paranoid, irritable, or anxious
- Having difficulties staying on task or staying focused
- Stealing, lying
- Becoming secretive, locking bedroom door
- A change in friends
- Declining school performance
- Loss of interest in hobbies
- Acting aggressive or angry or irresponsibly
- Sleeping more or less than usual
- Missing school, sports, or work
- Poor hygiene/change in appearance
- Glazed, watery, or bloodshot eyes
- Pupils larger (dilated) or smaller (constricted) than usual
- Frequent nosebleeds or runny nose
- Sores in the mouth, on the lips, or both
- Puffy face
- Small track marks (due to needle use) on arms or legs, wearing long sleeves (even in warm weather)
- Shaking hands or cold, sweaty palms
- Headaches
- Fidgeting

- Shakes or tremors
- Sudden weight loss

DSM 5 Criteria for substance use disorder in children and adolescents

Diagnostic Criteria A.

A problematic pattern of substance use leading to clinically significant impairment or distress, as manifested by at least two of the following, occurring within a 12-month period:

- Substance is often taken in larger amounts or over a longer period than was intended.
- There is a persistent desire or unsuccessful efforts to cut down or control substance use.
- A great deal of time is spent in activities necessary to obtain substance, use substance, or recover from its effects.
- Craving, or a strong desire or urge to use substance.
- Recurrent substance use resulting in a failure to fulfill major role obligations at work, school, or home.
- Continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of substance.
- Important social, occupational, or recreational activities are given up or reduced because of substance use.
- Recurrent substance use in situations in which it is physically hazardous.
- Substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by
- Tolerance, as defined by either of the following: a. A need for markedly increased amounts of substance to achieve intoxication or desired effect. b. A markedly diminished effect with continued use of the same amount of substance.
- 11. Withdrawal, as manifested by either of the following: a. The characteristic withdrawal syndrome for specific substance. b. Substance (or a closely related substance, such as a benzodiazepine in case of alcohol) is taken to relieve or avoid withdrawal symptoms

Severity Specifier

- Mild: Presence of 2–3 symptoms.
- Moderate: Presence of 4–5 symptoms.
- Severe: Presence of 6 or more symptoms.



Investigations

- FBC
- LFT's
- RFT's
- Toxicology
- drugs of abuse panel 10
- TFT (T3, T4, TSH)



Treatment

Supportive

Psychosocial/Behavioral Interventions are considered “first-line” treatment for adolescents with SUD and involve individual, group, and family-based interventions. *These include*

- Cognitive behavioural therapy
- Family therapy
- Motivational interviewing or motivational enhancement therapy
- Contingency management and motivational incentives

Pharmacological

Depend on the substance being abused and the level of severity of the substance use problem. (Refer to the section on substance use in adults. Doses would have to be titrated in consultation with a specialist)

Oppositional Defiant Disorder



Description

Oppositional defiant disorder (ODD) is a type of childhood disruptive behavior disorder that primarily involves problems with the control of emotions and behaviors. The main feature of ODD is a persistent pattern of angry or irritable mood, argumentative or defiant behavior, or vindictiveness toward others.



Signs and Symptoms

- Frequent temper tantrums that are outside of what one would expect for a child’s age, gender and culture
- Is often angry or easily annoyed
- Argumentative toward adults or others
- Deliberately annoying others
- Blaming others for mistakes or misbehavior, even when caught in the act
- Being resentful, spiteful or vindictive
- Being aggressive toward peers, and angry or disruptive toward adults.
- Refuse to follow commands or requests made by parents, teachers or other adults.

Diagnostic Criteria as per DSM- 5

- A. At least 4 symptoms from the list below should have been present on most days for at least 6 months, demonstrating a pattern of angry or irritable mood, argumentative or defiant behavior, or vindictiveness:
- Often loses temper
 - Often touchy or easily annoyed

- Often angry and resentful
 - Often argue with authority figures or, for children and adolescents, with adults
 - Often actively refuse or defy to comply with requests from authority figures or with rules
 - Often deliberately annoys others
 - Often blames others for his or her mistakes or misbehavior
 - The child has been spiteful or vindictive at least twice within the past 6 months
- B. There should be evidence of impairment either in the form of distress (in the individual, family, peers, etc) and/or negative impact on social, educational, occupational, or other important areas of functioning.
- C. The behaviors do not occur exclusively during substance use, psychotic, depressive, or bipolar disorder.
- D. The patients must not meet the criteria for disruptive mood dysregulation disorder.

NB: Severity: ODD is considered mild if symptoms are confined to only 1 setting, moderate if at least 2 settings, and severe if symptoms are present in 3 or more settings.



Treatment

Treatment of oppositional defiant disorder is multimodal and should involve the patient, family, school, and community. Identifying and treating comorbidities (like ADHD, depression, and anxiety) and modifiable risk factors (such as bullying and learning difficulties) should be done. Treatment modalities include:

- **Parent management training:** This is the main treatment for oppositional behaviors and involves positive reinforcement in changing behaviors to decrease unwanted behaviors and promote prosocial behaviors.
- **School-Based Interventions:** Supportive interventions to improve school performance, peer relationships, and problem-solving skills are particularly useful in treating ODD. This may include education and specific tools for the teacher to improve classroom behavior, techniques to prevent oppositional behavior or the escalation of such behavior, and other methods that facilitate adherence to classroom rules and acceptable social norms.
- **Individual therapy:** Cognitive-behavioral therapy (CBT) based anger management training is useful in treating anger problems. In older children, problem-solving skills training and perspective-taking are CBT components that may alleviate aggressive behaviors.
- **Pharmacological management:** Psychosocial interventions are the first-line treatment for children with ODD, hence pharmacologic agents are typically reserved for cases in which aggressive and disruptive behaviors cannot be managed by the above treatment modalities alone.

Risperidone 0.5 to 1mg once daily can be given for aggression and violence

- Treat any comorbid conditions

Conduct Disorder



Description

Conduct disorder is a mental health condition that is diagnosed when children or teens exhibit serious aggressive and antisocial behaviors that violate rules or rights of others, with little to no guilt or concern

regarding their actions. Conduct disorder typically arises during late childhood or early adolescence and many children with this condition were previously diagnosed with oppositional defiant disorder which was not adequately managed.



Signs and Symptoms

- Lying
- Stealing
- Fighting
- Vandalizing
- Destroying property
- Setting fires
- Skipping school
- Disregarding their parents' rules
- Threatening or intimidating others
- Bullying others
- Being cruel to animals
- Possessing or using weapons
- Forcing others to perform sexual acts
- Running away from home
- Becoming engaged in promiscuous sexual behavior
- Using illegal drugs
- Drinking alcohol
- Experiencing academic difficulties in school

DSM-5 Diagnostic Criteria for Conduct Disorder

- A. A repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate societal norms or rules are violated, as manifested by the presence of at least three of the following 15 criteria in the past 12 months from any of the categories below, with at least one criterion present in the past 6 months:
- **Aggression to People and Animals**
 - o Often bullies, threatens, or intimidates others.
 - o Often initiates physical fights.
 - o Has used a weapon that can cause serious physical harm to others (e.g., a bat, brick, broken bottle, knife, gun).
 - o Has been physically cruel to people.
 - o Has been physically cruel to animals.
 - o Has stolen while confronting a victim (e.g., mugging, purse snatching, extortion, armed robbery).
 - o Has forced someone into sexual activity.

- **Destruction of Property**
 - o Has deliberately engaged in fire setting with the intention of causing serious damage.
 - o Has deliberately destroyed others' property (other than by fire setting).
 - **Deceitfulness or Theft**
 - o Has broken into someone else's house, building, or car.
 - o Often lies to obtain goods or favors or to avoid obligations (i.e., "cons" others).
 - o Has stolen items of nontrivial value without confronting a victim (e.g., shoplifting, but without breaking and entering; forgery).
 - **Serious Violations of Rules**
 - o Often stays out at night despite parental prohibitions, beginning before age 13 years.
 - o Has run away from home overnight at least twice while living in the parental or parental surrogate home, or once without returning for a lengthy period.
 - o Is often truant from school, beginning before age 13 years.
- B. The disturbance in behavior causes clinically significant impairment in social, academic, or occupational functioning.
- C. If the individual is age 18 years or older, criteria are not met for antisocial personality disorder



Investigations

- FBC
- LFT's
- RFT's
- Toxicology
- Drug of abuse
- hormonal assay
- Drug of Abuse panel



Treatment

Supportive

- Contingency management programs
- Cognitive behavioral skills training
- Parent management training

Pharmacological

- Risperidone 1-2 mg once daily for aggression and violence
- Treat any comorbid condition accordingly



Complications

- If not treated adequately, conduct disorder progresses to antisocial personality disorder after the age of 18.

Delirium



Description

Delirium is the sudden severe confusion due to rapid changes in brain function that occur as a result of physical or mental illness. Delirium is also known as acute confusional state or acute brain syndrome.



Signs and Symptoms

Delirium involves a quick change between mental states (for example, from lethargy to agitation and back to lethargy).

Symptoms include:

- Changes in alertness Changes in feeling (sensation and perception), Changes in level of consciousness or awareness
- Changes in sleep patterns.
- Decrease in short-term memory and recall,
- Disorganized thinking
- Emotional or personality changes



Investigations

The following tests may have abnormal results:

- Mini mental state examination, Neuropsychological assessment
- FBC, Blood glucose level, RFTs, LFTs, RPR, Vitamin B-12 Levels and folate levels
- T3,T4, HIV , CSF analysis
- Neuroimaging- Chest x-ray, Electroencephalogram (EEG), Head CT scan, Head MRI



Treatment

- Treat the underlying cause
- Psychotropic drugs may be needed to control aggressive or agitated behaviours (refer to the section on the management of agitated patients). These are usually started at very low dosages and adjusted as needed.



Referral Criteria

- Consider need for referral to the next level of care

Puerperal Psychosis (Postpartum Pyschosis)



Description

Puerperal psychosis also known as postpartum psychosis can be defined as the occurrence of the following symptoms within 6 weeks after giving birth:

- Mania/mixed episodes with or without psychotic features.
- Depression with psychotic features; and
- Psychosis without mood symptoms.

The symptoms often begin within the first 2–3 days and can be overwhelming and frightening experience

Many women experience mild mood changes after giving birth. This is a normal mood change known as the “baby blues” and only lasts for a few days. Baby blues usually fade on their own within a few days, and will not exceed two weeks. Postpartum psychosis, is a psychiatric emergency because these mothers are at increased risk for harming themselves and their children



Signs and Symptoms

Symptoms usually start suddenly within the first 6 weeks of giving birth but may also start within hours or days after giving birth. Symptoms can include:

- Hallucinations
- Delusions
- Mood swings - being withdrawn or tearful
- lacking energy
- loss of appetite to sudden anxiety
- agitation or trouble sleeping
- Disinhibited behaviour, such as undressing
- Feeling suspicious or fearful
- Restlessness
- Overly disturbed behaviour



Investigations

- FBC
- LFT
- U & Es
- DOA6/DOA10
- TFTs
- HIV
- RPR
- Vitamin B1
- B12 and Folate Blood Levels
- CSF
- Urine (R/M)
- C-Xray



Treatment

Supportive

- Psychotherapy (individual and family therapy)
- Support with baby care to help in role transition

Pharmacological Treatment of perinatal presentations:

- **Medications for perinatal presentations:** To stabilise the patient's mood and prevent symptoms recurring.
- **Antidepressants:** Antidepressants Of choice are setralline and imipramine (for dosages refer to management of depression)
- Antipsychotics of choice in breastfeeding mothers are haloperidol and risperidone (for dosages refer to management of schizophrenia)
- **Benzodiazepines:** diazepam 2.5mg 24 hourly before sleep (**should only be given for 3 to 5 days**)
OR
- Lorazepam 0.5-1mg 24 hourly before sleep (should only be given for 3 to 5 days).



Referral Criteria

- If patient does not respond to first line medication
- If symptoms of catatonia are present consider referring to specialist care

- If patient is very suicidal, manic with psychotic features needing urgent stabilisation with lectroconvulsive therapy (ECT).

Psychiatric Manifestations of HIV/AIDS



Description

Neuropsychiatric manifestations of HIV include HIV mania

- HIV induced psychosis
- HIV induced mood disorder



Investigations

- HIV
- FBC
- Viral Load
- LFTs
- RFTs
- RPR
- CSF analysis
- CT scan
- MRI
- EEG
- C-Xray



Treatment

Supportive:

- Counselling
- Social/family support
- Patient education treatment
- Physical therapy
- Nutritional therapies

Pharmacological treatment

- Antiretroviral therapy

- Depressive, manic, and psychotic disturbances require psychotropic drugs.
- Treatment of psychiatric symptoms is symptomatic and depends on the presenting mental symptoms. (Refer to management of mania, depression and schizophrenia)



Referral Criteria

When the mood disturbance and psychotic features persist despite being on HAART for over 6months.

Adverse Effects of Commonly Used Drugs in the Treatment of Psychiatric Disorders

Adverse side effects are common, and they are based on their sedative and anticholinergic effects and their propensity to cause extrapyramidal symptoms.

Extrapyramidal effects:

Acute dystonia



Description

This effect develops generally within hours to days and affect the face, neck, trunk, or hands after I.V or I.M administration.



Signs and Symptoms

- Oculogyric crisis
- opisthotonos.
- Laryngeal spasm.



Treatment

- Benztropine 1-2mg I.V or I.M for immediate relief of acute signs
- OR**
- Benzhexol 2 to 5mg PO 24 hourly

Akathisia



Description

It is characterized by subjective motor restlessness of the feet and legs which occurs generally within a few weeks of initiating treatment but occasionally later



Treatment

- Reduce the dosage of the antipsychotic drugs
- OR**
- Propranolol 20 to 40mg PO 24 hourly
- OR**
- Diazepam 5mg PO 8 hourly
- OR**
- Benzhexol 5mg 24 hourly
 - Caution: propranolol must be avoided in asthmatic patients.

Parkinsonism



Description

Commonly seen in elderly patients, and it is typically seen in the early weeks of treatment, and it produces general poverty of movement, rigidity and later tremors and salivations.



Treatment

- Benzhexol 2 to 5mg once daily 24-hourly PRN
- Physiotherapy

Tardive Dyskinesia



Description

This adverse side effect is associated with prolonged use of antipsychotic drugs and is characterized by involuntary and abnormal movements of the jaw, lips and the tongue.

Note: it is important to regularly monitor patients on antipsychotics for early signs of tardive dyskinesia



Treatment

- Stop Anticholinergics
- Stop Antipsychotics
- Refer to next level of care.

Anticholinergic Effects



Description

All antipsychotic drugs cause anticholinergic effects such as: Dry mouth, blurred vision, Constipations, Bladder atony, Decreased or increased sexual function, Sweating, Salivation, Glaucoma

Commonly used psychotropic drugs that produce the above-mentioned side effects are usually first-generation antipsychotic such as chlorpromazine, haloperidol, fluphenazine decanoate (Modecate). Second generation such as risperidone, quetiapine and clozapine may produce EPS in high doses.

NB: These side effects are self-limiting; they don't warrant stopping the treatment of the patient unless when severe.

5.5.2. Neurological Conditions

5.5.2.1. Seizure Disorder (Epilepsy)



Description

It is a transient recurrent paroxysmal neuronal discharge that disturbs the cerebral function.

Types of epileptic seizures

1. Idiopathic epileptic seizures are the type of fits that develop without any identifiable cause.
2. Cryptogenic causes are hidden or occult. It may be possible to know the cause but is not yet known.
3. Symptomatic epileptic seizures develop due to identifiable, underlying factors such as the following:
 - Infections such as meningitis, HIV, and cerebral malaria, Febrile convulsions due to high body temperature in children, Trauma due to injury at birth or intrauterine, Metabolic disorders such as hypoglycemia, electrolyte imbalance
 - Toxicity due to alcohol and other drugs, Cerebral oedema, Circulation disturbances due to cerebral vascular accidents, sickle cell crisis OR Space occupying lesion due to tumours or haemorrhage, Degenerative Diseases such as Picks disease
 - Congenital Diseases such hydrocephalus

Note: If the conditions stated above are not identified early and adequately treated, then seizures may continue and lead to possible and subsequent damage to the brain.

- Precipitating (Trigger) factors of epileptic seizures
- The following events are known to trigger epileptic seizures:
 - o Flashing lights, Alcohol intoxication, Sleep or lack of enough sleep, Hyperventilation, Hypoglycemia (low blood sugar), Physical and emotional stress, Special smells, Hormonal change, Acute illness

Characteristics of True seizures/Fits

- The patient has no control over the seizure, There is uncontrollable movements of arms and legs, There is loss of consciousness, The seizure should repeat itself
- The repeat episodes should be uniform or stereotype, May present with tongue bites, May present with incontinence – urinary or stool
- The seizures tend to respond to anti-epileptic drugs

Stages of a Seizure

The following identifiable stages are characteristic of a typical epileptic seizure:

- **Prodromal phase:** Occurs hours or even days before actual seizure. Symptoms include headache insomnia, irritability, ill temper
- **Aura phase:** A seizure aura is caused by brain activity that precedes a seizure. Symptoms may include feeling tired or sleepy, distorted vision, smelling strange odours, feeling unusual, odd taste, ringing sounds in the ears, dizziness or light headedness and a sense of dejavu.
- **Seizure (ictus):** This is the most recognizable phase of a seizure and is characterized by sudden stiffness of the body sudden falling down and followed by involuntary and continuous jerking body movements, grunting noises, twitching of the face, tongue biting and, in some cases, loss of bladder or bowel control. In episodes where consciousness is affected, the patient will not be able to give account of what has transpired.
- **Post ictal phase:** This occurs after the fit. The body relaxes making the patient to go into deep sleep. Upon waking up, the patient may complain of headache and tongue bites and show signs of irritability or confusion.

Classification of Seizure Disorders

- **Partial Seizures (Focal onset seizures):** These seizures are caused by abnormal electrical discharges start in a localized brain area.
 - o **Simple Partial Seizures (Focal aware seizures):** The patient's consciousness is not affected. S/he may present with:
 - Motor symptoms such as muscle twitching, stiffening of limbs
 - Sensory/somato sensory symptoms such pinpricks, cold of limb, hearing sounds or seeing strange things
 - Autonomic symptoms such as sweating, palpitations flushing e.t.c.
 - Psychiatric symptoms such as mood changes, hallucinations and memory problems.
 - o **Complex Partial Seizures (Focal impaired awareness seizures)** are mainly characterised by impairment of consciousness during which the patient may be aware of what is happening but unable to control his/her behaviour. May have either motor or non-motor symptoms, or both.
 - o **Partial Seizures Secondarily Generalized (Focal to bilateral Tonic-Clonic seizures):** characterised by an aura, loss of consciousness followed by tonic-clonic seizures
- **Generalised Seizures:** These seizures originate in both brain hemispheres simultaneously.
 - o **Absence Seizures** are more common in children. These are characterised by very brief loss of consciousness that may last only for few seconds. The child exhibits a blank stare or with eyes rolling upwards for a brief moment

- o Tonic-Clonic Seizures are the commonest type, characterised by stiffening of muscles and violent body jerks. These are well known by society and commonly referred to as fits or epilepsy
- o Tonic Seizures are mainly characterised by stiffening of body muscles
- o Clonic Seizures are characterised by violent body jerks
- o Myoclonic Seizures are a type of seizure that causes sharp and uncontrollable muscle contractions which are common in children. The contractions are usually brief and minor but can sometimes spread to other body parts.
- o Atonic/Astatic Seizures are also called drop attacks and are characterised by sudden loss of muscle tone resulting into the patient to drop or fall to the ground.

Note that patients may suffer from one type of Seizure but it is possible for patients to suffer from a combination.

- **Status Epilepticus:** This is a seizure that lasts longer than 5 minutes or having more than one seizure within a period of 5 minutes without returning to normal level of consciousness between the episodes. Status epilepticus is a medical emergency that may lead to brain damage or even death

Psychiatric Aspects of Epilepsy



Description

Epilepsy is not a Mental Illness. However, a small percentage of patients may develop psychiatric problems. Psychiatric manifestation of epilepsy may be related to the following:

- Psychosocial factors
- Neuro-Psychiatric effects of medication
- Psychiatric syndromes directly attributed to epilepsy

Other Conditions Associated with Seizures

- Epileptic personality syndrome
- Violence
- Mania
- Neuroses
- Cognitive deterioration



Investigations

- Laboratory tests-FBC, Blood glucose level, RFTs, LFTs, RPR, TFTs, HIV, CSF analysis
- Neuroimaging-Chest X-ray, Electroencephalogram (EEG), Head CT scan, Head MRI
- Stool and Urine analysis- routine and microscopic examination to rule out neurocysticercosis, could be considered in some presentations.



Treatment

Supportive:

- Psychotherapy
- Individual therapy
- Family therapy

Pharmacological:

Table 118: Commonly Used 1st Line Anticonvulsants in Adults

Seizure type	1st Line	Starting dose	Daily dose	Maintenance dose	Dosage interval
Partial Seizures	Carbamazepine	100-200mg	800mg	400-2000mg	2-4 times a day
Simple Partial	Lamotrigine	25mg	100mg	100-200mg	1-2 times a day
Complex partial	(monotherapy)	25mg	25-50mg	100-200mg	1-2 times a day
Secondary	(Adjunctive VP)	50mg	300mg	200-400mg	1-2 times a day
Generalized	(Adjunctive W/T VP)	50mg	300mg	200-400mg	2 times a day
	Valproate	100-200mg	300mg	100-700mg	1- 2 times a day
	Phenytoin				
Generalised Seizures Absences	Ethosuximide	500mg	1000mg	500-2000mg	1-2 times a day
	Lamotrigine	25mg ive	25mg	100-200mg	1-2 times a day
	(monotherapy)	25mg 50mg	25mg	100-200mg	1-2 times a day
	(Adjunct	600mg	300mg	200-400mg	1- 2 times a day
	VP) (Adjunctive		1000mg	1000-2000mg	2 times a day
	W/T V Valproate				
Atomic/Clonic	Lamotrigine	25mg	25mg	100-200mg	1-2 times a day
	(monotherapy)	25mg	25mg	100-200mg	1-2 times a day
	(Adjunctive VP)	50mg	300mg	200-400mg	1-2 times a day
	(Adjunctive W/T VP)	600mg	1000mg	1000-2000mg	2 times a day
	Valproate Sodium				
Tonic-Clonic	Carbamazepine	100-200mg	800mg	400-2000mg	2-4 times a day
	Lamotrigine	25mg	100mg	100-200mg	1-2 times a day
	(monotherapy)	25mg	25-50mg	100-200mg	1-2 times a day
	(Adjunctive VP)	50mg	300mg	200-400mg	1-2 times a day
	(Adjunctive W/T VP)	50mg	300mg	200-400mg	2 times a day
	Valproate Sodium				
Myoclonic	Clonazepam	1mg	6mg	4-8mg	1 at night (or 3-4 times a day)
	Valproate Sodium	600mg	1000mg	1000-2000mg	2 times a day

Table 119: Commonly Used 2nd Line Anticonvulsants in Adults

Seizure type	2nd Line	Starting dose	Daily dose	Maintenance dose	Dosage interval
Partial Seizures	Acetazolamide	250 mg	500-750mg	250 -1000mg	3-4 times a day
Simple Partial	Gabapentin	300mg	600-2400mg	900 – 1200mg	3 times a day
Complex partial	Phenobarbitone	30-60mg	120mg	60-240mg	1-2 times a day
Secondary	Acetazolamide	250 mg	500-750mg	250 -1000mg	3-4 times a day
Generalized	Clonazepam	1mg	6 mg	4-8mg	1 at Night (or 3-4 times a day)
Generalized Seizures					
Absences					
Tonic/clonic	Acetazolamide	250mg	500 -750mg	250 -1000mg	3-4 times a day
	Carbamazepine	100-200mg	800mg	400 - 2000mg	3 times a day
	Phenobarbitone	30-60mg	120mg	60 - 240mg	1-2 times a day
	Phenytoin	100-200mg	300mg	100-700mg	1-2 times a day
Tonic-Clonic	Acetazolamide	250mg	500-750mg	250 -1000mg	250-1000mg
	Gabapentin	300mg	600-2400mg	600 - 2400mg	600-2400mg
	Phenobarbitone	30-60mg	120mg	60 - 240mg	1-2 times a day
Myoclonic	Acetazolamide	120mg	500-750mg	250 - 1000mg	3-4 times a day

Table 120: Commonly Used 1st Line Anticonvulsants in Children

Seizure type	1st Line	Starting dose (mg/kg per 24hours)	Target dose for initial assessment of effect (mg/kg per 24hours)	Incremental dose (mg/kg per 24hours)	Dose interval (days)	Usual effective dose (mg/kg per 24hours)	Frequency of dosing (times per 24 hours)
Partial Seizures	Lamotrigine (monotherapy)	5 150 microgram	12.5	2.5 150 microgram	3-7	12-25	2-3
Simple Partial	(Adjunctive VP)	300 microgram	30	300 microgram	1	1.5	1.2
Partial complex partial	(Adjunctive W/T VP)	5-7.5			4	1.5	1.2
secondary	Valproate	1.5-2.5			14	12.5 - 15	2
	Phenytoin		7		10		
Generalized seizures	Ethosuximide	5-	15-	10- 300 microgram	15- 14	10-20	2- 1-2
Absence	Lamotrigine (monotherapy)	150 microgram	30	300 microgram	14	1-5	1-2
	(Adjunctive VP)	300 microgram		300 microgram	10	1-5	2
	(Adjunctive W/T VP)	5-7.5		10		12.5-15	
	Valproate						

Seizure type	1st Line	Starting dose (mg/kg per 24hours)	Target dose for initial assessment of effect (mg/kg per 24hours)	Incremental dose (mg/kg per 24hours)	Dose interval (days)	Usual effective dose (mg/kg per 24hours)	Frequency of dosing (times per 24 hours)
Atonic/ Clonic	Lamotrigine (monotherapy) (Adjunctive VP)	- 150 microgram 300 microgram	- 150 microgram 300 microgram	- 150 microgram 300 microgram	- 150 microgram 300 microgram	- 150 Microgram 300 microgram	- 1-2
Tonic – Clonic	Valproate Sodium Carbamazepine Lamotrigine (monotherapy) (Adjunctive VP)	5 -7.5 5 - 150 Microgram 300 microgram	5-7.5 12.5 - 150 microgram 300 microgram	5-7.5 2.5 - 150 microgram 300 microgram	5-7.5 3-7 - 150 microgram 300 microgram	5-7.5 12-25 - 150 microgram 300 microgram	1-2 2 2-3 1-2
Myoclonic	Valproate Sodium Clonazepam	5-7.5 50 microgram	5-7.5 1	5-7.5 1	5-7.5 50 microgram	5-7.5 1	150 microgram 300 microgram 5- 7.5

Table 121: Commonly Used 2nd Line Anticonvulsants in Children

Seizure type	2nd Line	Starting dose (mg/kg per 24hours)	Target dose for initial assessment of effect (mg/kg per 24hours)	Incremental dose (mg/kg per 24hours)	Dose interval (days)	Usual effective dose (mg/kg per 24hours)	Frequency of dosing (times per 24 hours)
Partial Seizures	Acetazolamide	2.5	7.5	5-7	1	5-7	2-3
Simple Partial	Gabapentin	10	10	0	1,2,3	10-20	1- 1-2
Partial Complex	Phenobarbiton	1-1.5	1-1.5	2	1	2.5-5	2-3
Secondary Generalized	Acetizolamide	2.5	7.5	5-7	1	5-7	
Generalized Seizures	Clonazepam	50microgram	1	1	50microgram	12.5-15	1
Absences							
Atomic/ clonic	Acetazolamide	2.5	5-7.5	5-7		5-7	2-3
	Carbamazepin	5	10	2.5	1	2.5-5 2.5-4	2-3
	Phenobarbitone	1-1.5	1-1.5	2	3-7	2.5-5	1-2
	Phenytoin	1.5-2.5	7.5	2.5-5	1 1		2

Seizure type	2nd Line	Starting dose (mg/kg per 24hours)	Target dose for initial assessment of effect (mg/kg per 24hours)	Incremental dose (mg/kg per 24hours)	Dose interval (days)	Usual effective dose (mg/kg per 24hours)	Frequency of dosing (times per 24 hours)
Tonic-Clonic	Acetazolamide	2.5	5-7.5	5-7		5-7	2-3
	Gabapentin	10	10	0	1	10-20	1
	Phenobarbitone	1-1.5	1-1.5	2	1,2,3 1	2.5-4	2-3
Myoclonic	Acetazolamide	2.5	5-7.5	5-7	1	5-7	2-3

Supportive

- Psychoeducation
- Social support services
- Family counselling

Status Epilepticus



Description

This is a seizure that lasts longer than 5 minutes or having more than one seizure within a period of 5 minutes without returning to normal level of consciousness between the episodes. Status epilepticus is a medical emergency that may lead to brain damage or even death



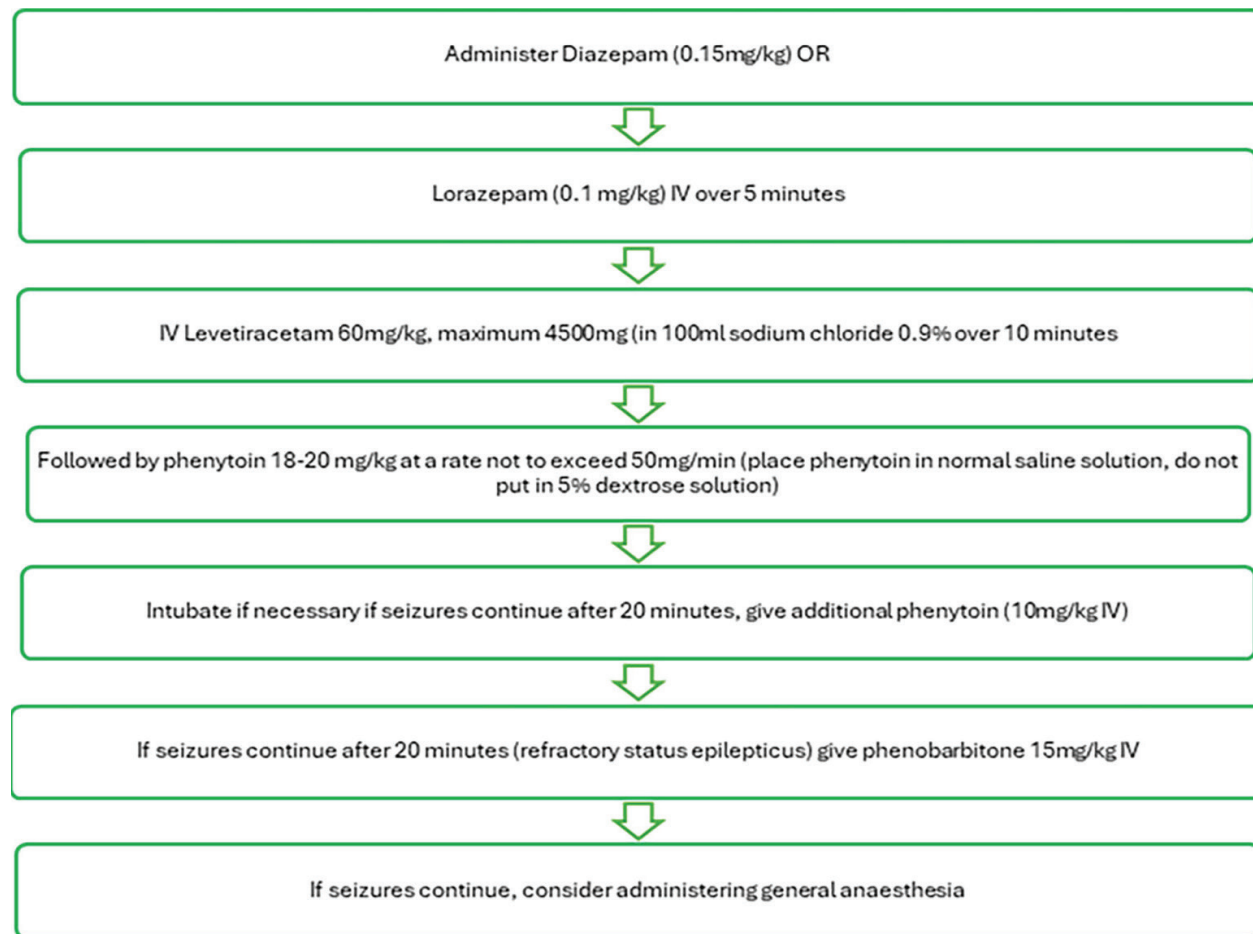
Treatment

Status epilepticus usually responds to Benzodiazepines.

Approach:

- Check ABCs
- Insert IV
- Insert urinary catheter
- Laboratory investigations
- Treat underlying disorders
- Admit to hospital (for at least 24 hours after last fits)
- Start an IV line, administer 20-50ml bolus 50% dextrose IV and 100mg of thiamine
- Then start the anticonvulsant.

Figure 13: Pharmacological Management of Status Epilepticus



Maintenance pharmacological treatment

Option 1

- Carbamazepine 200 – 400mg B.D P. O
 - o *Administer with Folic acid 5mg O.D P. O if for long term administration

OR

Option 2 – Consider if option 1 not available or if adverse reactions to option 1

- Sodium valproate 500mg - 1g B.D P. O

OR

Option 3 – consider if not responding to option 1 and 2

- Sodium divalproex 500mg-1g O.D initially then can gradually increase to B.D if indicated (if patient does not stabilize on minimal dose)

If there are psychotic features

1st line

- Haloperidol 2.5mg-5mg O.D P. O; then increase to B.D if indicated

OR

- Chlorpromazine 50mg-100mg B.D P. O

2nd line

- Risperidone 1-2mg O.D P. O; then increase to 1-2mg B.D P. O if indicated

NB: Be cautious of Extrapyrimal Side Effects (EPS) with first generation antipsychotics, explain to patients and care givers the side effects and the need to return for review if observed. Start at minimal dose and slowly taper up as observe to avoid EPS.

Psychoeducation on epilepsy and psychotherapy will be important for both the patient and the caregivers.

5.5.2.2. Headache



Description

Headaches are among the most common medical problems for which people seek health services. There are several causes of headaches therefore a good history is crucial to distinguish the type and possible causes.

Causes and types of headache

- Facial and frontal headache (Sinusitis, Eye problems, Oropharyngeal disorders)
- Temporal headache (Severe hypertension, Tension type headaches, Temporal arteritis, Ear disorders e.g., otitis media, externa, mastoiditis, Subarachnoid haemorrhage e.g., Stroke or CVA)
- Unilateral (one-sided); -Migraine, cluster headaches
- Whole head - Meningitis, Malaria, Hypertension (severe)
- Back of the head (occiput) or neck- Meningitis, Malaria, refractive eye problems, Neck injury or strain (sports, stress)

These are some of the possible causes that require urgent investigations/referral

- Altered mental state or neurological signs or symptoms
 - o Subarachnoid haemorrhage
 - o Abscess
 - o Brain tumour
 - o Subdural haematoma
- Acute onset (i.e., within minutes to hours)
 - o Subarachnoid bleeding
 - o Severe Hypertension
 - o Tumour
- Projectile vomiting and nausea
 - o Brain tumour (raised intracranial pressure)
 - o Migraine
- High fever
 - o Meningitis

- o Malaria
- o Abscess
- Chronic or worsening headaches
 - o Tumour
 - o Severe Hypertension
 - o Chronic meningitis (e.g. TB, cryptococcal)
- Recent trauma to the head
 - o Intracranial bleeding
 - o Head injury



Investigations

- MRI or CT scan of the brain (in consultation with the Specialist physician or Neurologist)
- Other investigations depend on suspected underlying cause



Treatment

- If the patient shows no signs of serious disease, give paracetamol 500mg-1g PRN up to QID for maximum of 3 days.
- Treat underlying cause.

Migraine Headache



Description

A migraine is a recurrent episode of headache of varying severity with sudden onset that lasts from 4 to 72 hours, in some cases is associated with visual or sensory symptoms (aura) and is often unilateral.



Signs and Symptoms

- Unilateral headache, worse with physical activity, but could be bilateral.
- Pulsating
- Nausea, vomiting
- Photophobia and phonophobia (patient wants to lie in a dark and quiet room)
- Sometimes an aura is experienced before onset.



Treatment

- Bed rest in a quiet and dark room
- For acute attack:
 - Paracetamol and or NSAID
 - Triptans (oral/ nasal/ subcutaneous) (e.g. Sumatriptan 50mg PO)
 - Metoclopramide 10mg (oral/IV) (NOTE: If given at this stage of the aura, this can decrease the nausea and vomiting)
- Prophylactic
 - Propranolol 20mg PO BD (up to 240 mg/day in divided doses)

OR

- Amitriptyline 12.5mg PO nocte. This will be titrated gradually to at least 50mg nocte every 5 days. Maximum 100 mg nocte. If no response in 6 weeks, refer to specialist/doctor for further evaluation.

Meningitis



Description

This is inflammation of the meningeal covering of the brain or spinal cord. Common causes include bacteria (*Streptococcus pneumoniae*, Group B *Streptococcus*, *E. coli*, *H. influenzae* type b, *Neisseria meningitidis*, *Listeria*, syphilis, TB), viral (e.g. coxsackie, polio, Measles, Mumps, Influenza, Herpes simplex, HIV), fungal (e.g. *Cryptococcal*) and non-infectious conditions such as SLE and malignancies.

5.5.2.3. Bacterial Meningitis



Description

This is inflammation of the meningeal covering of the brain or spinal cord. Common causes include *Streptococcus pneumoniae*, Group B *Streptococcus*, *E. coli*, *H. influenzae* type b, *Neisseria meningitidis*



Signs and Symptoms

- Headache
- Neck stiffness/ache (common)
- Photophobia

- Fever
- Vomiting
- Seizures
- Confusion, Drowsiness, Loss of consciousness
- Vascular collapse characterized low blood pressure (hypotension) and (Waterhouse - Friderichsen syndrome)
- Petechae skin rash
- Positive Kernig or Brudzinski's sign
- Cranial nerve palsies (facial nerve, oculomotor nerve palsies and occasional deafness)



Investigations

- Cerebral Spinal Fluid analysis
 - CSF color that is cloudy
 - Low CSF glucose
 - CSF positive gram stain
 - Positive culture and organism identification
 - Rapid antigen test for streptococcus
 - Multiplex PCR (if available)
- Supportive tests
 - HIV testing should be offered to all patients whose HIV status is unknown
 - Full blood culture
 - Kidney function tests and electrolytes
 - Malaria parasite slide
 - Blood cultures
- Imaging
 - A CT-scan should be done if available but should not delay starting therapy.



Treatment

- Empiric: Benzylpenicillin 2.4 MU IV 4 times daily
PLUS
- Chloramphenicol IV 1g 4 times daily
OR
- Ceftriaxone IV 2g 12 hourly
OR
- Cefotaxime IV 2g 8 hourly

Specific treatment will vary depending on CSF-culture results

- **Prevention**
 - Vaccination is recommended for those with hyposplenism
- **Post exposure prophylaxis**
 - For those exposed or contacts of meningococcal. The contacts include:
 - Sharing same household or dormitory
 - More than 8 hours of contact or exposure
 - Exposure to secretions
- **Drug options AND dosages:**
 - Ceftriaxone 250 mg intramuscular as stat dose
 - Ciprofloxacin (20 mg/kg) max 500 mg single dose
 - Azithromycin 500 mg single dose
 - Follow up for at least 10 days



Complications

- Seizures
- Loss of consciousness
- Hydrocephalus
- Thrombophlebitis
- Cranial palsies
- Hemiplegia and death.
- Mental retardation
- Hearing loss
- Blindness
- Epilepsy.



Referral Criteria

- Complications such as hydrocephalus
- Failure improves in 48-72 hours
- Suspected atypical infection based on history
- Resistant pathogen detected
- Suspected TB meningitis

5.5.2.4. Cryptococcal Meningitis



Description

The causative organism is *Cryptococcal neoformans*. The high-risk groups most affected are those with severe immunosuppression such as Advanced HIV Disease (AHD) with low CD4 counts, and patients on cancer treatment.



Signs and Symptoms

- Headache
- fever
- Nausea and projectile vomiting
- Seizures
- Visual impairment
- Altered mental status with somnolence
- Photophobia
- Cranial nerve palsies
- Hemiplegia or hemiparesis



Investigations

- Lumbar puncture with measurement opening pressure for CSF analysis as above in bacterial meningitis including the following:
 - o Cryptococcal antigen (CrAg) assay
 - o India Ink
 - o Culture for *Cryptococcus neoformans*
- Serum CrAg
- Contrast enhanced CT scan of the Brain



Treatment

- **Induction phase:**
 - o Liposomal Amphotericin B 3-4 mg/kg IV daily**PLUS**

- o Flucytosine 25 mg/kg PO in 4 divided doses at 6hour intervals for 7 days

OR

- o Amphotericin B deoxycholate 0.7-1 mg/kg IV daily PLUS Flucytosine 25 mg/kg PO in 4 divided doses at 6 hour intervals for 7 days
- o Amphotericin B as above

PLUS

- o Fluconazole 800-1200 mg once daily for 14 days
- **Consolidation phase:** Eight-week anti-fungal regimen
 - o Fluconazole 400–800 mg/day after a two-week induction with Amphotericin B regimen (6–12 mg/kg/day up to 400–800 mg/day, if below 19 years)
 - o Fluconazole 800 mg/day after induction treatment with short-course Amphotericin B or Fluconazole-based induction (Fluconazole 12mg/kg/day up to 800 mg/day, if below 19 years)
- **Maintenance Phase:**
 - o Oral Fluconazole 200 mg daily (6 mg/kg/day up to 200 mg/day, if below 19 years) until CD4 >350 cells/mL for more than 6 months or lifelong.

Serial lumbar puncture is recommended to manage raised intracranial pressure

Prevention of Cryptococcal Disease

The routine use of antifungal primary prophylaxis for Cryptococcal disease in HIV-infected with a CD4 count less than 100 cells/ μ L and who are CrAg negative or where CrAg status is unknown is not recommended before ART initiation, unless a prolonged delay in ART initiation is likely.

5.5.2.5. Viral Meningitis



Description

This is inflammation of the meningeal covering of the brain or spinal cord. Common causes include coxsackie, polio, Measles, Mumps, Inflenza, Herpes simplex and HIV.



Signs and Symptoms

- As for bacterial and cryptococcal meningitis



Investigations

Cerebral Spinal Fluid analysis

- Clear appearance
- Lymphocytes: 10 to 100

- Polymorphs: none
- Protein: 0.4 to 0.8 g/l



Treatment

Acyclovir 10-15mg/kg IV 3 times per day for 7 days

5.6

CARDIOVASCULAR CONDITIONS

5.6.1. Hypertension



Description

Hypertension is one of the leading public health problems and a major cause of premature death worldwide. It is often asymptomatic, easily detectable, and potentially easily amenable to treatment. Yet, if left untreated it often leads to fatal complications.

Since hypertension tends to be asymptomatic, public education about the dangers of hypertension plays a significant role in the overall management of hypertension.

Causes and risk factors

Primary or essential Hypertension (about 90% of all hypertension cases)

Etiology is poorly understood but most likely result from a combination of genetic and environmental factors such as:

- Age
- Black race
- Family history
- Physical inactivity
- High sodium diet (> 3g/day of sodium chloride)
- Excess alcohol intake
- Hypercholesterolemia
- Diabetes Mellitus
- Obesity
- Secondary Hypertension: due to a specific underlying condition such as:

- Renal Parenchymal Diseases (e.g. glomerulonephritis)
- Renovascular Diseases e.g. renal artery stenosis, atherosclerotic (mainly older men) and fibroplastic (mostly younger women) diseases.
- Endocrine Diseases (e.g. Pheochromocytoma, Cushing's Syndrome, Hyperaldosteronism)
- Cardiovascular Disease (e.g. coarctation of the aorta)
- Pregnancy (gestational hypertension)
- Drugs (e.g. contraceptives, erythropoietin, steroids)

Classification

Classification based office Blood Pressure Records (WHO/ JNC 7)

Normal Blood Pressure	< 120/80 mmHg
Prehypertension	Systole: 120-139 mmHg
	Diastole: 80-89 mmHg
Stage 1 Hypertension	Systole: 140-159 mmHg
	Diastole: 90-99 mmHg
Stage 2 Hypertension	≥ 160/100 mmHg

Classification based on Home Blood Pressure Monitoring (HBPM) or Ambulatory Blood Pressure Monitoring (ABPM)

Normal Blood Pressure	< 120/80 mmHg
Elevated Blood Pressure	Systole: 120-129 mmHg
	Diastole: < 80 mmHg
Stage 1 Hypertension	130-139 mmHg
	80-89 mmHg
Stage 2 Hypertension	140-159 mmHg
	≥ 90 mmHg



Signs and Symptoms

Hypertension is usually asymptomatic until when it has caused complications and damage to target organs. At this point, the symptoms are thus associated with the affected organ.

- Palpitations
- Dizziness
- Shortness of breath
- Blurred vision

- Distribution of body fat, skin lesions (eg Cushing, Stroke)
- Alertness, confusion, visual disturbance, muscle strength, focal weakness, Carotid bruit, fundoscopy (eg Stroke, malignant hypertension)
- Thyroid gland examination (eg Hyperthyroidism)
- Location of apex beat, assessment of rhythm and heart sounds (eg DCM, LVH)
- Rhonchi, rales, wheezing, peripheral edema (Heart failure)
- Renal masses, aortic or renal artery bruits, femoral pulses and peripheral pulses (eg Polycystic kidney, renal artery stenosis, Coarctation).



Investigations

- Urinalysis, Fundoscopy, Electrocardiogram
- Chest x-ray, Echocardiogram
- Urea, creatinine and electrolytes
- Random blood sugar
- Lipid profile, Abdominal ultrasound



Complications

- Atherosclerosis
- Cerebral vascular insufficiency
- Cerebral vascular accident
- Congestive heart failure
- Coronary artery disease
- Peripheral vascular insufficiency
- Dissecting aortic aneurysm
- Hypertensive retinopathy
- Hypertensive nephropathy and renal failure

Hypertensive crisis



Description

These are clinical situations associated with blood pressure rising to levels usually ≥ 180 mmHg systole and ≥ 120 mmHg diastolic. There are two types:

- **Hypertensive urgency:** Markedly raised BP but without significant signs or symptoms suggestive of end-organ damage. In this setting BP reduction may be gradual over 24 hours.

- **Hypertensive emergency:** associated with acute end-organ dysfunction (brain, heart and kidneys). In this setting, there is a high risk of causing irreversible damage to the brain, heart or kidneys if blood pressure is not controlled within an hour or so.

Types of hypertensive emergencies:

- Ischemic stroke
- Intracerebral haemorrhage
- Acute aortic dissection
- Hypertensive encephalopathy
- Acute heart failure
- Acute coronary syndrome
- Acute hypertensive nephrosclerosis
- Preeclampsia.
- All hypertensive emergencies should be referred for treatment by a specialist.



Treatment

The objective of treating high blood pressure is both to prevent and lower related complications such as strokes, renal failure and heart failure. Hypertension not responding to treatment should be referred to a specialist for further investigations.

Prevention

Supportive

- The initial approach is lifestyle modification:
- Smoking cessation
- Weight reduction to optimal weight, BMI less than 25,
- Regular exercise
- Reduction in alcohol intake
- Dietary modifications (e.g. salt reduction, fat-free diet).

Pharmacological

Goals of therapy blood pressure less than 130/80mmHg and 120-125mmHg systolic and less than 80 mmHg diastolic for those with cardiovascular diseases (Heart failure, Stroke, PAD, Coronary heart disease, diabetes and chronic kidney disease).

Stepwise approach, use of a combination of drugs for better effect.

- Step 1.
Start with:
Diuretics (e.g. Hydrochlorothiazide 12.5mg – 25mg orally daily) **OR**
Calcium channel blockers (Amlodipine 5-10mg orally daily or Nifedipine retard 20mg -80mg- 8m oncedaily orally) **OR**

Angiotensin-converting enzyme inhibitors (Captopril 25-50mg two or three times daily orally, Enalapril 5-40mg once daily orally)

Those who cannot tolerate ACEI may be given, ARBs (Losartan potassium 25-100mg once daily orally or Telmisartan 40-80mg orally daily).

Note

It is preferable to start with lower doses antihypertensive drugs and titrate upward to response, though maximum monotherapy dosages are usually not required; if optimum monotherapy dosage can't control hypertension, combination therapy is needed in order to avoid high doses related side effects

Individuals with severely elevated blood pressure (e.g > 160/100) should receive combination therapy as initial therapy

Amloride combination with HCTZ (Modiuretic) to only be considered in individuals who develop hypokalemia when thiazides or other kaliuretic diuretics are used alone or in individuals in whom the development of hypokalemia cannot be risked, or in whom maintenance of normal potassium levels is considered to be clinically important (eg, digitalized patients, patients with significant cardiac arrhythmias).

- **Step 2:**

Sequential monotherapy to be considered prior to combination therapy initiation (e.g if failure to control hypertension with thiazide monotherapy, consider switching to monotherapy with calcium channel blockers or ACEIs prior to considering combination therapy)

- **Step 3.**

Use a combination of drugs from different groups (e.g. Diuretic + ACEI, or Calcium channel blocker + ACEI, or Diuretic + Calcium channel blocker).

In comorbid conditions with diabetes melitus, consider adding ACEI/ARB, SGLT2 and antiplatelet therapy (ASA, clopidogrel)

ACEI/ARB should be part of hypertensive therapy in chronic kidney disease

- **Step 4.**

If not controlled as above:

Optimize the dose, add further diuretic therapy

OR

Add Alpha-adrenoceptor blocker (Prazosin 0.5mg two to three times daily orally. Initial should be at bedtime to avoid postural hypotension – then increase to 1-3mg two to three times daily after three to seven days, maximum daily dose 20mg)

OR

Add Beta-adrenoceptor blocker e.g. Atenolol 50-100 mg once daily orally,

OR

Hydralazine 25-50mg two or three times daily orally.

Beta-blockers are no longer preferred as a routine initial therapy for hypertension, however, can be used in younger people, patients with cardiovascular risk or existing ischemic heart disease, those with contraindications or intolerance to ACEI, ARB as adjunctive drugs to other antihypertensive.

- Hypertensive Emergency

Very severe to malignant hypertension:

Start with Labetalol 20mg IV bolus, over at least a minute, repeated at 20mg to 80mg every 10 minutes if necessary, maximum dose is 200mg in 24 Hours.

OR

Hydralazine 10mg IV stat followed by 5 mg IV every 30 minutes until diastolic BP is 110 mm Hg or less (If Labetalol contraindicated or unavailable)

Frusemide Injectable only to be considered if associated pulmonary oedema or GFR < 30 ml/min/1.73m²

5.6.2. Congestive Heart Failure



Description

Heart failure is a clinical syndrome characterized by typical symptoms (orthopnea, dyspnea, ankle swelling, cough and easy fatigability) 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 reduced cardiac output and/or elevated intra-cardiac pressures at rest or during stress.

Currently, the most common terminology for describing HF is based on left ventricular ejection fraction (LVEF). HF with normal LVEF ($\geq 50\%$) is defined as HF with preserved ejection fraction (HFpEF), and HF with decreased LVEF ($\leq 40\%$) as HF with reduced ejection fraction (HFrEF). HF patients with LVEF in the range of 41% to 49% are defined as HF with mildly reduced ejection fraction (HFmrEF).

Causes

- Some underlying causes of heart failure:
- Hypertension, Cardiomyopathies
- Ischaemic heart disease, Arrhythmias
- Pericardial diseases
- Myocarditis (Viruses, Parasites)
- Valvular Heart Disease e.g. mitral valve disease
- Congenital Heart Disease
- Thyroid dysfunctions
- Anaemia

Precipitating Causes

- Infection including endocarditis
- Anaemia

- Thyrotoxicosis
- Arrhythmias
- Systemic hypertension
- Pulmonary embolism
- Pregnancy

Classification

The New York Heart Association (NYHA) functional classification defines four functional classes as:

- Class I - Asymptomatic
- Class II - Symptomatic on moderate exertion
- Class III - Symptomatic on mild exertion
- Class IV - Symptomatic at rest

The American College of Cardiology / American Heart Association Stages of Heart Failure

- **Stage A (At risk for Heart Failure)**-Asymptomatic patients with HF risk factors but normal cardiac structure and function.
 - o Hypertension, Coronary artery disease
 - o Metabolic syndrome (diabetes, obesity, hypertension, dyslipidemia)
 - o History of alcohol abuse
 - o History of rheumatic fever
 - o Exposure to cardio-toxic agents
 - o Genetic variant for cardiomyopathy or family history of cardiomyopathy
- **Stage B (Pre-Heart failure)** - Asymptomatic patients with cardiac structural or functional abnormalities.
 - o Structural heart disease
 - o Evidence of increased filling pressures
 - o Increased Natriuretic peptide levels or persistently elevated cardiac troponin in the **absence of competing diagnoses**
- **Stage C (Symptomatic Heart Failure)**- Symptomatic HF: Patients with current or previous Heart failure symptoms/signs
- **Stage D (Advanced Heart Failure)** -Refractory HF requiring specialized interventions: Marked Heart failure symptoms that interfere with daily life and with recurrent hospitalizations despite attempts to optimize guideline-directed medical therapy.



Signs and Symptoms

- *Typical symptoms:*
 - o Breathlessness
 - o Orthopnoea
 - o Paroxysmal Nocturnal dyspnoea

- o Reduced exercise tolerance
- o Fatigue / tiredness
- o Increased time to recover after exercise
- o Ankle swelling
- Less typical symptoms:
 - o Nocturnal cough
 - o Wheezing
 - o Weight gain, (> 2kg /week)
 - o Weight loss (advanced HF)
 - o Bloating feeling
 - o Loss of appetite
 - o Confusion (elderly)
 - o Palpitations
 - o Syncope
- Specific signs:
 - o Elevated jugular venous pressure
 - o Hepatojugular reflex
 - o Third heart sound (Gallop)
 - o Laterally displaced apical impulse
 - o Cardiac murmur
- Less specific signs:
 - o Peripheral oedema
 - o Pulmonary crepitation
 - o Reduced breath sounds and dullness at lung bases (Pleural effusion)
 - o Tachycardia
 - o Irregular pulse
 - o Hepatomegaly
 - o Ascites



Investigations

FBC/DC, Troponin I, NT Pro-BNP, Serum creatinine, urea and electrolytes, TSH, Free T4 CXR, ECG, Echo

Coronary angiography

Diagnostic criteria

- HFrEF: The diagnosis of HFrEF requires 3 conditions to be satisfied
 - o Symptoms typical of HF
 - o Signs typical of HF
 - o Reduced LVEF $\leq 40\%$

- HFpEF: The diagnosis of HFpEF requires 4 conditions to be satisfied
 - o Symptoms typical of HF
 - o Signs typical of HF
 - o Normal (or mildly reduced LVEF)
 - o Relevant structural heart disease (LVH, LA enlargement) and/or diastolic dysfunction.



Treatment

- **Supportive**
 - o Restrict physical activities
 - o Restrict salt and water intake
 - o Lifestyle modification
- **Pharmacological**
 - o Acute decompensated Heart Failure
 - o Airways assessment and oximetry
 - o Supplemental Oxygen + NIV/IV
 - o Haemodynamic status assessment
 - o Continuous cardiac monitoring
 - o IV access
 - o Seated position
 - o Urine output monitoring
 - o Loop diuresis (IV)
 - o Early vasodilator therapy (Nitroglycerin), Starting doses are 5-10ug/min, titrate up to max 200ug/min depending on response.
 - o Inotropes/Vasopressors (Dobutamine infusion at 5-20 mcg/kg/min, not to exceed 40 mcg/kg/min; alternatively, Dopamine 5-15mcg/kg.min IV [watch-out for tachycardia when dopamine is used])

Chronic Heart failure

- Careful diagnostic workup
- Treat reversible causes
- Ensure on optimal doses of evidence based medical therapy
- Stage A Heart Failure treatment
 - o Optimize management of Hypertension and cardiovascular diseases
 - o If Diabetes, Initiate SGLT2 Inhibitors if available (e.g: Empagliflozin, Dapagliflozin)
- Stage B Heart Failure treatment
 - o Treat as Stage A
 - o If LVEF $\leq$ 40%:
 - o Add ACEI (e.g: Enalapril, Lisinopril, Captopril) or ARBs if ACEI contraindicated (e.g: Losartan, Telmisartan, valsartan)
 - o Add Beta blockers (e.g: Carvedilol, or Metoprolol, or Bisoprolol)

- Stage C Heart Failure treatment
 - o For Heart Failure with preserved Ejection Fraction (HFpEF: EF $\geq$ 50%)
 - o Diuretics as needed (Loop diuretics $\pm$ thiazide diuretics)
 - o Initiate SGLT2 inhibitors if available (e.g Empagliflozin or Dapagliflozin)
 - o Initiate ARNI (Sacubitril/Valsartan) if available or Angiotensin Receptor Blockers (e.g: Losartan, or Telmisartan, or valsartan)
 - o Initiate mineralocorticoid antagonists (e.g Spironolactone or Eplerenone)
 - o For Heart Failure with reduced Ejection Fraction (HFrEF: EF $\leq$ 40%)
 - o Diuretics as needed (Loop diuretics: Frusemide, or Torasemide) $\pm$ thiazide diuretics can be added if poor response to loop diuretics (e.g Hydrochlorothiazide, Metolazone)
 - o ACEIs (e.g: Enalapril, Lisinopril, Captopril) or ARBs (e.g: Losartan, Telmisartan, valsartan) or initiate ARNI if available (For NYHA I and II)
 - o Beta blockers for NYHA I or II, but delay initiation if NYHA III or IV until resolved pulmonary oedema (Carvedilol, or Metoprolol, or Bisoprolol)
 - o Mineralocorticoids Receptor Antagonists (e.g: Spironolactone, Eplerenone)
 - o Sodium-Glucose cotransporter 2 inhibitor (SGLT2i): e.g Empagliflozin, Dapagliflozin
 - o Hydralazine + Nitrates additional therapy if no improvement on above medications (especially in African Americans) or contraindications to ACEI, ARB or ARNI
 - o Add Ivabradin in those with poor response with sinus rhythm and Pulse rate >70 per minute
 - o In those with poor response to above therapy and LVEF $\leq$ 35%, consider:
 - o ICD: If NYHA I-III and > 1 year survival
 - o CRT-D: If normal sinus rhythm, Left Bundle Branch Block and wide QRS complex (> 150 ms)
- Stage D Heart Failure treatment
 - o Mechanical Circulatory Support
 - o Cardiac transplant
 - o Palliative care

5.6.3. Myocardial Infarction



Description

Myocardial infarction is myocardial cell death that occurs due to prolonged mismatch between perfusion and demand

The myocardium distal to the occluded segment is starved of oxygen and gets injured and eventually infarcted if restoration of flow is not done in good time.

Cause

Usually caused by occlusion of coronary arteries due to rupture of an atherosclerotic plaque leading to platelet and fibrin adhesion which form a clot causing complete vessel closure.



Signs and Symptoms

- Chest pains: crushing, burning, heavy, can radiate to left shoulder, both shoulders or the neck
- Epigastric pain
- Autonomic symptoms such as nausea and sweating
- Dyspnoea
- Pallor
- Features of cardiogenic shock
- VT or VF
- Some infarcts may be painless (e.g. in the elderly and diabetics)



Complications

- Arrhythmias, Heart Failure, Hypotension, Pericardial effusion, Systemic embolisation
- Dressler's syndrome (autoimmune syndrome- pericarditis, pneumonia, pleurisy)
- Papillary muscle rupture, Cardiogenic shock
- Rupture of the ventricular septum or ventricular wall
- Left ventricular aneurysm with Left Ventricular Failure



Investigations

In STEMI:

The most important investigation is an ECG (should be done within 10 minutes of presentation).

The only thing to look for on ECG is the presence of ST segment elevation in 2 or more anatomically contiguous leads

In NSTEMI:

Troponin I and CKMB are needed for diagnosis

Other investigations:

- Echocardiography
- RBS/FBS
- Urea
- Creatinine
- Serum sodium and potassium
- Fasting lipid profile



Treatment

Initial interventions:

- ECG should be done within 10 minutes of presentation and the only thing to look for on that ECG is presence of ST segment elevation in 2 or more anatomically contiguous leads. This influences your immediate treatment decision
- Do not waste time looking for morphine or nitrates; ECG is the MOST IMPORTANT investigation. The aim is to look for an ST elevation myocardial infarction whose treatment is IMMEDIATE REPERFUSION with lysis.
- 5.2 ST-Elevation Myocardial Infarction (STEMI)
- Reperfusion strategy is the cornerstone in the treatment of STEMI
- **Once a STEMI is confirmed on the ECG, institute IMMEDIATE REPERFUSION with Thrombolytic agents. Do not wait for tomorrow, TIME IS MUSCLE.**
- In Zambia, pharmacological reperfusion (administration of a thrombolytic agent like Streptokinase, Alteplase or Tenecteplase) is the number one option due to the very limited number of Cathlabs in the country to perform primary coronary angiography and PCI.
- Streptokinase is the most available in Zambia, can give 1,500,000 units in 100ml of 0.9% saline intravenously over 1 hour.
- Do not give pharmacological reperfusion if there is a history of hemorrhagic stroke, or active bleeding in the last 2 months, blood pressure > 200mmHg, surgery or trauma in last 10 days, bleeding disorder, pregnancy, diabetic retinopathy, previous streptokinase or any thrombolytic treatment in the last 5 days to 1 year.
- Following successful lysis, all STEMI patients must be referred for percutaneous coronary interventions where coronary angiography and stent implantation will be done in a Cathlab. Currently, there is only one active Cathlab in a government hospital at National Heart Hospital.

Adjuvant therapy

- These medications should not delay the administration of a lytic agent.
- Dual antiplatelet therapy: Aspirin 300mg orally and clopidogrel 300mg orally as STAT doses.
- Heparin: recommended anticoagulant of choice is Intravenous Enoxaparin 40mg to be given together with the lysis. However, if not available, use any available heparin. Heparin, 5000 I.U intravenously start, then 1000 I.U hourly intravenously for 24hrs for 3-5 days or LMWH given at 1mg/kg
- Beta blockers: the number one cause of death in STEMI patients in the first 72 hours is ventricular tachycardia. Therefore, all patients not in cardiogenic shock must be on a B blocker. Give Atenolol 50mg twice a day or any available B blocker to the recommended doses.
- High dose statin – this is given to stabilise the plaque in as much as it is given for cholesterol lowering (pleiotropic effects). Give Simvastatin or Atorvastatin 40mg once a day.
- ACE inhibitors: these can be started within 24 hours of admission if the blood pressure allows. Give Enalapril starting with 2.5mg twice a day; titrate to 10mg twice a day if tolerated. ACE inhibitors prevent ventricular remodeling.
- For pain control, give IV nitroglycerine or Morphine. Important to note is that Morphine should not be

given before instituting lytic therapy as this will mask the symptoms. Lysis usually leads to resolution of chest pain and is a good guide of response to therapy. Therefore, morphine should only be given if the patient is extremely uncomfortable despite the lysis.

Non-ST-Elevation Acute Coronary Syndrome (Unstable angina and NSTEMI)

Diagnosis in the setting of typical chest pain but no ST elevation on the ECG with or without positive cardiac Troponin

Heparin, 5000 I.U intravenously start, then 1000 I.U hourly intravenously for 24hrs for 3-5 days.

Low Molecular weight heparin Enoxaparin 1mg/kg SC twice daily.

Dual antiplatelet therapy comprising -**Aspirin 75mg daily and clopidogrel 75mg daily**

ACE inhibitors i.e. Enalapril 5- 10mg orally daily.

Beta-blockers e.g. Atenolol 50mg orally daily.

Aspirin, 75-150mg daily.

Statins e.g. Simvastatin 10 – 20mg daily orally

Isosorbide dinitrate, 5mg to 10mg 12 hourly

Refer all myocardial infarction patients for coronary angiography and possible percutaneous intervention to National Heart Hospital.

5.6.4. Angina Pectoris



Description

This is chest pain due to myocardial ischemia.



Signs and Symptoms

- Chest pain: The pain is central/retrosternal and may radiate to the jaw/or arms.
- Breathlessness
- Fourth heart sound
- Anxiety
- There may be no signs



Investigations

- ECG
- Exercise ECG

- Echocardiogram
- Lipid profile
- Myocardial perfusion scan
- Coronary angiography



Treatment

- Supportive
- Manage co-existing conditions
Stop smoking
Weight loss
Encourage regular exercise

- Pharmacological
 - o Aspirin, 75 - 300mg orally once daily
 - o Glyceryl trinitrate, 0.3-1mg sublingually, repeated as required or
 - o Isosorbide dinitrate, 5-10mg sublingually, 30-120mg orally in 2 divided doses daily.
 - o Atenolol, 50-100mg orally once daily
 - o Nifedipine (immediate-release) 10-20mg orally once or twelve hourly
 - o Statin e.g. Simvastatin, 10-20mg daily orally
- Surgery
 - o Coronary angioplasty
 - o Coronary by-pass

5.6.5. Pulmonary Oedema



Description

Acute left ventricular failure due to various cardiac conditions or due to severe mitral stenosis with pulmonary hypertension.



Signs and Symptoms

- Breathlessness
- Wheezing
- Profuse sweating
- Productive cough

- Paroxysmal dyspnea
- Anxiety
- Blood-stained sputum
- Tachypnoea
- Peripheral circulatory shut down
- Crackles



Investigations

- Arterial gases
- Pulse oximetry
- Chest X-Ray
- Central venous pressure
- ECG
- Echo
- Cardiac enzymes



Treatment

- Supportive
 - o The patient should be placed in a sitting position.
- Pharmacological
 - o Frusemide, adults: initially 40-120mg I.V. Stat, thereafter continue Frusemide 20mg-daily orally or 40mg on alternate days
 - o Morphine 5mg to 10mg I.V. slowly
 - o Oxygen 60% via a mask
 - o Glycerol trinitrate, 0.3-1mg sublingually, repeated as required
 - o Underlying conditions should be treated.

5.6.6. Rheumatic Fever



Description

This is an inflammatory disease that occurs in children and young adults (5 - 15 years) as a result of infection with group A streptococcus. It affects the heart, skin, joints and central nervous system. Pharyngeal infection

with group A streptococcus may be followed by the clinical syndrome of rheumatic fever. This is thought to develop because of an autoimmune reaction triggered by the infective streptococcus and not due to direct infection of the heart or the production of a toxin.



Signs and Symptoms

Revised Jones diagnostic criteria

- Major
- Carditis
- Polyarthritits
- Sydenham's chorea
- Erythema marginatum
- Subcutaneous nodules
- Minor
- Arthralgia
- History of rheumatic fever
- Fever
- Increased P-R interval on ECG
- Raised ESR
- Increased C-reactive protein
- Evidence of streptococcal infection
- Raised ASO titre (or increased titre of other specific antistreptococcal antibodies) Positive throat culture



Investigations

- Throat swab
- Serology
- ESR
- ECG
- Echocardiography

Diagnosis is made based on two or more major criteria or one major plus two or more minor criteria plus evidence of antecedent streptococcal infection.



Treatment

Pharmacological

- Benzathine penicillin 0.6–1.2 mega units IM stat
- OR**
- Phenoxymethylpenicillin 500mg orally 4 times daily for 10 days. For recurrences, 250mg daily until the age of twenty or for 5 years after the latest attack
- OR**
- Erythromycin, 250 – 500mg orally 4times daily for 10 days. For recurrences, 125 – 250mg once daily until the age of twenty or for 5 years after the latest attack
 - Prednisolone 1 – 2mg/kg per day divided into 4 equal doses for 10 days (in severe carditis)

Chronic rheumatic heart disease



Description

More than 50% of those who suffer acute rheumatic fever with carditis will later develop chronic rheumatic valvular disease predominantly affecting the mitral and aortic valves.



Investigations

- Chest X-Ray
- ECG
- Echocardiography



Treatment

Treat underlying complications

- Give prophylaxis against recurrent rheumatic fever with Benzathine Penicillin 1.2-2.4 MU monthly for life
- Give prophylaxis against infective endocarditis (provide details)



Complications

- Congestive cardiac failure
- Pulmonary oedema



Referral Criteria

- For further evaluation, if the patient has significant heart murmurs
- All patients with increasing cardiac symptoms.

5.6.7. Cardiac Arrhythmias



Description

This involves the disorders of cardiac impulse formation, automaticity, impulse conduction, heart rate and abnormal ectopic activity.



Signs and Symptoms

- Palpitation
- Missing heart beats
- Dizziness and syncope
- Difficulty in breathing
- Increased or decreased pulse and heart rate (more than 100 or less than 60/min)
- Irregular pulse and heart rate
- Features of heart failure
- Bradyarrhythmias (sinus bradycardia, sinus node dysfunction, atrioventricular blocks), heart rate <55/min
- Tachyarrhythmias (atrial fibrillation and flutter, supraventricular and ventricular tachycardia). Premature atrial and ventricular contractions.



Investigations

- ECG
- Ambulatory ECG monitoring (Holter)
- Serum electrolytes level
- Echocardiography
- Stress ECG test, TFTs



Treatment

- Bradyarrhythmias:
 - o Sinus bradycardia – no treatment required unless symptomatic, remove offensive drugs (e.g. B-blockers, digoxin) if symptomatic – Atropine 0.6mg IV or cardiac pacing
 - o Sinus arrhythmia – no treatment needed
 - o Atrioventricular block 1st degree – treat underlying causes (carditis, drug toxicity).
 - o Atrioventricular block 2nd degree – may require cardiac pacing, refer to a specialist
 - o Atrioventricular block 3d degree – cardiac pacing, refer to a specialist.
- Tachyarrhythmias:
 - o Supraventricular tachycardia
 - Heart rate 150–220/min on ECG narrow QRS complex strictly regular tachycardia – start with vagal stimulation (unilateral carotid massage, Valsalva manoeuvre), the drug of choice is Adenosine 6mg IV push, if no response, give 12mg IV push. Other drugs – Verapamil 2.5-5.0mg IV slowly. Diltiazem 15-20mg IV over 2 min. Propranolol 1-2 mg IV bolus. Refer to a specialist.
 - o Ventricular tachycardia
 - Heart rate 130-180/min, on ECG wide QRS complex not strictly regular tachycardia– if the patient's condition is unstable – defibrillate at 50-100 + 200.
 - If the patient is stable, pharmacological treatment: Amiodarone 300mg IV over 10 min, followed by infusion at 1mg/min for 6 hours; Lignocaine 100mg IV bolus, followed by infusion of 4 mg/min for 30 min, 2 mg/min for 2 hours, then 1 mg/min. In case of multifocal Ventricular tachycardia use Magnesium sulfate 1-2 g IV. Correct reversible causes: hypokalemia, digoxin toxicity.
- Atrial fibrillation:
 - o Rate control can be achieved by Digoxin 0.125-0.25 mg once daily or 12 hourly orally, Verapamil 40-80mg eight hourly orally, Diltiazem 60mg eight hourly orally.
 - o Amiodarone 200mg 8 hourly orally 1st week, then reduce to 200mg 12 hourly (maintenance dose 200-400mg daily)
 - o Electrical cardioversion (refer to a specialist)
 - o Anticoagulation therapy (to reduce the risk of systemic embolization) – Aspirin 75-150mg once daily orally, Warfarin 2.5-10mg once daily orally (to maintain INR 2.5 to 3.5).
 - o Use Warfarin, if no INR available, Aspirin 75-150mg orally once daily.
- Premature atrial contractions
 - o No treatment required. If symptomatic: B-blockers (e.g. Propranolol 20-40mg orally 2-3 times daily, Verapamil 40-80mg orally 8-12 hourly).
- Premature ventricular contractions
 - o No treatment if asymptomatic. If symptomatic or frequent – Beta-blockers (Propranolol 40-80mg eight hourly orally), Amiodarone 200mg eight hourly orally for 5-7 days, then reduce to 200mg 12 hourly (maintenance dose 100-200mg daily).
 - o Monitor for possible side effects: TFTs, LFTs, consult ophthalmologist and CXR once a year.

5.6.8. Infective Endocarditis



Description

This is a microbial infection of the endocardium, which may result in valvular damage, myocardial abscess, or mycotic aneurysm.

Causes

- Streptococcal species (especially *Streptococcus viridans*)
- Staphylococci
- HACEK group
- Enterococci.

Predisposing factors

- Preexisting valvular disease
- Congenital heart disease
- Dental and surgical procedures
- Intracardiac devices (prosthetic valves, pacemaker)
- Intravascular catheters
- Intravenous drug abuse
- Can be acute and subacute.



Signs and Symptoms

- Fever
- Peripheral stigmata (splinter haemorrhages, Osler's nodes, Janeway lesion, Roth's spots)
- Pallor and jaundice
- Heart murmurs
- Features of heart failure
- Embolic phenomena
- Splenomegaly
- Hematuria
- Fever
- Night sweats
- Arthralgia
- Malaise

- Weight loss
- Dyspnoea



Investigations

- Blood culture
- Echocardiography
- FBC
- Urinalysis and microscopy
- U/E
- LFTs

Duke's criteria:

Two major criteria or One major and three minor or Five minor criteria

Major criteria

- Positive blood culture X >2 (typical microorganisms for infective endocarditis)
- Positive Echocardiographic study (vegetation on the valves, wall abscess, new valve regurgitation)

Minor criteria

- Predisposing heart condition or injected drug user
- Febrile syndrome
- Vascular phenomena (embolism, CNS haemorrhage, conjunctival haemorrhage, Janeway lesion)
- Immunologic phenomena (glomerulonephritis, Rheumatoid factor, Osler's nodes, Roth's spots, false-positive VDRL test)
- Microbiologic evidence (positive blood culture, but not typical microorganisms)
- Echocardiography: suggestive but not positive for infective endocarditis



Treatment

Supportive

- Bed rest
- Good oral hygiene, regular dental review

Pharmacological

- Appropriate antibiotics: Penicillin G 10-20 MU /day IV in divided doses (4 times) or Ampicillin 8-12 g/day IV for 4 weeks and Gentamycin 1 mg/kg (up to 80 mg) 8 hourly IV daily 2-4 week. If Staphylococcus aureus: Oxacillin or Vancomycin IV.
- Treat heart failure and arrhythmias

Surgical

- Cardiac transplantation with valvulopathy. No prophylaxis is recommended for most dental, GIT and GUT procedures, with acquired valve disease, hypertrophic cardiomyopathy, a pacemaker or coronary by-pass surgery.
- Valvular replacement (indications: refractory heart failure, uncontrolled infection, fungal infections with large vegetation >10mm in size, recurrent systemic embolism, suppurative pericarditis, mycotic aneurysm or rupture of sinus of Valsalva)

Prophylaxis

Conditions in which prophylaxis is recommended:

- Prosthetic cardiac valves
- Previous infective endocarditis
- Certain types of Congenital Heart Diseases (unrepaired cyanotic CHD, complete repair of CHD with prosthetic material or device for first 6 months; repaired CHD with the residual defects at the site of prosthetic valve or patch)
- Cardiac transplantation with valvulopathy. No prophylaxis is recommended for most dental, GIT and GUT procedures, with acquired valve disease, hypertrophic cardiomyopathy, a pacemaker or coronary by-pass surgery.

Prevention

Antibiotics for prophylaxis, 1 hour before procedure:

- Oral:
 - Amoxycillin 2 g (adult), 50 mg/kg (children) or
 - Cephalexin 2g (adult), 50 mg/kg (children) or Azithromycin 500 mg (adult), 15 mg/kg (children)
- Parenteral
 - Amoxycillin 2 g IM/IV (adult), 50 mg/kg (children)
 - Cefazolin or Ceftriaxone 1 g IM/IV (adult), 50 mg/kg (children)
 - Clindamycin 600 mg IM/IV (adult), 20 mg/kg (children).

5.7 RESPIRATORY TRACT CONDITIONS

5.7.1. Upper Respiratory Tract Infections

These are infections of the upper respiratory tract systems. They include the common cold, laryngotracheobronchitis and upper Obstructive Airway Diseases.

5.7.1.1. Common Cold



Description

This is a self-limiting disease caused by viruses and allergies. If it is viral, it is a highly infectious condition comprising mild systemic upset and prominent nasal symptoms



Signs and Symptoms

- Running nose/nasal congestion
- Cough
- Irritation of the throat
- Fever
- Sneezing



Treatment

- Analgesics; Aspirin, 600mg 3 - 4 times daily or paracetamol, 500mg - 1g orally 3 - 4 times daily in adults, children; paracetamol, 10 - 20mg/kg 3 times daily
- Nasal decongestants
- Cough mixtures may offer symptomatic relief
- Take plenty of fluids

Note: (i) Aspirin is not recommended for children under 16 years.
(ii) Antibiotics are not indicated

Supportive

- Advise patient to take plenty of fluids



Complications

- Lower respiratory tract infection (see 6.1.2)
- Bronchitis and pneumonia

5.7.1.2. Laryngotracheobronchitis



Description

This is an inflammation of the larynx, trachea and bronchus following an acute viral respiratory infection.



Signs and Symptoms

- Pain in the larynx
- Hoarseness of voice
- Irritating persistent cough
- Shortness of breath
- Fever
- Stridor
- Persistent or recurrent laryngitis



Treatment

Analgesics in early stages

- Paracetamol, 500mg – 1g orally 3 – 4 times daily in adults, 10 – 20mg/kg orally 3 – 4 times daily in children

Supportive

- Give more fluids and humidification

5.7.1.3. Upper airway obstruction

The condition is caused by a viral infection or inhaled foreign body. The main symptom is stridor.

When it is caused by viral infection the condition is called Croup. Croup is fairly common and is frightening to parents. Usually, admission is advisable. If the infection has caused epiglottitis, the obstruction may be so severe as to necessitate tracheal intubation and antibiotics may be required.



Treatment

- Chloramphenicol 50 - 100mg/kg intravenously in 4 divided doses daily for 5 days
- Humidified oxygen (30 - 40% concentration)

- Dexamethasone 0.3mg/kg intramuscularly stat, Repeat after 6 hours.
- Naso-tracheal intubation or tracheostomy if an obstruction is severe

5.7.2. Lower Respiratory Tract Infections

These are infections of the lower respiratory tract system. They include the Lower Obstructive Airway Diseases, Chronic Obstructive Pulmonary Disease (COPD), Pneumonia, Aspiration Pneumonia, Atypical Pneumonia and COVID 19.

5.7.2.1. Asthma



Description

This is a chronic inflammatory disease of the airways whose main characteristics are airflow limitation, airway hyperresponsiveness and inflammation of the bronchi.

Asthma may start in childhood, worsening or improving in adolescence. Airflow limitation is usually reversible either spontaneously or with treatment.



Signs and Symptoms

- Difficulty in breathing
- Coughing
- Restlessness
- Wheezing
- Prolonged expiration
- Cyanosis if severe
- Rapid pulse



Treatment

Supportive

- Modification in lifestyle
- Stop smoking
- Avoid known precipitants
- Reduction in weight (to normal BMI)

Pharmacological

For long-term management of Asthma, the stepwise approach is recommended.

STEP 1

- Intermittent asthma (symptoms < twice a month)
- Use Low dose inhaled corticosteroids (ICS) & Short acting β -blockers (SA β A) as needed.

STEP 2

- Mild persistent (symptoms $\geq$ twice a month but < daily)
- Daily low dose ICS + as needed SA β A

STEP 3

- Moderate persistent (symptoms most days, or waking with asthma once a week or more, or low lung function)
- Low dose ICS-LA β A maintenance + Reliever therapy

OR

- Low-dose ICS-LA β A maintenance
- Plus as needed SA β A
- Consider adding leucotriene receptor antagonist

STEP 4

- Severe persistent symptoms most days or waking with asthma once a week or more, Or low lung function
- Medium-dose ICS-LA β A as maintenance + reliever therapy
- Alternative options include
- High-dose ICS, add-on ipratropium or /add on LTRA

STEP 5

- High dose ICS plus LABA
- Refer to phenotypic assessment $\pm$ add-on therapy anti-IGE and anti-IL4R (Interleukin 4 Receptor)

Management of Acute Exacerbation

Mild to Moderate attack

- Inhaled SA β A 4-10 puffs by metered dose inhaler plus spacer till symptoms improve.

OR

- Nebulized salbutamol 5mg every 15 – 20 minutes until symptoms improve.
- Oral prednisolone 30-60 mg once daily for 3-5 days

Severe Attack

- Prop-up patient
- Give O₂ @ 60% (6-15L/min) high flow mask
- Nebulization with Salbutamol 5mg. Repeat after 30 minutes.
- Then add Ipratropium Bromide 0.5mg 4 hourly and Hydrocortisone 200mg IV stat then 100mg tds IV

5.7.2. 2. Chronic Obstructive Pulmonary Disease (COPD)



Description

COPD is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive (over time)

COPD cover a wide variety of clinical syndromes associated with airflow obstruction and destruction of the lung parenchyma, spanning the spectrum with chronic bronchitis on one end and emphysema on the other extreme

Risk factors:

- Cigarette smoke
- Biofuel smoke
- Genetic- α 1-antitrypsin deficiency



Signs and Symptoms

- Cough
- Sputum
- Exertional breathlessness
- Wheezes



Investigations

- Sputum- for Gram staining
- Blood culture (where necessary)
- CxR
- Chest CT Scan
- FBC – Hb and PCV are elevated due to persistent hypoxemia
- Urea & Creatinine
- SpO₂
- Arterial Blood Gases
- Peak Flows
- ECG- maybe normal or reveal P-pulmonale or RVH
- α 1-antitrypsin levels where possible



Treatment

- Smoking cessation is a major factor in improving outcomes
- Treat hypoxia & respiratory failure - Oxygen 24-28% (Venturi mask)
- Bronchodilators adrenergic dilators - salbutamol inhaler 200mcg 6 hourly
- Anticholinergic agents-inhaled ipratropium bromide 20mcg/dose 6 hourly (not to exceed 12 puffs in 24 hours)
- Theophyllines - may not be helpful in COPD
- Phosphodiesterase type IV inhibitors-increase intracellular cyclic adenosine monophosphate (cAMP) resulting in bronchodilatation
- Corticosteroid inhaler (investigation should be clearly done)
- Antibiotics - Erythromycin 500mg four times daily for 5 days (frequency to be uniform)

Exacerbation of COPD



Description

This is an acute deterioration of the respiratory symptoms of patients with underlying COPD results in additional therapy.

Common causes include:

- Infections
 - Bacteria-H. influenzae, S. pneumoniae, M. catarrhalis
 - Viruses-Community Acquired Pneumonia
- Bullae-Pneumothorax



Treatment

- Treat causes of exacerbations of the conditions
- Hydrocortisone 200mg intravenously 4 hourly for 24 hours and maintain on oral Prednisolone 30mg on alternate days (duration required)
- Suction of the fluid from the airway
- Give an appropriate antibiotic: Erythromycin 500mg QID (frequency) daily for 10 days
- Smoking cessation
- Give oxygen.

Prevention

- Reduce industrial exposure
- Wear gas masks

5. 7.2.3. Emphysema



Description

This is an irreversible obstruction of the airways characterised with the destruction of the alveoli and bronchioles by fibrosis.



Signs and Symptoms

- Severe shortness of breath with slight exertion
- Recurrent coughs
- Slight wheezing
- Barrel chest Signs
- Barrel chest
- Clubbing of fingers
- Hyper inflated lungs on X-ray
- Air trapping on X-ray



Treatment

Treat causes of exacerbations of the conditions

- Hydrocortisone 200mg intravenously 4 hourly for 24 hours and maintain on oral Prednisolone 30mg on alternate days
- Suction of the fluid from the airway
- Give an appropriate antibiotic i.e. Erythromycin
- 500mg while awaiting sputum results Supportive
- Give up the habit that caused the emphysema e.g. stop smoking,
- Give oxygen. Prevention
- Stop smoking
- Reduce industrial exposure
- Wear gas masks

5.7.2.4. Pneumonia



Description

This is an inflammation of the lungs usually caused by *Streptococcus pneumoniae*, *Mycoplasma pneumoniae* and *Staphylococcus aureus* *Haemophilus Influenzae* type B and atypical organisms such as *Jiroveci pneumonia*.

Clinical features

These are usually of sudden onset.



Signs and Symptoms

- Fever
- Dry or productive cough
- Chest pain
- Chills
- Breathlessness
- Children may be unable to drink or breastfeed
- Bronchial breathing
- Drowsiness
- Increased respiration rate
- Cyanosis may be present
- Flaring of nostrils
- Chest indrawing
- Increased pulse rate
- Crepitations
- Breath sounds may be reduced
- Sputum may be “rusty”.



Complications

- Septicaemia
- Lung abscess
- Emphysema
- Heart failure
- Meningitis



Investigations

This is based on clinical findings but may be supported by radiological examinations which show lobar and bronchial pneumonia.



Treatment

Some patients will need admission particularly if there is cyanosis or complications.

- Benzylpenicillin 1-2MU intravenously 6 hourly for 5 days adults, children 25,000-50,000 units/kg intravenously/intramuscularly in 4 divided doses for 7 days (as soon as the symptoms and respiratory rates are controlled change to oral medication i.e. Amoxycillin 250mg for adults and 125 mg/5ml in children) or
- Ceftriaxone 1g - 2g daily adults, children 20 50mg/kg daily intravenously/intramuscularly for 7 days. if allergic to penicillin or
- Erythromycin 500mg adults, orally 6 hourly for 7 days, children 2030mg/kg in 4 divided doses for 7 days
- Oxygen is indicated if respiratory distress or cyanosis is present
- Non-opiate analgesics; Paracetamol 500mg - 1g orally 3 - 4 times daily adults, children 10-20mg/kg orally 3 - 4 times daily.

Refer early to a specialist if the patient is not rapidly improving with antibiotic treatment.

Aspiration Pneumonia



Description

A pulmonary infection resulting from inhalation of bacteria-rich fluids into the lower respiratory tract.

This is frequently found in:

- Older adults
- CVA & post-stroke pneumonia
- Alcohol Use Disorder (AUD)
- Seizures
- Drug overdose
- Use of sedatives
- CNS disorders
- Muscular disorders



Signs and Symptoms

Commonly present with features of CAP, including cough, fever and malaise



Investigations

A comprehensive history regarding current or previous dysphagia, previous stroke, instances of aspiration, coughing during eating or drinking, and other medical conditions predisposing to overt or silent aspiration aids in diagnosing aspiration pneumonia.

- CxR
- CT Scan
- Septic screen
- FBC
- Urea & Creatinine
- Videofluoroscopy swallowing study (VFSS) (a modified barium swallow)



Treatment

Supportive

- Nurse in lateral decubitus or propped-up
- NG tube insertion where necessary
- Chest physiotherapy

Pharmacological

Local facility outpatient

- Amoxicillin 500mg eight hourly 5-7 days
- Doxycycline 100mg twelve hourly 5-7 days
- Azithromycin 500mg stat then 250 mg once daily for 4 days

Patients with co-morbidities who are not admitted may be given

- Amoxicillin/clavulanate 500mg/125mg 8 hourly
- A combination of a cephalosporin and a macrolide
- Also, a respiratory quinolones (levofloxacin or moxifloxacin)

Hospitalized patients with non-severe CAP, without risk factors for methicillin-resistant Staphylococcus aureus (MRSA) infection or Pseudomonas aeruginosa

- Ampicillin/sulbactam 1.5g to 3 g 6 hourly
- Cefotaxime 1g to 2g -8 hourly or ceftriaxone 1g to 2g daily
- Ceftaroline 600 mg 12hourly plus a macrolide
- Also, a respiratory quinolones

In patients with confirmed risk factors for MRSA or P-aeruginosa or a prior history of infections secondary to these organisms

- Piperacillin/tazobactam
- Cefepime imipenem, or meropenem in combination with vancomycin or linezolid is the CURB 65 score necessary should it be included

Atypical Pneumonia

Signs and symptoms of pneumonia plus extra-pulmonary signs such as arthritis, splenomegaly caused by Mycoplasma, Chlamydia, PCP.



Treatment

- Erythromycin 500mg orally QID for 14 days for Chlamydia
- Co-trimoxazole 960mg every 12 hours for 21 days in combination with a steroid i.e. Prednisolone for PCP starting with 40mg per day and reducing by 5mg every 3 days for adults
- For children above 4 weeks to adults 120mg/Kg body weight in 2 to 4 divided doses for 21 days

5.7.2.5. COVID-19



Description

Corona virus disease 2019 (COVID-19) is a respiratory disease caused by the Severe Acute Respiratory Syndrome Corona-Virus 2 (SARS-CoV-2).



Signs and Symptoms

Non-severe

- Fever
- Cough
- Myalgia
- Fatigue
- Evidence of lower respiratory tract infections by clinical assessment or imaging
- SpO₂ >93% on room air above sea level
- Lung infiltrates < 50%

NB: Some patients may test positive for COVID-19 but are asymptomatic

Severe and/or Critical

- Shortness of breath
- Increased respiratory rate >30 bpm
- Respiratory failure
- Low oxygen saturations ($\text{SpO}_2 \leq 93\%$ on room air above sea level)
- Lung infiltrates $> 50\%$
- $\text{PaO}_2/\text{FiO}_2 > 300\text{mmHg}$
- Sepsis/ septic shock
- Multi-organ failure



Investigations

- SARS-CoV-2 Antigen RDT (rapid diagnostic test)
- SARS-CoV-2 rt-PCR (Nucleic Acid Amplification Test - NAAT) test
- SpO_2
- D-dimer
- CRP
- RBS/ FBS
- BP
- Chest x-ray or other imaging
- LFTs
- RFTs
- Gene Xpert for TB
- HIV
- Malaria (RDT and MPS)



Treatment

Risk factors for hospitalization or progression to severe disease:

- Age > 50 years
- BMI <18 or >24
- Co-morbidities such as HTN, DM
- Immunosuppressive conditions such as HIV, cancer, long-standing steroid use
- Chronic cardiopulmonary disease (asthma, CHF, CAD)
- Chronic kidney disease
- Pregnancy

Non-severe

- Nirmatrelvir/ Ritonavir 300/ 100mg twice daily for 5 days (150mg/ 100mg for eGFR ≥ 30 ml/min and < 60 ml/min) **OR**
- Remdesivir IV (Adults and Children ≥ 40 kg): 200mg on day 1 and 100mg on subsequent days. Duration 3-5 days
- Dosage (Children ≥ 3 kg to < 40 kg): 5mg/kg on day 1 and 2.5mg/kg on subsequent days. Duration 3-5 days
- Molnupiravir 800mg twice daily for 5 days

Indications for Antivirals:

- Positive COVID-19 test
- Symptoms within 5 days of onset (for oral antivirals)
- Symptoms within 7 days of onset (for IV antiviral)
- At least 1 risk factor for progression to severe disease
- ≥ 12 years and ≥ 40 kg body weight (Nirmatrelvir/Ritonavir)
- ≥ 28 days and ≥ 3 kg body weight (Remdesivir)
- ≥ 18 years (Molnupiravir)

NB: Molnupiravir is contraindicated in Pregnancy

Multiple drug-drug interactions with Nirmatrelvir/Ritonavir. Check www.covid19-druginteractions.org/checker

Supportive treatment

Severe and Critical (hospitalized patients) need:

- Oxygen therapy
Escalate to achieve target SPO₂ above 94%
- Immune modulating drugs
 - o Dexamethasone IV 6mg once daily for up to 14 days **OR**
 - o Hydrocortisone IV 50mg three times daily for up to 14 days
 - o Prednisolone 40mg once daily for up to 14 days

NB: Steroids are only indicated in patients on O₂

- Baricitinib
 - o Adults and children > 9 years: 4mg od for up to 14 days
 - o Children ≥ 2 to ≤ 9 years: 2mg od for up to 14 days

Given to:

Among hospitalized adults with severe COVID-19 having elevated inflammatory markers but not on invasive mechanical ventilation, or

Among hospitalized patients with severe COVID-19 who cannot receive a corticosteroid (which is standard of care) because of a contraindication (add Remdesivir)

Monitor ALC, ANC and renal function

- Tocilizumab

Weight <30 kg: 12 mg/kg as a single IV infusion over 60 minutes. Weight ≥30 kg: 8 mg/kg as a single IV infusion over 60 minutes

Single dose administration. Second in 12-48 hrs depending on clinical response. Max 800mg per infusion

Should be given only in combination with dexamethasone (or another corticosteroid at an equivalent dose), age ≥ 2 years

Renal: adjustment currently not warranted

- Antithrombotic

- o Enoxaparin 0.5mg/kg SC once daily for mild infection

- o Enoxaparin 1mg/kg SC twice daily for severe infection

- Chest physiotherapy

- Psycho-social counselling

Aspiration pneumonia

More common in new-born babies especially in premature, respiratory distress, chronically ill, chronic aspirators, post vascular operations



Treatment

- Gentamycin, 5mg/kg twice a day or I.M 10 mg once daily
- Ciprofloxacin, 10mg/Kg body weight 3 times daily, the benefit must outweigh the risk but may be used for 5 to 17-year-olds.

Obstructive Airway Disease

Obstructive Airway Disease can be upper or lower.

Stridor due to Diphtheria

In stridor due to diphtheria, an examination of the throat will reveal a white membrane. Diphtheria infection is uncommon nowadays.



Treatment

- Benzyl Penicillin IM/IV 25,000 - 50,000 units/kg intravenously in 4 divided doses for 5 days

Prevention

- Diphtheria can be effectively prevented by active immunisation in childhood

Stridor due to an inhaled foreign body

This is usually preceded by sudden choke whilst eating a meal or playing with small objects.



Treatment

- Remove foreign body

Stridor due to inhaled Paraffin



Signs and Symptoms

- Smell of paraffin
- Cyanosis
- High respiratory rate
- Tachycardia
- Tachypnoea



Treatment

DO NOT INDUCE VOMITING!

- Give milk
- Hydrate
- Give Oxygen
- Antibiotic prophylaxis with Amoxycillin 125mg/5ml taken 3 times a day.

Advice to patients

- Do not put paraffin in soft drink containers
- Clearly label paraffin containers

5.8 ENDOCRINE CONDITIONS

5.8.1. Diabetes Mellitus



Description

Diabetes is a chronic condition characterized by high blood glucose (hyperglycaemia) resulting from disordered metabolism of glucose. The hyperglycemia is caused by insulin resistance or impaired insulin secretion, or a combination of both.

Causes/Risk Factors include:

- Sedentary lifestyle and excess body weight trigger type 2 diabetes.
- Family history of diabetes (i.e. parents or siblings with diabetes)
- Gestational diabetes mellitus is diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt diabetes prior to gestation
- History of GDM
- Hypercholesterolemia



Signs and Symptoms

- Polyphagia (frequently hungry)
- Polyuria (frequently urinating large volume of urine)
- Polydipsia (frequently drinking water due to excessive thirst)
- Blurred vision may be due to increased blood glucose in the eye lens, causing initially distorted far vision and later near vision as well.
- Fatigue
- Weight loss
- Dry mouth
- Dry or itchy skin
- Poor wound healing
- Impotence (erectile dysfunction)
- Recurrent infections such as vaginal yeast infections (vulval itchiness and curd-like discharge), balanitis (itchy rash on the penis)
- Groin rash (tinea cruris)

- External ear infections (swimmers ear)
- Peripheral neuropathy (pins and needles sensation of feet or burning sensation of feet)

NB: All these symptoms need not necessarily be present in all patients with diabetes



Investigations

Table 122: Diagnostic Criteria

A fasting plasma glucose (FPG) value of ≥ 7.0 mmol/L
2-hrs plasma glucose value during a 75-g oral glucose tolerance test (OGTT) of ≥ 11.1 mmol/L
HbA1c value of $\geq 6.5\%$ *
Random blood glucose of ≥ 11.1 mmol/L in the presence of diabetes symptoms (polyuria, polydipsia, polyphagia, weight loss), or in the presence a hyperglycaemic crisis**.

*HbA1C interpretation requires normal haemoglobin levels therefore avoid using it in patients with chronic anaemia such as sickle cell or in pregnancy

**Hyperglycaemic crisis may be diabetes ketoacidosis(DKA), or hyperglycaemic hyperosmolar state(HHS), or uncomplicated severe hyperglycaemia

NB:

Presence of glucose in urine(glucosuria) is not diagnostic of Diabetes but should prompt blood tests above to confirm the diagnosis

Fasting is defined as no caloric (carbohydrate) intake overnight for 8 -12 hours.



Treatment

Table 123: Treatment Targets

Blood glucose level targets while on treatment	General Population FPG: 4 –7 mmol/L 2H-PG: 6 –10 mmol/L Pregnant woman FPG <5.3 mmol/l 1H-PG <7.8mmol 2H-PG ≤ 6.7 mmol/l Be cautious in elderly and children!
Blood cholesterol level	Total cholesterol <5.2 mmol/L HDL-C > 1.0 mmol/L LDL-C < 2.6 mmol/L Triglycerides < 1.7 mmol/L

Blood pressure	Target <130/80 mmHg
Physical activity	≥ 30minutes of exercise at least 5days/week (total ≥150 minutes/week)
Body mass index (BMI)	5 –10% weight loss for overweight Or obese Aim for BMI<25 kg/m ²
Waist circumference	<102cm for men <88cm for women
Spot Urine albumin	UACR<30mg/g
Cigarette consumption	Nil
Alcohol consumption	≤2 standard drinks per day

FPG-fasting plasma glucose; 2H-PG 2hour postprandial glucose(random); 1H-PG-1hour post prandial glucose(random)

UACR: Urine albumin-to-creatinine ratio

Non-Pharmacological Therapies for DM

- **Dietary modification**
 - o Eat less processed foods with low glycemic index and rich in fibre e.g. roller mealie meal, brown rice, brown bread, sorghum or millet
 - o AVOID highly processed starches (high glycemic index foods) e.g. pasta, white bread, breakfast mealie meal, cakes, sweet drinks, sugar, etc.
- **Exercise**
 - o Any form of exercise including brisk walking, dancing, swimming, cycling and playing sports for at least 150minutes/week is recommended.
- **Sleep**
 - o At least 7 hours of sleep per day
- **Smoking**
 - o Must be discontinued
- **Alcohol**
 - o Intake must be reduced

5.8.1.1. Type 1 Diabetes Mellitus (T1DM)



Description

Is due to autoimmune destruction of the pancreatic beta cells resulting in absolute insulin deficiency.

In genetically predisposed individuals, viral infections trigger the development of autoantibodies against beta cells I of the pancreas

Type 1 DM may exist together with other autoimmune conditions in autoimmune polyglandular syndromes

Autoimmune diabetes includes latent autoimmune diabetes of adulthood (LADA); diagnosed in slender adults.

Risk Factors

- Presence of genes HLA DR3 or HLA DR4
- Caucasian race
- Viruses (Rubella, enteroviruses, coxsackie B4, mumps virus, Epstein-Barr virus, rotavirus, and cytomegalovirus) are said to be the main triggers in genetically predisposed persons.



Investigations

- Anti-Glutamic Acid Decarboxylase (GAD) 65 antibodies
- Anti-islet tyrosine phosphatases 2 (IA2) and IA-2 β
- Islet cell autoantibodies
- Insulin autoantibodies
- Anti-zinc transporter 8 (ZnT8) antibodies



Treatment

Pharmacological

Table 124: Insulin therapy

Insulin type	Onset of action	Peak	Duration of action	Examples
Rapid acting	5-15minutes	1 hour	2-4 hours	Aspart and Lispro
Short acting/Regular/ Soluble	30minutes	2-4hours	5-8hours	Actrapid
Intermediate acting/**NPH	1-2hours	4-6hours	12-14hours	Isophane, Protaphane
Long-acting	1-4hours	5 hours(plateau)	24hours	Glargine, Detemir, Degludec
Premixed (30% rapid or short acting, 70% NPH)	5-60minutes	Varies*	10-16hours	Actraphane, Novomix 30, Mixtard

*Varies depending on whether rapid-acting or regular (short-acting) insulin is used.

**NPH- Neutral Protamine Hagedorn

Insulin regimens

Total daily dose (TDD) of insulin is 0.3 to 1 IU/kg bodyweight/day

Basal-Bolus OR four injections daily

Comprises short-acting insulin **bolus** at meal time and **basal** (intermediate or long acting insulin at bedtime) insulin subcutaneously

Give prandial insulin (**bolus**) **3 times** a day approximately (30 minutes if regular insulin OR 5-10 minutes if rapid-acting) prior to the start of a meal

Give basal insulin at bedtime.

TDD is divided as follows:

Give 1/3 of TDD at bedtime (Basal)(22:00hrs)

Give 2/3 of TDD divided by 3 and given before meals

Example

A 70kg patient can be initiated on $0.3 \times 70\text{kg} = 21 \text{ IU}$ as TDD

$2/3$ of 21IU = 14IU soluble

$1/3$ of 21IU = 7IU intermediate or long-acting

Soluble = $14\text{iu}/3 = 5\text{iu}$ before breakfast, lunch and supper (rounded off to nearest whole number)

Intermediate = **7iu** at bed time

**Insulin doses will be adjusted accordingly until target levels are achieved (tablexxx above on glycaemic targets)*

Two Injections Daily with Premixed Insulin (Biphasic insulin regimen)

Two injections daily of Premixed insulin containing 70% Basal insulin (Intermediate-acting insulin/NPH) and 30% Prandial insulin (Short-acting insulin)

Morning dose is $2/3$ of the TDD, given 30 minutes before Breakfast

Evening dose is $1/3$ of the TDD, given 30 minutes before supper

Example:

70kg man whose TDD is 21iu

Before breakfast $2/3$ of 21iu = **14iu**

Before supper $1/3$ of 21iu = **7iu**

Subsequent insulin doses will depend on blood glucose levels before or 2 hours after main meal

Twice Daily Injections using Separate Regular and Intermediate(NPH) Insulin

$2/3$ of TDD is given at **breakfast** and $1/3$ at **supper** time

Each dose should comprise $2/3$ NPH, $1/3$ Regular insulin

Example

70kg patient needs 21iu/ day TDD

30 minutes before breakfast he needs 2/3 of TDD=**14iu** as follows:

1/3 of 14 IU = 4 IU soluble insulin

2/3 of 14 = 10iu intermediate insulin

30 minutes before supper he gets 1/3 of TDD= **7iu**:

1/3 of 7iu=2iu soluble insulin

2/3 of 7iu=5iu intermediate insulin

(numbers have been rounded off to whole numbers)

NOTE

Regular and intermediate-acting insulin can be carefully drawn into the same syringe and administered as one injection. ALWAYS start with the soluble insulin! That is, withdraw the CLEAR insulin BEFORE CLOUDY one!

Table 125: Adverse Effects of Insulin Therapy

Side effect	Treatment
Hypoglycaemia	See 4...xxx below for details section on hypoglycaemia
Weight gain	Exercise Diet control
Allergic skin reactions	Anti-histamine Change insulin types if severe
Lipo-hypertrophy at the site of injection	Change injection sites regularly.

5. 8.1.2. Type 2 Diabetes Mellitus (T2DM)



Description

Prediabetes

- Prediabetes or intermediate diabetes develops before the onset of overt T2DM
- Prediabetes is a state in which an individual has a blood glucose that is higher than the upper limit of normal but lower than the minimum threshold for them to be diagnosed as being diabetic.
- Patients with prediabetes must be counselled on lifestyle and dietary management and may be commenced on metformin.
- Follow up of patients should be annually to be monitored for development of T2DM.
- May be undiagnosed for many years; it may be 4–6 years or more before a clinical diagnosis is reached.

Table 126: Diagnostic criteria of Prediabetes

Fasting blood glucose	5.6 - 6.9mmol/L
2-hour post 75g glucose (Oral Glucose Tolerance Test)	7.8 - 11.0mmol/L
HbA1C	5.7 - 6.4%

Type 2 Diabetes Mellitus

- T2DM is based on 8 identified defects (known as the Ominous Octet) that contribute to the hyperglycaemia. The following are some of the notable defects:
- Reduced β -cell mass leads to reduced insulin secretion
- Increased glucagon production in the pancreatic α -cells.
- Impaired action of incretin hormones; glucose dependent insulinotropic peptide (GIP) and glucagon-like peptide -1 (GLP-1) causing reduced insulin secretion.
- Increased hepatic glucose production (gluconeogenesis, glycogenolysis)
- Insulin resistance in the adipose tissue
- Insulin resistance in the skeletal muscle
- Abnormal increase in glucose reabsorption by sodium glucose cotransporter-2 (SGLT-2) in the kidneys
- Insulin resistance in the brain

Development of T2DM runs in two phases:

In the first phase, the individuals genetically predisposed to T2DM develop insulin resistance and impaired β -cell function, culminating in impaired glucose tolerance (IGT) i.e. prediabetes.

In the second phase, the IGT progresses to T2DM as a result of declined β -cell function. T2DM is progressive. By the time of T2DM diagnosis, around **40–50%** of beta-cell function is already lost, with a further loss of 4–5% expected each year thereafter



Investigations

- Fasting plasma glucose (8-12 hours after the last meal/drinks included)
- Random plasma glucose (at least 2 hours after a meal)
- Glycosylated Haemoglobin (HbA1c)
- Lipid profile (total cholesterol, HDL-C, LDL-C, triglycerides)
- Urea, creatinine and electrolytes
- Urinary albumin and creatinine ratio
- Electrocardiogram (ECG)
- Echocardiogram (ECHO)

Individualized Glycaemic Targets

- The glycaemic targets should be individualized according to:
- The duration of diabetes (tighter control in those who are recently diagnosed)
- Patient's age and life expectancy (less stringent goals in the elderly)
- Comorbid conditions e.g. cardiovascular disease or advanced microvascular complications
- Hypoglycaemia unawareness
- Self-motivation by the patient



Treatment

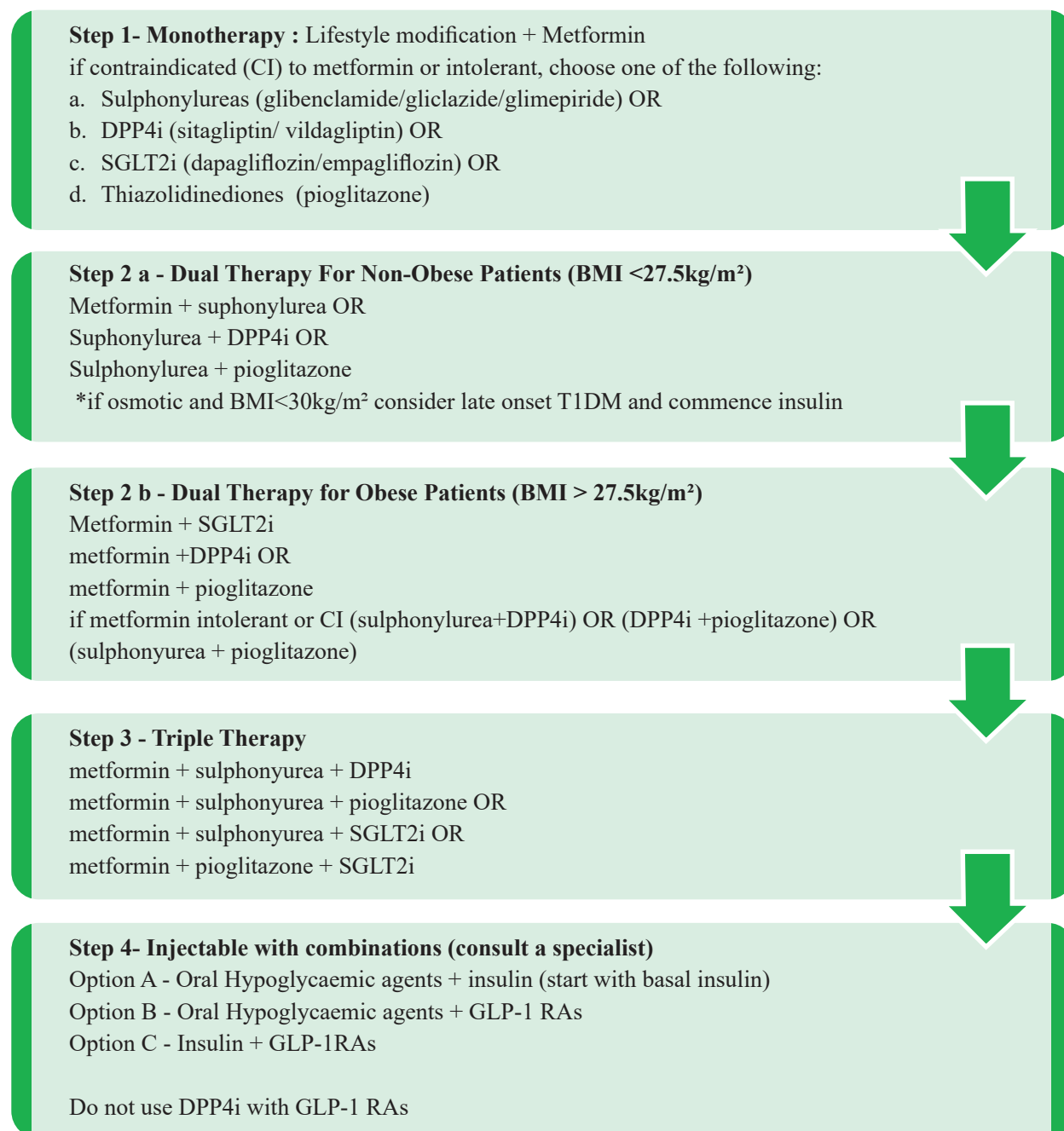
Table 127: Summaries the classes of drugs used in treatment of T2DM

Drug Class	Drug Dose & Frequency	Advantages	Disadvantages	Contraindications
Biguanides	Metformin initially 500mg daily, up to 2g in 3 divided doses/day	Weight loss/neutral Hypoglycaemia is rare Lessens risk of CVD	GI symptoms Lactic acidosis B12 deficiency	End stage kidney disease
Sulphonyureas	Glibenclamide 2.5-5mg once or twice daily (maximum 20mg/day) Glimepiride 1-2mg daily maximum 8mg/day (increments of 2 mg/ 1 or 2 weeks) Gliclazide 40-80mg 12hourly (maximum 320mg in 24hours)	Acts quickly Low cost	Weight gain Hypoglycaemia	BMI >30kg/m2 End stage kidney disease
Thiozolidinedones (TZD)	Pioglitazone 15- 30mg once daily maximum 45mg/day	Increase insulin sensitivity Reduces CVD	Fluid retention Bladder cancer Osteoporosis Weight gain	Heart failure Bladder cancer
Dipeptidyl peptidase-4 inhibitors (DPP4i)	Vildagliptin 50 –100mg in 2 divided doses Sitagliptin 25mg, 50mg & 100mg once a day	No hypoglycaemia Weight neutral	Pancreatitis Expensive	History of pancreatitis
Sodium Glucose Co-transporter 2 inhibitors (SGLT2i)	Dapagliflozin 5-10mg once a day	Weight loss Reduced CVD Lowers BP No hypoglycemia	Euglycaemic DKA Recurrent UTIs Genital mycotic infections	• end stage kidney disease • pregnancy and lactation • hypersensitivity
Glucagon like polypeptide 1 Receptor agonist (GLP-1 RA)	Semaglutide 0.25 to 2mg weekly (injectable)	Weight loss Reduce CVD No hypoglycaemia	GI side effects Pancreatitis Expensive	• History of pancreatitis • End stage kidney disease • Hx of medullary thyroid cancer • pregnancy

*CVD- Cardiovascular Disease, UTI – urinary tract infection, BMI- Body Mass Index, BP- Blood pressure

Algorithm for Pharmacological Management of T2DM

Figure 14: Algorithm for Pharmacological Management of T2DM



5.8.1.3. Emergencies in Diabetes Mellitus

Hypoglycaemia



Description

Hypoglycaemia is defined as low plasma glucose level of ≤ 3.9 mmol/L.

It is categorised into 3 levels:

- Level 1 glucose of 3.0-3.8 mmol/l,

- level 2 is blood glucose < 3.0 mmol/l)
- level 3 is blood glucose level presenting with altered mental state and/or physical status needing the intervention of a third party for recovery.

Hypoglycaemia unawareness is defined as absence of hypoglycaemia symptoms, but at plasma glucose of ≤ 2.5 mmol/L. It's more common in people who have T1DM and is a limitation for tight glycemic control.

Relative or Pseudohypoglycemia means the person with diabetes reports typical symptoms of hypoglycemia (and thinks they have hypoglycaemia), but the measured blood glucose level is not low (> 3.9 mmol/L)

NO HYPOGLYCAEMIC AGENTS SHOULD BE TAKEN WHEN HYPOGLYCAEMIA IS DETECTED!



Signs and Symptoms

Table 128: Treatment of mild Hypoglycaemia

Early symptoms	Treatment of mild Hypoglycaemia
• Diaphoresis(sweating) • Palpitations (due to tachycardia), • tremor • anxiety • irritability, restlessness • sensation of hunger • Tingling lips • General body weakness	Ingest 15g of glucose (e.g. 200ml fruit juice or soft drink or 3 teaspoons or 1 tablespoon of sugar/honey) every 15 minutes with blood glucose checked every 15 minutes until blood glucose is ≥ 6.0 mmol/L. (The 15-15-15 Rule) When blood glucose reaches ≥ 6.0 mmol/L, the patient should take a meal or consume a snack if the next meal time is more than an hour later.
Late symptoms (neuroglycopenia) • loss of consciousness and seizures • confusion • aggressive behaviour • Headache • poor concentration and co-ordination • glazed eyes • slurred speech • double vision • drowsiness	Treatment Give 20-25g glucose (40-50mls) of 50% dextrose diluted in the ratio of 1:1 with NS/RL, or water for injection) intravenously. Recheck blood glucose after 25 minutes repeat the above treatment if the blood glucose is still low (<3.9mmol/L) Blood glucose should be checked every 25 minutes, until it is ≥ 6.0 mmol/l followed by a snack/meal if conscious, or NG tube feeds if unconscious. Change blood glucose monitoring frequency to hourly when BG>6.0mmol/L Alternative: A bolus of Glucagon at dose 0.5mg IM in children, or 1mg IM in adults can be administered in those with normal liver function Maintenance fluids 10% Dextrose should be given at rate of 75ml/hour (OR 5% dextrose at 150ml/hour) to prevent rebound hypoglycaemia. Stop dextrose infusion when the blood glucose level is 12mmol/L ALWAYS Refer to the patient with neuroglycopenia to the next level of care

Patient with mild hypoglycaemia is capable of self-treatment, while those with neuroglycopenia require admission.

Glucagon can cause nausea and vomiting, therefore if used in an unconscious patient, the patient should be turned to left lateral position to prevent aspiration

DIABETIC KETOACIDOSIS – DKA refer to adult emergencies pgxxx

HYPEROSMOLAR HYPERGLYCAEMIC STATE –HHS refer to adult emergencies pgxxx

5.8.1.4. Gestational Diabetes Mellitus



Description

Diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt before Pregnancy

Risk factors for GDM

- Advanced maternal age
- Obesity
- Family history of diabetes
- Personal history of GDM or previous delivery of a large baby
- Polycystic ovary syndrome
- Physical inactivity
- Smoking

Diagnostic Criteria

- Fasting plasma glucose $>5.1\text{mmol/L}$
- 1-hour plasma glucose $>10.0\text{ mmol/L}$ following a 75g oral glucose load
- 2-hour plasma glucose $>8.5\text{ mmol/L}$



Treatment

Table 129:Recommended Blood Glucose Target in Pregnancy

Blood glucose sample Type	Blood Glucose Level
Fasting	$<5.3\text{mmol/L}$
1-hour post prandial	$<7.8\text{mmol/L}$
2-hour postprandial	$<6.8\text{mmol/L}$
**Use of HbA1c levels is not as valuable for assessing glucose control in GDM	

Lifestyle Modification

- *Diet*
 - Advice food with low glycaemic index and high fibre foods with 3 meals and 2 snacks per day

- *Exercise*
 - o Initially 10-15 minutes of exercise (for 3 days a week) which can be increased to 20-30 minutes (for 4 days in a week). The exercise should be preceded by a warm up for 5 – 10 minutes and the warm up should also be done after the exercise. Warm up can be stretching and walking.
- *Self-monitoring*
 - o Blood glucose should be done 4 times (Fasting, before and after every main meal)
 - o Foetal movements should be monitored especially in the last 8-10 weeks of pregnancy

Treatment

The drug of choice is insulin but when it is not readily available or the patient opts out, oral hypoglycaemic agents can be used.

Insulin Therapy

Initially an evening dose of intermediate acting insulin or long acting insulin such as glargine or detemir may be considered

If there is elevation of postprandial glucose levels, short acting insulin can be introduced

Where both the fasting and post prandial glucose levels are high:

- use both regular and intermediate insulin

OR

- pre-mixed insulin

The ratio of regular to intermediate insulin is 1:2

The dose is 0.3-1 IU/kg body weight/day, divided into:

- 2/3 morning
- 1/3 evening

Example 1: a patient weighing 72kg

Insulin dose at 0.5 IU/kg = $72 \times 0.5 = 36$ units

24 IU morning, 12 IU evening

8 IU regular/16 IU intermediate morning

3 IU regular/8 IU intermediate evening

Example 2: Body weight 67kg at 1IU/kg body weight

Morning 44units (15IU regular/ 30IU intermediate)

Evening 22units (7IU regular/14 IU intermediate)

Glibenclamide 5-10mg daily or 12 hourly, maximum total daily dose of 20mg

Metformin 500-1000mg daily, 12 hourly, OR 8 hourly, maximum total daily dose of 3000mg

Table 130: Complications of GDM

Maternal	Foetal/neonatal
Pre-eclampsia	Macrosomia
Pre term delivery	Hypoglycaemia
Antenatal depression	Still birth
Type 2 diabetes mellitus	Shoulder dystocia

5.8.2. Dyslipidaemias and Hypercholesterolaemia



Description

Dyslipidemia is lipid abnormalities including elevated triglycerides and low levels of high-density lipoprotein cholesterol (HDL-C) the ‘good cholesterol’.

Hypercholesterolaemia is a condition in which there are high levels of cholesterol in the blood notably low-density lipoprotein cholesterol (LDL-C) which is termed as ‘bad cholesterol’. Hypercholesterolaemia is a risk factor for the development of atherosclerotic cardiovascular disease such as coronary heart disease, peripheral artery disease and cerebrovascular disease.

Parameter	Normal Range (mmol/L)
Total Cholesterol	≤ 5.2
HDL-Cholesterol	≥ 1
LDL-Cholesterol (Non-HDL)	≤ 2.5
Fasting triglycerides	≤ 1.8
Non-fasting triglycerides	≤ 2.3
Total cholesterol to HDL cholesterol ratio	≤ 6

Risk Factors

- Sedentary lifestyle
- Smoking
- Obesity
- Unhealthy diet (especially with high content of saturated and trans fats)
- High blood pressure
- Diabetes
- Age >40 years



Signs and Symptoms

Usually asymptomatic but later presents with:

- Xanthelasma (cholesterol deposits in the eyelids)
- Corneal arcus
- Xanthoma



Investigations

- Fasting lipid profile (LDL-C, Total Cholesterol, HDL-C, Triglycerides)

Other tests to evaluate possible causes/complications;

- AST and ALT
- FBS/HbA1c
- Urea and creatinine
- Thyroid function tests
- ECG/ECHO
- Carotid doppler



Treatment

Supportive

- Encourage exercise (minimum 5 days a week for 30 minutes/day)
- Smoke cessation
- Limit alcohol intake
- Dietary counselling (refer to nutritionist)
- Weight loss if overweight or obese

Pharmacological

- **Statins**
 - o Atorvastatin 10-80mg once daily
 - o Simvastatin 10-40mg once daily maximum 40mg/day
 - o Rosuvastatin 5-40mg once daily
- **Fibrates**
 - o Fenofibrate 160 mg daily PO
 - o Gemfibrozil 1.2 g daily in 2 divided doses, maintenance 0.9–1.2 g daily.

5.8.3. Thyroid Disorders



Description

Thyroid disorders include hypothyroidism, hyperthyroidism, goiter, thyroid nodules and thyroid cancer.

5.8.3.1. Hypothyroidism



Description

Hypothyroidism is a condition in which a person's thyroid hormone production is below normal.

Causes

- Autoimmune thyroiditis
- Post-surgery (thyroidectomy)
- Post radioactive iodine
- Secondary hypothyroidism due to pituitary diseases



Signs and Symptoms

- Depression
- Swelling legs
- Weight gain
- Abnormal menstrual cycle
- Fatigue
- Hair loss
- Memory loss
- Dry, rough skin
- Constipation
- Hoarse voice



Investigations

- A blood test for Thyroid stimulating hormone (TSH), Free T4 and Free T3
- High serum TSH level with low free T4 and Free T3 hormones suggests hypothyroidism
- *Once diagnosis is conformed, refer to specialist for initiation of treatment*

Indications for Treatment

- TSH level persistently > 10 mU/L
- TSH levels (4.5 –10 mU/L); consider, treatment in patients younger than 65yrs old 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.

Treatment

- Clinical hypothyroidism –Thyroxine 1.6 –1.8 $\mu\text{g/kg}$ ideal body weight. Subclinical hypothyroidism – Thyroxine 1.1 –1.2 $\mu\text{g/kg}$ 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 adults with overt hypothyroidism, consider beginning treatment with full replacement doses
- Adjust dosage when there are large changes in body weight, intercurrent infections, with aging and with pregnancy.

Monitoring

TSH monitoring 6 –8 weeks after any thyroxine dose change, and yearly life – long monitoring once euthyroidism is achieved (target TSH 0.2 –4.0 $\mu\text{m/l}$). FT4 can be measured in early stages of treatment.

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 up to 10.0 mU/L with normal free T4=Subclinical Hypothyroidism.
- TSH > 2.5 up to 10.0 mU/L with low levels of free T4: Overt Hypothyroidism.
- TSH $> \text{or} = 10.0$ mU/L, despite the level of free T4: Overt Hypothyroidism

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

5.8.3.2. Hyperthyroidism



Description

Hyperthyroidism is a condition in which an overactive thyroid gland is producing an excessive amount of thyroid hormones that circulate in the blood.

Causes:

- Graves disease
- Toxic adenoma
- Multinodular goiter (TMNG)
- Inflammation of the thyroid gland (thyroiditis)
- Excessive iodine intake



Signs and Symptoms

- Anxiety and Tremors
- Excessive sweating
- Weight loss despite polyphagia
- Muscle weakness
- Lid lag and lid retraction
- A rapid heart rate, palpitations
- An enlarged thyroid gland
- Frequent bowel movements
- Irregular menses
- Hypertension with wide pulse pressure



Investigations

- Thyroid function test (Low TSH and high free T4 and free T3 suggest hyperthyroidism)
- TSH-receptor antibodies
- Anti-TPO antibodies
- Thyroid Ultra-sound
- Radioactive iodine uptake scan



Treatment

Management of hyperthyroidism depends on the cause.

- Symptomatic: Propranolol 20-40mg
- Antithyroid drugs:
 - o Carbimazole 15–40 mg daily continue until the patient becomes euthyroid, usually after 4 to 8 weeks, higher doses should be prescribed under specialist supervision only, then reduced to 5–15 mg daily, reduce dose gradually, therapy usually given for 12 to 18 months.
 - o Propylthiouracil: Initially 200–400 mg daily in divided doses until the patient becomes euthyroid, then reduced to 50–150 mg daily in divided doses, initial dose should be gradually reduced to the maintenance dose.
- Radioactive Iodine therapy
- Surgery (Thyroidectomy)

5.8.3.3. Thyroid storm (crisis)



Description

Thyroid storm is one of the most life-threatening endocrine emergencies, resulting from exacerbation of manifestations of thyrotoxicosis.

Thyroid storm is not a matter of thyroid levels increased beyond those of uncomplicated thyrotoxicosis, but the systemic decompensation that occurs. Therefore, diagnosis is clinical.

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.



Treatment

- Propranolol 60 –80 mg every 4 hours
- Propylthiouracil 500 –1000 mg load, then 250 mg every 4 hours

- Inorganic iodide - saturated solution of potassium iodide (SSKI) 5 drops (0.25 mL or 250 mg) orally every 6 hours (SSKI). **Do not start iodine until 1 hour after antithyroid medicine**
- Hydrocortisone 200mg IV load then 100mg every 8 hours
- Aggressive cooling with paracetamol 1g IV/PO every 6 hours, and cooling blankets.
- Volume resuscitation
- Respiratory support
- Monitoring in an intensive care unit

5.9 GASTRO-INTESTINAL CONDITIONS

5.9.1. Gastritis



Description

Gastritis can present as either acute or chronic gastritis. *Helicobacter pylori* is the commonest (80%) cause of gastritis.

In acute gastritis, there is inflammation of the superficial gastric mucosa. It can occur because of ingestion of drugs such as acetyl salicylic acid (ASA) and other non-steroidal anti-inflammatory drugs (NSAID) and alcohol.

Chronic gastritis is divided into 3 categories:

- Type A (autoimmune) gastritis seen in pernicious anaemia and also in other autoimmune diseases.
- Type B (bacterial) gastritis, which is associated with *Helicobacter pylori*.
- Type C (chemical) gastritis, which is due to repeated injury with bile reflux or chronic ingestion of NSAIDs.



Signs and Symptoms

- Indigestion
- Vomiting
- Haematemesis/melena (GI haemorrhage)
- Epigastric pain

Most chronic gastritis is asymptomatic.



Investigations

Non-invasive

- ^{13}C -urea breath test
- Fecal antigen test

Invasive (antral biopsy)

- Rapid urease Test
- Microbiological culture
- Endoscopy
- Histology



Treatment

(See notes under Chronic Peptic Ulcer Disease)

Remove offending cause

Triple therapy regimens: (1-week regimen)

- Amoxicillin 1g 2 times daily
Plus
- Metronidazole 400mg 3 times daily
Plus
- Omeprazole 20mg twice daily or 40mg once daily for 7 days OR

Eradication Therapy (at higher levels of care)

1. Clarithromycin Triple Therapy

Ppi + Clarithromycin + Metronidazole (7-14 Days)

2. Bismuth Quadruple Therapy

Ppi + Tetracycline + Metronidazole + Bismuth (10-14 Days)

3. Concomitant Therapy

Ppi + Clarithromycin + Amoxicillin + Tinidazole (3-10 Days)

4. Sequential Therapy

Ppi + Amoxicillin (5 Days), Followed By
Ppi + Clarithromycin And Tinidazole For 5 Days

5. Hybrid Therapy

A cross between sequential and concomitant therapies PPI + Amoxicillin for 7 days, followed by PPI + Clarithromycin + Tinidazole (or Metronidazole) for another 7 days

6. Levofloxacin-Based Therapies

Levofloxacin based therapies have shown favorable results, and are highly favored, though in Zambia Levofloxacin remain protected for use in DR-TB treatment.

NB: When patient presents with persistent or non-improvement of symptoms refer to higher level for further management (which may include scoping)



Complications

- Recurrent *H. pylori* infection
- Barrett's oesophagus
- Frank haemorrhage and anaemia
- Recurrent aspiration pneumonia
- Perforation of peptic ulcer
- Pyloric stenosis

Chronic Peptic Ulcer Disease



Description

Most peptic ulcers occur in the stomach or proximal duodenum but can also occur in the oesophagus (with oesophageal reflux).



Signs and Symptoms

- Epigastric pain
- Indigestion
- Flatulence
- Heartburn
- Anorexia: weight loss may occur



Investigations

- Endoscopy
- Barium meal

NB: Many patients, particularly the young presenting with indigestion, can be treated symptomatically for 4-5 weeks without investigation.



Treatment

Refer to section on Gastritis where available or as below

Anti-acids

- Magnesium trisilicate compound chewable tablet 250 - 500mg to chew when required or
- Aluminium hydroxide chewable tablet 500mg - 1g to chew when required

OR

- Magnesium trisilicate suspension 250mg with dried Aluminium (indicate strength /per ml)hydroxide 120mg 10ml orally 3 times daily OR
- Aluminium hydroxide (dried Aluminium hydroxide 500mg) 5 - 10ml orally 4 times daily; Children 6 - 12 years 5ml orally 3 times daily.
- Adults 1 - 4 tablets to be chewed 4 times daily between meals and at bedtime or as required.

Anti-Secretory Agent

a. *H₂-receptor antagonists*

Cimetidine 400mg tablets twice daily (with breakfast and at night) or 800mg at night for at least 4 weeks. Maintenance 400mg at night or 400mg morning and night.

Reflux oesophagitis:

- Cimetidine 400mg 4 times daily for 4 – 8 weeks.

OR

- Ranitidine 150mg tablets twice daily (with breakfast and at night) or 300mg at night for 4 – 8 weeks, up to 6 weeks in chronic episodic dyspepsia. Maintenance 150mg at night.
- Ranitidine 150mg twice daily or 300mg at night for up to 8 weeks or if necessary 12 weeks.

OR

- Famotidine 20-40mg once daily up to 8 weeks

b. *Proton pump inhibitors*

- Omeprazole 20mg tablets daily for 4 weeks followed by a further 4 – 8 weeks if not fully treated.
- Long term management of acid reflux disease. Omeprazole 10mg daily increasing up to 20mg if symptoms return. Not recommended for children under 3kg
- Children under 3kg - 5kg 0.7 to 1.4mg/kg daily
- Child 5 to 10kg: 5mg once daily in morning, child 10kg to 20kg: 10mg once daily in morning

OR

- Esomeprazole 20-40mg once daily for 4-8 weeks

OR

- Rabeprazole 20mg twice daily for 4-8 weeks

c. *Tripotassium dicitratobismuthate (Bismuth chelate)*

- Liquid 12mg/5ml. 10ml twice daily or 5ml 4 times daily for 28 days followed by a further 28 days if necessary. Not recommended for children.
- Tablets 120mg. 2 tablets twice daily or 1 tablet 4 times daily for 28 days followed by a further 28 days if necessary.

d. *Triple therapy regimens*

14-day regimen

- Amoxicillin 1g 2 times daily Plus
- Metronidazole 400mg 2 times daily Plus
- Omeprazole 20mg twice daily or 40mg once daily for 14 days

OR

Alternative: Clarithromycin 500mg daily twice daily Plus Metronidazole 400mg (or Tinidazole 500mg) twice daily for 7 days Plus Omeprazole 20mg twice daily for 14 days



Complications

- Change of the oesophageal mucosa (Barrett's oesophagus) which is premalignant.
- Anaemia and frank haemorrhage
- Recurrent aspiration pneumonia when stricture formation is present
- Perforation of peptic ulcer
- Pyloric stenosis

5.9.2. Diarrhoea

Diarrhoea in adults



Signs and Symptoms

In addition to diarrhoea, there may be:

- Fever
- Abdominal pain
- Vomiting
- Dehydration (mild or severe)
 - *No dehydration:* The patient does not show enough signs to classify as moderate or severe dehydration.

- o *Some dehydration:* The patient has two or more of the following signs:
 - Restlessness
 - Irritability
 - Sunken eyes
 - Dry mouth and tongue
 - Absence of tears
 - Thirsty, drinks eagerly
- o *Severe dehydration:* The patient is classified as having severe dehydration if there are two or more of the following signs:
 - Lethargic or unconscious; floppy
 - Absence of tears
 - Very dry mouth and tongue
 - Very thirsty, drinks poorly or unable to drink
 - Pinched skin goes back very slowly
 - Absent radial pulse
 - Low blood pressure.



Investigations

Investigations are necessary if the diarrhoea lasts more than one week, i.e.,

- Stool microscopy
- Culture and drug susceptibility.



Treatment

1. *Fluid replacement*
Fluid therapy (See the section on Cholera) (show page)

2. *Drugs*
In chronic diarrhoea where the cause has not been found:

- Loperamide 4mg Stat, then 2mg per loose stool (do not exceed 16mg in 24 hours)

NB: Any infective causes should be treated according to antimicrobial sensitivity patterns.

Persistent/Chronic Diarrhoea



Description – as in children.

Causes include:

- Infections such as giardia, cryptosporidium, Isospora belli and microsporidia in AIDS patient.
- Colonic lesions such as carcinoma, Crohn's disease and ulcerative colitis

- Coeliac disease, Tropical sprue, Chronic pancreatitis
- Pseudo membranous colitis
- Thyrotoxicosis
- Diabetes



Signs and Symptoms

- Diarrhoea, bloody diarrhoea or steatorrhoea
- Abdominal pain
- Weight loss
- Anaemia

NB: Persistent and chronic diarrhoea may be associated with vomiting



Investigations

- Stool microscopy, culture and sensitivity
- Special tests may be needed for certain parasites such as cryptosporidium, Isospora and microsporidia
- Rectal/jejunal biopsy
- Barium enema
- Full blood count



Treatment

Treat infective causes

- Fluid therapy – Oral fluid use should be stressed except for patients presenting with severe dehydration in whom intravenous fluids should be used. However, even with severe dehydration, oral fluids should be given concurrently. Fluid management is as for cholera (*See the section for fluid replacement in children*)
- Antidiarrheal agents
 - Loperamide 4mg start then 2mg every after loose stool
 - Nitazoxanide 500 mg tablets three times a day with food for 3 days.

Treat specific causes such as:

- Giardia – Metronidazole 400mg 8 hourly orally for 7 days
- Cyclospora Belli – Co-trimoxazole 960mg four times daily orally for 10 days. Give Pyrimethamine for sulpha-allergic patients. Recurrences tend to occur. In case of recurrence, refer to the experts.
- Cryptosporidia – Nitazoxanide 500 mg tablets three times a day with food for 3 days. Combination antiretroviral therapy (cART) with immune reconstitution is the main line of management.

5.9.3. Dysentery

Dysentery is the passage of bloody diarrhoea or mucus or both in the stool.

There are two types of dysentery:

- Bacillary
- Amoebic

Bacillary Dysentery



Description

Bacillary dysentery is mostly caused by the bacteria *Shigella* which has a short incubation period, usually being 2 days.



Signs and Symptoms

- Acute onset, Malaise
- Fever, Watery diarrhoea
- Bloody diarrhoea with mucus Faecal urgency
- Severe cramping abdominal pain
- Nausea
- Vomiting
- Headache
- Convulsions (in children)
- Tenesmus
- Mild or moderate dehydration



Investigations

- Stool Microscopy may show leukocytes
- Stool culture and susceptibility test



Treatment

- Ciprofloxacin - children 15mg/kg; Adults 500mg twice daily for 5 days
- OR**

- **Nalidixic Acid** - Adult: 1g orally 4 times a day for 7 days
- **Child:** 50mg/ kg body weight orally in 4 divided doses for 7 days

OR

- Ceftriaxone 1g once daily for 3 – 5 days

NB: Use of Ciprofloxacin in children is contraindicated except where the benefit outweighs the risk.



Complications

Complications of Shigella type 1 infection include:

- Arthritis, Conjunctivitis
- Colonic perforation, Septicaemia
- Haemolytic uraemia syndrome
- Metabolic disorders, Encephalopathy
- Toxic megacolon and Rectal prolapse in children

Prevention

- Drink clean, boiled/chlorinated water
- Good sanitation
- Good personal hygiene (Put prevention on the beginning for all types of diarrhea)

Amoebic Dysentery



Description

Amoebic dysentery is caused by the parasite *Entamoeba histolytica*.



Signs and Symptoms

- Bloody diarrhoea with mucus
- Low-grade fever
- Dehydration is unusual



Investigations

- Stool microscopy
- Sero diagnosis



Treatment

- **Metronidazole**

Adult: 800mg orally 3 times daily for 5 days followed by Diloxanide furoate 500mg 3 times daily for 10 days (for the eradication of cysts)

Child: 1 – 3 years, 200mg orally 8 hourly for 5 days; 3 – 7 years, 200mg orally 6 hourly for 5 days; 7 – 10 years, 400mg orally 8 hourly for 5 days

OR

- **Tinidazole**

Adult: 2g daily for 2 – 3 days.

Child: 50 – 60 mg/kg orally for 3 days.

NB: Avoid the use of anti-diarrhoea agents

Supportive

- Fluid replacement – Refer to chapter xxx
- Analgesics

Prevention

- Proper disposal of excreta - good pit latrines, flush toilets
- Provision of clean water
- Boiling water for at least 10 minutes to kill amoeba cysts.
- Chlorination of water - effects variable on an amoeba.
- Personal hygiene - washing of hands after use of the toilet, when preparing food and before eating.



Complications

- Fulminant colitis
- Colon perforation
- Peritonitis
- Chronic infection
- Stricture formation
- Severe haemorrhage
- Amoebic liver abscess
- Amoeboma

5.9.4. Cholera



Description

Cholera is an illness characterized by excessive diarrhoea and vomiting caused by the organism *Vibrio cholerae*. It is transmitted by the faecal-oral route. The incubation period varies from a few hours to 6 days. Cholera may be present as a mild illness indistinguishable from diarrhoea due to other causes.



Signs and Symptoms

It has three phases:

- *Evacuation phase*
 - o Abrupt onset of painless
 - o Profuse watery diarrhoea
 - o Vomiting in severe forms
 - o Stools may be rice-water.
- *Collapse phase is reached if appropriate treatment is not given*
 - o Features of circulatory shock (cold clammy skin, tachycardia, hypotension and peripheral cyanosis)
 - o Dehydration (sunken eyes, hollow cheeks and diminished urine output)
 - o Muscle cramps.
 - o Children may also have convulsions due to hypoglycaemia
 - o Renal failure
 - o Aspiration of vomitus may occur

Recovery phase occurs if the patient survives the collapse phase.



Investigations

- Stool Cholera Culture
- RDT for Cholera
- Supportive Investigation (FBC, HIV, Covid, kidney function, RBS, Malaria, Other stool culture)



Treatment

1. Rehydration

Table 131: Management of mild dehydration

ORS Dose Age	Amount after each loose stool
Less than 24 months	50 – 100ml after each loose stool
2 – 5 years	100 – 200ml
10 years and above	As much as the patient can tolerate

NB: ORS and other fluids should be continued until diarrhoea stops. Breastfed children should continue to breastfeed normally. Encourage the patient to eat.

Table 132: Management of moderate dehydration

Give ORS in the first 4 hours as follows:					
Age Less than 4 months	4-11 months	12-23 months	24-59 months	5-14 years	15 yrs and above
Weight Less than 5kg	5-10 kg	10-12 kg	12-19 kg	16-29 kg	30kg and above
Amount 150ml in ml per (approx.) hour	40 0 ml per hour	600 ml per hour	1,500 ml per hour	2,000 ml per hour	3,800ml per hour

- monitor the patient frequently.
- Reassess the patient after 4 hours using the classification of dehydration. If signs of (moderate) dehydration are still present, repeat the same management. If the patient shows signs of severe dehydration change management to that of severe dehydration.
- Patients should be encouraged to eat and drink as much as they want.
- If the child vomits, wait 10 minutes and then continue giving ORS slowly, i.e. every 2 – 3 minutes.
- Encourage the mother to continue breastfeeding.
- For infants less than six months who are not breastfed also give 100 – 200ml clean water during this period.

Management of severe dehydration

Start intravenous drip with Ringers Lactate or Sodium Chloride 0.9% w/v (normal saline) immediately (give ORS while drip is being set).

- Patients below 1 year:
 - o Give 100ml/kg in 6 hours as follows:
 - 30ml/kg in the first 1 hour then 70ml/kg in the next 5 hours.
 - Reassess the patient very frequently.
 - o If the patient can drink, give about 5ml/kg per hour of ORS in addition to the IV fluid.
 - o Assess the state of re-hydration after six hours using the classification of dehydration level chart; classify and manage accordingly.

- o If the patient shows no sign of dehydration after treatment with IV fluids or ORS, continue ORS as follows:
 - Less than 24-months old = 100ml after each loose stool
 - 2 – 9 years-old = 200ml after each loose stool
 - 10 years or more = as much as the patient wants (at least 300ml)
- Patients 1 year and above:
 - o Give IV fluids, 100ml/kg in 3 hours as follows: 30ml/kg as rapidly as possible (within 30 minutes), then 70ml/kg in the next 2 1/2 hours.
 - o Reassess the patient very frequently.
 - o If the patient can drink, give about 5ml/kg per hour of ORS in addition to the IV fluid.
 - o Assess the state of rehydration after 3 hours using the classification of dehydration on treatment charts; reclassify and manage accordingly.
 - o If the patients show no sign of dehydration after treatment with IV fluids or ORS continue ORS as follows:
 - 24 months old = 100ml after each loose stool
 - 2 – 9 years old = 200ml after each loose stool
 - More than 9 years = as much as the patient wants (at least 300ml)

Drugs

Indications for Antibiotic use include:

- Above 65 years of age
- Co-morbidities (e.g. SAM, HIV, kidney disease)
- Severe Dehydration
- Pregnancy
- High Purging (at least one loose stool per hour in the first 4 hours)

One of the following Medicines should only be given according to the sensitivity patterns.

Table 133: Recommended Antibiotics

Recommended Antibiotics	CHILDREN	ADULTS
Doxycycline OR Tetracycline	– 2 to 4mg/kg as single dose >12 years 12.5mg/kg	300mg as a single dose 500mg 4 times daily for 3 days
Erythromycin OR Azithromycin	10mg/kg (12.5mg/kg 6hourly for 3 days) 20mg/kg stat	500mg: 4 times daily for 3 days 1g single dose
Ciprofloxacin	20mg/kg stat	1g single dose

NB: Doxycycline, Tetracycline and Ciprofloxacin **SHOULD NOT** be used in Pregnancy

Prevention

- Drink clean boiled/ chlorinated water
- Proper sanitation
- Good personal hygiene and sanitation
- Cholera vaccination

5.9.5. Typhoid and Paratyphoid



Description

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.



Signs and Symptoms

- Fever
- Severe headache
- Abdominal pain
- Muscle pains (myalgia)
- Obtundation
- Intestinal haemorrhage
- Bowel perforation
- Sequela neuropsychiatric complications



Investigations

- 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.



Treatment

- Ciprofloxacin 500mg (PO) **OR** 400mg (IV) 12 hourly for 10-14 days
- OR**

- Azithromycin (PO) Adult 500mg for 7 days
- OR**
- Ceftriaxone 2g once daily for 10-14days

5.9.6. Helminth Infestation



Description

- Helminthic infestation is infection with worms, which belong to several different classes, i.e. Nematodes, Cestodes and Trematode (flukes).
- These affect various parts of the body such as the skin, muscles, lymphatics, blood or gastrointestinal tract.
- Trematodes or flukes will be presented under schistosomiasis.

Nematodes (Non-Intestinal)



Description

- Non-intestinal
- Filariasis
- The adult worms are threadlike. The large females give birth to larvae known as microfilaria. These require two hosts to complete their lifecycle. The first host is the mosquito culex, aedes, anopheles or flies such as Simulium.

Wuchereria bancrofti



Signs and Symptoms

Adult worms are found in the lymphatics and lymph nodes. Larvae grow and mature in the regional lymph nodes for up to 18 months. The patient then presents with:

- Fever ranging from 39°C - 41°C
- Lymphangitis, both of which subside in 3 - 5 days.
- Red streaks on the skin, are tender and cord-like.
- Involvement of the lymphatics of the epididymis, testes and spermatic cord causing obstruction which presents with oedema of the lower limbs and scrota.
- Long-standing oedema produces thick, rough skin which may ulcerate.



Treatment

- Diethylcarbamazine 2 – 6mg/kg daily in divided doses for 2 – 3 weeks. The course is repeated after 6 weeks.
- Supportive care is antihistamines or steroids for allergic reactions that can occur.
- Also associated bacterial infections should be treated and reconstructive surgery can be done on unsightly tissue.



Complications

Tropical eosinophilia is characterized by:

- Lymphadenopathy
- Splenomegaly
- Cough
- Bronchospasm and asthma-like picture.

Loa loa



Signs and Symptoms

Caused by adult worms which prefer the sub conjunctival and periorbital tissues. The main features are:

- Calabar swellings – painless, localised, transient, hot soft tissue swellings often near joints lasting from a few hours to several weeks
- Urticaria
- Pruritis
- Lymphoedema, arthritis and chorioretinitis may occur
- A meningoencephalitis like picture may occur during treatment.



Treatment

- Diethylcarbamazine, 2 - 6mg/kg daily for 2 - 3 weeks

Onchocerciasis



Signs and Symptoms

The incubation period averages 1 year

- Initially, a papular, reddish, itchy rash occur

- After repeated infection subcutaneous nodules develop associated with genital elephantiasis, hydrocele and ocular lesions. Ocular lesions are serious and may cause blindness
- Initially, there is excessive tear production, photophobia and the sensation of a foreign body in the eye
- Then conjunctivitis, iridocyclitis, chorioretinitis, secondary glaucoma and optic atrophy may occur.



Treatment

- Ivermectin 150mcg/kg orally as a single dose. Annual retreatment must be given until adult worms die.
- In endemic areas not all patients need treatment. Indications for treatment are the threat of eye damage and severe pruritis.

Prevention

- Primary prevention is aimed at vector control and protection of humans from vectors.
- Mass chemotherapy with Diethylcarbamazine is effective in bancroftian filariasis and loasis.

Nematodes - Intestinal

Ascaris lumbricoides (Roundworm)



Description

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.

Infection is acquired by ingesting contaminated food.



Signs and Symptoms

- Chronic Diarrhea
 - Nausea
 - Vomiting
 - Abdominal discomfort
 - Anorexia
- Steatorrhea
- Malnutrition
- Chronic Cough (loffers's syndrome)
- Intestinal obstruction
- Obstructive jaundice



Investigations

Wet mount stool examination (Evidence of ova or worms)



Treatment

- Mebendazole (PO) 500mg as a single dose or 100mg 12 hourly for 3 days.

OR

- Albendazole (PO) 400mg as a single dose.

Strongyloides stercoralis



Description

Infestation occurs by penetration of the skin by larvae. This can lead to life-threatening infestation and disseminated strongyloidiasis in an immune-compromised host.



Signs and Symptoms

- Pruritic papulo-vesicular rash at the site of penetration or urticarial rash involving the perineal region extending to the buttocks, thighs and abdomen
- Chronic cough
- Colicky abdominal pains
- Chronic diarrhea and passage of mucus
- Weight loss
- Hyper-infection syndrome



Investigations

- Wet mount stool examination (Evidence of rhabditiform larva)
- ELISA for anti-strongyloides antibody



Treatment

- Mebendazole (PO) 500mg as a single dose or 100mg 12 hourly for 3 days.

OR

- Albendazole (PO) 400mg as a single dose.

OR

- Ivermectin (PO) 200 µg /kg daily for 2 days

OR

- 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

Ancylostomiasis



Description

It is a hookworm disease caused by infestation of the small intestine with Ancylostoma duodenale or Necator americanus leading to anaemia and malnutrition.



Signs and Symptoms

- Abdominal pains
- Chronic diarrhoea
- Melena stool
- Weight loss
- Chronic cough (loafers' syndrome)
- Anaemia



Investigations

- Wet mount stool examination (Evidence of ova or worms)
- FBC



Treatment

- Mebendazole (PO) 500mg as a single dose or 100mg 12 hourly for 3 days.

OR

- Albendazole (PO) 400mg as a single dose.

Note:

- If it persists, give second course after 4 weeks.
- Iron replacement and nutritional supplementation (protein and vitamins) should be part of the management strategy.

NB: Albendazole is contraindicated in the first trimester of pregnancy

Trichuris trichiura (whipworm)

Most infestations are asymptomatic.



Signs and Symptoms

Heavy infestation is associated with:

- Bloody diarrhoea and mucus
- Abdominal discomfort
- Anorexia and weight loss.
- Appendicitis
- Rectal prolapse (mostly in children)



Treatment

Mebendazole 100mg twice daily for 3 days.

Enterobius vermicularis (threadworm)



Description

Intense anal pruritis which is usually nocturnal. Scratching results in dissemination of eggs.



Treatment

A single dose of Mebendazole 500mg followed by a second dose 2 weeks later. Family members should also be treated.

Prevention

- Personal hygiene
- Proper sanitation

Cestodes (Tapeworms)



Description

Taeniasis

Can be due to *Taenia saginata* (beef tapeworm), *Taenia solium* (pork tapeworm), *Diphyllobothrium latum* (fish tapeworm) and *Hymenolepis nana* (faecal oral contamination from human and dogs) leading to chronic malnutrition (Taeniasis) or multi-organ dissemination and dysfunction (Cysticercosis)

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



Signs and Symptoms

Taeniasis

- Colicky abdominal pain
- Body Weakness
- Loss of or increased appetite
- Constipation or diarrhea
- Pruritus ani
- Hyperexcitability

Cysticercosis

- 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.



Investigations

Taeniasis

- Wet mount stool (Evidence of characteristic ova, proglottides or scolex)

Cysticercosis

- CT scan

NB: Refer the patient to high centres for further investigation and expertise.



Treatment

Taeniasis

- Praziquantel (PO) 5–10mg/kg single dose
- OR**
- Niclosamide (PO) 2g as a single dose after a light breakfast followed
- AND**
- Magnesium sulphate 5–10 g in a glass of water after 2 hours

Cysticercosis

- Praziquantel 50mg/kg/day for 21 days
- OR**
- Albendazole 15mg/kg/day for 30days.
- AND**
- Dexamethasone IV 4mg hourly can be given up to 7days.
- AND**
- Carbamazepine initially 200 mg 1–2 times daily, increased slowly to 0.8–1.2g daily in divided doses

Note:

- Hydrocephalus should be treated with surgical shutting.
- Ocular manifestation cysticercosis, should be referred to eye specialist

Prevention

- Careful inspection of beef or pork for cysticerci (encysted larval forms)
- Refrigeration of beef at -10°C for 5 days or cooking at 57°C for at least 30 minutes.

Trematodes (Flukes)

Schistosomiasis (Bilharziasis)



Description

Parasitic disease caused by blood flukes (trematodes) of the genus *Schistosoma*. Most common species in Zambia are *Schistosoma haematobium* in urine and *Schistosoma mansoni* in stool 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.



Signs and Symptoms

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 amyloidosis
- Bladder carcinoma
- Chronic kidney failure



Investigations

Laboratory evidence characteristic eggs:

- In urine, (*S. Hematobium*)
- In stool (*S.manson*, *S.japonicum*) examined by kato katz thick smear procedure
- PCR assays of both urine and stool samples



Treatment

Praziquantel (PO) 40mg/kg as a single dose or in 2 divided doses

Prevention

- Use of latrines, preventing children from playing in infected water
- Using water from a protected well or boiling for at least 10 minutes

Giardiasis



Description

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 diarrhoea. Spread is faecal-oral and person to person. The infective form is the cyst.



Signs and Symptoms

- Crampy abdominal pain
- Chronic diarrhoea
- Steatorrhea
- Weight loss



Investigations

- Serial 3 samples of stool examination (Evidence of *Giardia intestinalis* trophozoites or cysts)
OR
- Serological evidence of *G. Intestinalis* trophozoites antigen or antibody
OR
- Evidence of *G. Intestinalis* in duodenal aspirates or biopsy specimen.



Treatment

- Metronidazole (PO) 400–800mg 8 hourly for 5 days **OR** 2g Stat
OR
- Tinidazole (PO) 2g once daily for 3 days
OR
- Secnidazole (PO) 2g single dose

Prevention

- Personal hygiene
- Improvement of water safety by either boiling it for at least 10 minutes or correctly chlorinating it.



Complications

Growth retardation in children.

References

- Cunha, BA, Pneumonia Essentials. 3rd Edition. Royal Oak Michigan. Physicians Press; 2010

5.9.9. Viral Hepatitis



Description

Acute inflammation of the liver caused by primarily human viruses B and C transmitted through contact with infected blood and other body fluids, and vertically from mother to child.



Signs and Symptoms

- Malaise
- Nausea
- right upper Abdominal pain
- Anorexia
- Jaundice
- Dark urine
- Fever
- Rash
- Arthralgia



Investigations

- HBsAg
- Anti HCV



Treatment

Refer to the national HIV and STI guidelines.

- **Prevention**
 - o Hepatitis B vaccine is available, but no vaccine for Hepatitis C
 - o Safe sex
 - o Avoid the use of contaminated needles.

5.10 GENITO-URINARY CONDITIONS

5.10.1. Sexually Transmitted Infections (STI)



Description

Sexually Transmitted Infections (STIs) are among the most common causes of all Out-Patient Department (OPD) attendances in Zambia.

There are 8 common syndromes namely:

- Urethral discharge
- Vaginal discharge
- Genital ulcer
- Genital growth
- Lower abdominal pain
- Inguinal bubo
- Scrotal swelling
- Neonatal conjunctivitis

5.10.1.1. Urethral Discharge



Description

This is a condition in which there is dysuria coupled with often copious, mucoid discharge from the urethral meatus. Two common conditions presenting with urethral discharge are Gonococcal urethritis.

Gonococcal urethritis



Description

This is an acute inflammatory condition of the columnar epithelial lining of the urethra. It is caused by a gram-negative intracellular diplococcus, *Neisseria gonorrhoea*. The incubation period is 3 to 5 days



Signs and Symptoms

- Dysuria
- Urethral discharge of copious, mucoid fluid which sometimes contains puss
- Urinary frequency and urgency
- lips of the meatus may be red and swollen



Complications

- Acute epididymo-orchitis
- Urethral strictures
- Disseminated Gonococcal Infection

Non-Gonococcal Urethritis



Description

The term non-gonococcal urethritis is used to describe other causes of urethritis apart from *Neisseria gonorrhoeae*. The organisms commonly responsible are *Chlamydia trachomatis* and *Ureaplasma urealyticum*. Symptoms usually occur 7 to 28 days after intercourse



Signs and Symptoms

- Mild dysuria
- Discomfort in the urethra
- A clear to purulent mucoid discharge.
- The lips of the meatus are often stuck together with dried secretions.
- The meatus may be red, with evidence of dried secretion on underwear.



Investigations

This is based on bacteriological examination of the discharge to exclude gonorrhoea.



Treatment

Refer to the Table 129 below

NB: Persistent urethral discharge one week after treatment consider *Trichomonas vaginalis*, then treatment with Metronidazole 2g PO single dose for adults and 5mg/kg body weight for children.

- **Prevention**
 - Avoiding multiple sexual partners and unprotected casual sexual intercourse. Condom use is advised.



Complications

- These include epididymitis and urethral stricture. Perihepatitis could also occur.

5.10.1.2. Pelvic Inflammatory Disease (PID)



Description

Pelvic inflammatory disease is a condition involving the pelvic organs i.e. cervix (cervicitis), uterus (endometritis), salpinx (salpingitis) and ovaries (oophoritis).

Risk factors include sexual intercourse, induced abortion, dilatation and curettage or endometrial biopsy, intra-uterine device (IUD) insertion or use, hysterosalpingoscopy, laparoscopy, radium insertion into the endometrial cavity.



Signs and Symptoms

- Lower abdominal pain, Copious purulent vaginal discharge may be present or absent, High -grade fever is an indicator for admission
- Nausea, Vomiting
- Painful sexual intercourse (dyspareunia)
- Occasional diarrhoea
- Lower abdominal tenderness with rebound is an indicator for admission

- Adnexia tenderness
- Cervical excitation



Complications

- Peritonitis, Tuba-ovarian abscess, Hydrosalpinx, Ectopic Pregnancy, Chronic Pelvic Pain, Infertility, Mortality
- Indications for immediate referral to gynaecology or surgery
- Missed/overdue period, recent delivery or abortion, abdominal guarding or rebound tenderness
- Abnormal vaginal bleeding, abdominal mass, temperature above 38 degrees Celsius

5.10.1.3. Vulvovaginitis



Description

Vulvovaginitis is an inflammatory condition affecting the vulva and the vagina. The causative organisms include; *Candida albicans*, *Chlamydia trachomatis*, *Trichomonas vaginalis*. Bacterial vaginosis.



Signs and Symptoms

- Vaginal itching
- Burning sensation
- A watery, thick or mucoid, foul-smelling and yellowish or brown vaginal discharge is sometimes present.



Investigations

- Insert a speculum into the vagina and using a swab take two specimens one from the cervical mucosa for gram stain and culture on Gonococcal media for gonorrhoea, the second for wet mount and microscopy for *Candida*, *Trichomonas*.



Complications

- Secondary bacterial infection, Skin excoriation, Dermatitis Treatment

5.10.1.4. Genital Ulceration



Description

Genital Ulceration is the loss of continuity in the epithelial surface covering the genital area.

Ulcerative lesions of the genitalia are common outpatient problems. Men are more commonly affected than women. There are many causes including:

Chancroid, Granuloma inguinale (Donovanosis), Herpes genitalis, Lymphogranuloma venereum, Syphilis

Syphilis



Description

This is an infection caused by spirochaetes called *Treponema pallidum*, a corkscrew-shaped organism with an incubation period of 9 to 90 days.



Signs and Symptoms

- **Primary:**
 - o Painless papule/ulcer called a chancre found on the glans penis, shaft, anus and rectum in men, whereas in women it is found on the vulva, cervix and perineum.
 - o Bilateral inguinal lymphadenopathy.
- **Secondary:**
 - o Cutaneous rashes may affect the soles and palms.
 - o Patchy hair loss
 - o Oral ulcers
 - o Condylomata lata
 - o Generalised lymphadenopathy
 - o Uveitis)
 - o Arthritis
 - o Meningitis
 - o Glomerulitis
- **Tertiary:**
 - o Aortic aneurysm
 - o Aortic valvular insufficiency
 - o Dementia

- o Manic syndrome
- o Neurosyphilis. Congenital syphilis presents with clinical features as those of secondary syphilis in adults.



Investigations

Screening: VDRL (Venereal Disease Research Laboratory), RPR (Rapid Plasma Reagin)

Confirmatory test: Treponema Palidum Haemagglutinin Assay (TPHA)



Treatment

Refer to the Table 129 below.

Treatment of Genital Ulcers

Most patients with primary or secondary syphilis infection have Jarisch - Herxheimer reaction within 6 hours to 12 hours of initial treatment. The reaction is manifested by generalized malaise, fever, headache, sweating, rigours and a temporary exacerbation of syphilitic lesions. This usually subsides within 24 hours and poses no danger other than the anxiety it produces.

Chancroid



Description

This is an acute, localized, contagious disease characterised by painful genital ulcers and suppurative inguinal lymph nodes caused by *Haemophilus ducreyi*



Signs and Symptoms

- Small, painful papules
- Shallow ulcers in various sizes with ragged undermined edges, painful non-indurated, with a reddish border.
- Enlarged, tender and matted inguinal lymph nodes (Bubo)
- The skin over the abscess can become red and shiny and may break down to form a sinus.



Complications

- Phimosis, Urethral stricture, Urethral fistula
- Severe tissue destruction leading to a phagedenic ulcer which may grow rapidly and cause auto amputation of the penis. Biopsy the ulcer to distinguish from squamous cell carcinoma.

Lymphogranuloma Venereum



Description

This is characterized by transitory primary ulcerative lesion followed by suppurative lymphadenitis. It is caused by serotypes of *Chlamydia trachomatis* L1, L2, L3 which are distinct from those causing trachoma, urethritis, cervicitis and inclusion conjunctivitis.



Signs and Symptoms

- A small, transient, non-indurated vesicular rapidly healing ulcer
- Unilateral, tender enlarged inguinal lymph nodes, with groove sign.
- Multiple sinuses with purulent or bloodstained discharged.
- Constitutional symptoms of fever, malaise, joint pain, anorexia, and vomiting.
- Backache is common in women in whom the lesion may be on the cervical or upper vagina resulting in the enlargement and suppuration of perirectal and pelvic lymph nodes. This results in the formation of rectovesical and rectovaginal fistulas.

Aspirate suppurating glands with a wide bore needle through intact skin. Avoid incision and drainage through a fluctuant area which results in chronic sinus formation.

Herpes Genitalis



Description

Herpes Genitalis is an infection of the genital or anogenital area by herpes simplex virus (herpesvirus hominis type 2). Lesions usually develop 4 to 7 days after sexual contact. The condition tends to recur because the virus establishes a latent infection of the sacral sensory nerve from which it reactivates and re-infects the skin.



Signs and Symptoms

- A small group of painful vesicles develops, they erode and form several superficial, circular ulcers with a red areola, which coalesce.
- The ulcers become crusted after a few days and generally heal with scarring in about 10 days.
- The inguinal lymph nodes are usually slightly enlarged.
- Tender lesions in men may occur on the prepuce, glans penis, and penile shaft whereas in women may occur on the labia, clitoris, perineum, vagina and cervix.
- Generalized malaise, fever, difficulty in micturition or difficulties in walking.



Investigations

- RDT for Herpes
- Tissue culture.
- Skin Scraping for Cytology



Complications

- Aseptic meningitis
- Transverse myelitis
- Autonomic nervous dysfunction involving the sacral region leading to urinary retention.

Granuloma Inguinale (Donovanosis)

Rare in Zambia



Description

This is a chronic granulomatous condition usually involving the genitalia and spreads by sexual contact caused by *Klebsiella granulomatis*.



Signs and Symptoms

- Painless, multiple beefy-red nodule which coalesce to form a large elevated, velvety, ulcerated lesion appearing in men on penis, scrotum, groin and thighs, whereas in women on the vulva, vagina and perineum
- There is no lymphadenopathy.



Investigations

- Do a punch biopsy of the lesion for histology



Treatment

- Erythromycin 500mg orally 6 hourly for 14 to 21 days
- OR**
- Azithromycin 1g PO once weekly times 3 doses.

Genital Growth (Condylomata Acuminata)



Description

This is a fleshy growth found around the anogenital region caused by Human papillomavirus infection HPV6 and 11



Signs and Symptoms

- Lesions can be subclinical or overt anogenital warts
- Fleshy multi-focal growth of the lower genital tract
- For Cervical Warts DO NOT CAUTERISE



Investigations

- Biopsy



Treatment

Refer to the Table 129 below

Recommended treatment regimens for syndromic treatment of STIs

The following is the list of recommended treatment regimens for syndromic treatment of STIs:

Table 134: Recommended Treatment Regimens for Syndromic Treatment of STIs

STI Syndrome	Recommended Actions	Preferred drugs	Alternative drugs
Vaginal Discharge	Treat for gonorrhoea	Ceftriaxone 500mg IM Stat (to treat gonococcal infection) Children and Adolescents (≤ 17 years) Ceftriaxone 25-50mg/kg body weight IM stat If ≥ 45 kg, use adult dose	Cefixime 400mg PO stat Children/adolescents < 17 years Cefixime 8mg/kg body weight PO stat Note: If patient allergic to Cephalosporin use Gentamycin 240mg IV stat
	Treat for chlamydia	Doxycycline 100mg PO BD for 7 days	Azithromycin 1g PO stat OR Erythromycin 500mg PO QID 7 days (in pregnant or lactating woman)

STI Syndrome	Recommended Actions	Preferred drugs	Alternative drugs
	Treat for Vaginal candidiasis	Fluconazole 150mg PO stat	Clotrimazole vaginal pessaries 200mg OD for 3 days OR Miconazole vaginal pessaries 200mg for 3 days OR Nystatin pessary 100,000 units Nocte for 14 days
	Treat for Bacterial vaginosis	Metronidazole 400mg PO BD for 7 days OR Metronidazole 0.75% 5g gel (full applicator) intravaginally OD for 5 days OR Clindamycin cream 2% one full applicator (5g) intravaginally OD for 7 days	Clindamycin 300mg PO BD for 7 days OR Tinidazole 2g PO BD for 3 days OR Tinidazole 1g PO OD for 5 days
	Treat for trichomoniasis	Metronidazole 2g PO stat OR Metronidazole 400mg PO BD for 7 days For children ≤ 17 years 5mg/kg PO TDS for 7 days	Tinidazole 2g PO stat
Genital Ulcer	Treat for syphilis	Benzathine penicillin 2.4 MU IM stat as a single injection split as 1.2 MU given in each buttock	Erythromycin 500mg PO QID for 14 days (in pregnant or lactating woman)
	Treat for chancroid	PLUS Azithromycin 1g PO Stat	
	Treat for Lymphogranuloma venereum (LGV) Treat for Herpes simplex	PLUS Doxycycline 100mg PO BD for 21 days PLUS Acyclovir 400mg PO TDS for 7 days	
Urethral Discharge Syndrome	Treat for gonorrhoea	Ceftriaxone 500mg IM stat PLUS	Cefixime 400mg PO stat Azithromycin 1g PO Stat OR Erythromycin 500mg PO QID for 7 days
	Treat for chlamydia	Doxycycline 100mg PO BD for 7 days, Metronidazole 2g PO stat (to treat Trichomonas vaginalis)	
	If urethral discharge persists after 7 days despite adequate treatment and no history of re-exposure to STI then treat with	PLUS Doxycycline 100mg PO BD for 7 days followed by Azithromycin 1g PO stat, then 500mg PO OD for 3 days (to treat M. genitalium)	

STI Syndrome	Recommended Actions	Preferred drugs	Alternative drugs
Inguinal Bubo†	Aspirate FLUCTUANT bubo with a large bore needle through normal skin Treat for chancroid Treat for LGV	Azithromycin 1g PO stat PLUS Doxycycline 100mg PO BD for 21 days	Ceftriaxone 500mg IM stat OR Cefixime 400mg PO stat If pregnant or lactating woman use Erythromycin 500mg PO QID 21 days (Note: Do not use Doxycycline)
Female Lower Abdominal Pain (PID) Outpatient	Treat for gonorrhoea, chlamydia and anaerobic bacteria at the same time	Ceftriaxone, 500mg IM stat PLUS Doxycycline 100 mg PO BD for 14 days PLUS Metronidazole 400mg PO TDS 14 days OR Metronidazole 2g PO stat (to treat anaerobic bacteria)	Cefixime 400mg PO stat PLUS Erythromycin 500mg PO QID for 14 days
Female Lower Abdominal Pain (PID) Inpatient	Treat for gonorrhoea, chlamydia, and Anaerobic bacteria at the same time	Ceftriaxone 1g IV stat PLUS Doxycycline 100mg PO BD for 14 days PLUS Metronidazole 500mg PO TDS for 14 days OR Metronidazole 500mg IV BD for 7 days Note: Switch to oral treatment upon clinical improvement and continue up to 14 days	Cefixime 400mg PO stat PLUS Erythromycin 500mg PO QID for 14 days
Genital Growth	Treat for Condylomata acuminata (ano- genital warts)	Podophyllin 25% tincture. Apply topically weekly up to 12 weeks (protect surrounding normal skin with Vaseline jelly before application by health care provider) Imiquimod cream 5% applied at bedtime 3 times a week up to a duration of 8-12 weeks	Cauterization, Trichloroacetic Acid (weekly), Cryotherapy (fortnightly) Surgical excision of warts for isolated lesions
	Treat for Condylomata lata	Benzathine Penicillin 2.4 MU IM stat	

STI Syndrome	Recommended Actions	Preferred drugs	Alternative drugs
Scrotal Swelling	Treat for gonorrhoea	Ceftriaxone 500mg IM stat PLUS	Cefixime 400mg PO stat
	Treat for Chlamydia	Doxycycline 100mg PO BD for 14 days	Azithromycin 1g PO weekly for 2 weeks (Total of 2 doses) OR Erythromycin 500mg PO QID for 14 days
Neonatal Conjunctivitis	Treat for gonorrhoea and chlamydia	Ceftriaxone 25 – 50mg/kg body weight (max. 125mg) IM stat PLUS Erythromycin syrup, 50mg/kg body weight PO daily in 4 divided doses for 14 days PLUS Saline lavage of eyes	Cefotaxime 100mg per kg/body weight IV/IM stat

* **Risk Assessment.** The vaginal discharge algorithm is not very sensitive for predicting presence of cervical infection (Gonorrhoea and Chlamydia). Speculum examination improves its diagnostic utility. However, presence of certain risk factors increases the sensitivity and specificity of the algorithm for predicting cervicitis. Routine use of risk assessment is therefore recommended in all cases of vaginal discharge where speculum examination is not available or feasible. Consider risk assessment to be positive if the client is sexually active and has one or more of the following:

1. Has engaged in sex with multiple partners in last three months
2. Has had a new sex partner in the last three months
3. Has a current partner with an STI
4. Has a history of an inappropriately treated STI
5. Is a victim of sexual assault

Inguinal bubo accompanied **with genital ulcer(s)** should receive treatment as for genital ulcer disease.

5.10.2. Urinary Tract Infection and Pyelonephritis



Description

This is an infection, often bacterial, of the ureters, bladder and urethra commonly caused by gram-negative bacteria, including *E. coli*, *Klebsiella* species, and *Proteus* species. It can also affect the kidneys and renal pelvis, often bilateral in pyelonephritis. Urinary tract infection occurs much more frequently in women than in men, especially in pregnancy.



Signs and Symptoms

- Frequency
- Urgency
- Dysuria (pain on passing urine)
- Fever
- Nausea and Vomiting
- Lower abdominal pain
- Flank pain



Investigations

- Urinalysis
- Urine microscopy, culture and sensitivity



Treatment

- Nitrofurantoin 50 - 100mg 6-12 hourly for 5 to 7 days
- OR**
- Nalidixic Acid 250-500mg 6 hourly for 5 days
 - For complicated UTIs (UTI in immunocompromised patients, in males, in pregnancy, associated with stones, catheters, or involving the kidneys), use Intravenous Antibiotics:
 - o Ceftriaxone 2g once daily
- OR**
- o Ciprofloxacin 400mg twice daily

NB: Culture should guide the choice of antibiotics. After 24 to 48 hours without fever, most patients receiving I.V therapy can be switched to oral regimes.

5.10.3. Renal Conditions

5.10.3.1. Metabolic Disorders

Hyperkalemia



Description

This is serum Potassium > 5.5 mmol/L.



Signs and Symptoms

- May be asymptomatic
- Muscle weakness
- Ascending paralysis with respiratory failure
- Cardiac conduction abnormalities; Cardiac instability, ventricular fibrillation, cardiac arrest
- May have signs of acute kidney injury or underlying CKD with or without or metabolic acidosis



Investigations

- Serum Potassium
- ECG – tall, peaked symmetrical T wave, flat P, increased PR interval, wide QRS, bradycardia, AV block



Treatment

- Stop the source of Potassium (oranges, bananas, ACEI, K⁺ sparing diuretics, cotrimoxazole, heparin, NSAIDs, B-blockers)
- Severe Hyperkalemia (K > 6.5) and ECG changes
- Protect the heart- 10mls 10% Calcium Gluconate over 10mins.
- Drugs that drive potassium into the cell: insulin, salbutamol (albuterol) and sodium bicarbonate, either singly or in combination with;
 - o 150mmols of 8.4% NaHCO₃ in 1 litre 5% Dextrose over 3 to 4 hours if the patient is also acidotic. Another dose can be given to bring the serum bicarbonate level to 24 mmol/L.

DON'T USE or INFUSE WITH Ringer's Lactate but USE 5% Dextrose for infusion

- o 100mls 50% Dextrose with 10 IU soluble insulin over 15-20mins. May give 2-4 hourly as required. Monitor serum glucose 2-4 hourly.
- o 10-20mg nebulized salbutamol
- Remove potassium from the body with the following;
 - o Frusemide 1mg/kg IV (Please hydrate patient first if dehydrated)
 - o Kayexalate/Sodium Resonium 15-30g in 50- 100mls 20% Sorbitol or with lactulose PO/PR
 - o Consider Hemodialysis if refractory
 - o Consult renal physicians timely especially in patients with underlying AKI or CKD
 - o Moderate Hyperkalemia (Potassium 6.0 – 6.5 mmol/L)
 - o Push Potassium (K⁺) into the cell

- o Push Potassium (K⁺) out of the body
- o Mild Hyperkalemia (Potassium 5.5 – 5.9 mmol/L) Push Potassium (K⁺) out of the body

Hypokalemia



Description

Serum Potassium (K⁺) < 3.5, may be associated with hypomagnesaemia and hypocalcaemia. Causes include GIT and Renal losses.



Signs and Symptoms

- Muscle weakness, fatigue, constipation, muscle cramps.
- Paralytic ileus, ascending paralysis, reduced reflexes.
- Tetany when associated with alkalosis
- Arrhythmias



Investigations

- Check K⁺, other electrolytes and serum pH
- ECG- flat or inverted T wave, prominent U wave.



Treatment

- 20 mmol KCL in 250-500mls Normal saline over one hour. Check K⁺ before repeating dose and ECG monitoring.
- Consider 6-12mls (5-10mmol/l) 20% magnesium sulphate or 2mls 50% magnesium sulphate diluted in 50mls 5% Dextrose over one hour.
- If cardiac arrhythmia or arrest give 2 mmol KCl per minute iv for 5mins.
- Repeat ONCE only if necessary
- Oral K⁺ supplements if K⁺>3.0

Hypernatremia



Description

Serum Na⁺ less than 150 mmol/ L. Hypernatremia may occur as hypovolemic (diarrhea), euvoletic (DI) and hypervolemic cases (Cushing's)

Causes include:

- Water loss more than electrolyte
- GIT losses
- Renal losses (osmotic diuresis, DI)
- Increase in Na^+
- Hyperaldosteronism, Cushing's
- Excessive saline or sodium bicarbonate infusion



Signs and Symptoms

- Thirsty, nausea, vomiting, weakness, malaise
- Muscle tremor, weakness
- Drowsiness
- Stupor
- Coma
- Convulsions
- Tremors
- Ataxia



Investigations

- Electrolytes
- Urine Na^+
- Blood glucose



Treatment

- Treat the cause
- Correct water deficit – rehydrate first if the patient is dehydrated
- Stable/asymptomatic patients
- Take it easy
- Replace fluids orally
- Unstable/symptomatic patients
- IV fluids with NS, DNS, avoid 5%Dextrose as Na^+ may drop too fast rate of lowering serum Na^+ 0.5-1mmol/hr, aim for 12mmol/l in 24hrs and not more than this.

- Estimate the effect of 1 litre of any infusate on serum Na⁺ using the following formula:
 - o $\text{Change in serum Na}^+ = (\text{infusate Na}^+ - \text{Serum Na}^+) \text{ divided by } (\text{total body water} + 1)$
 - o The answer is in mmol/L. The formula helps to calculate the infusion rate so that you do not exceed 1 mmol/min.

Hyponatremia



Description

Low serum Na but treatment warranted with severe (<120mmol/l) or acute. Causes include:

- Hyponatremia classified as hypovolemic, euvoletic and hypervolemic
- hypovolemic
- GI losses, renal losses, renal sodium estimation enables differentiating between the two
- Euvoletic
- SIADH
- Hypothyroidism
- Adrenal insufficiency
- Hypovolemic
- CCF
- cirrhosis
- Nephrotic syndrome



Signs and Symptoms

Asymptomatic unless severe or acute:

- Nausea,
- Vomiting,
- Seizures,
- Coma



Treatment

- Investigate and treat the cause.
- Urine Na⁺ should be ordered, urine and serum osmolarity should be measured.
- Establish if acute or chronic, or if severe
- CNS manifestations

- 200 mls 5% NaCl over 6 hours. Monitor serum Na⁺ hourly
- Aim to increase Na⁺ to 120mmol/l at a rate of 0.5 – 1.0mmol/l per hour
- If no CNS symptoms, do not use Hypertonic saline.
- Once serum sodium is around 120mmol/l, stop active therapy and restrict fluid intake to approx. 500mls/day.
- Asymptomatic
- Use of conservative measures such as fluid restriction may be enough.
- SIADH
- Restrict fluid intake to 50-60% of estimated maintenance fluid requirements ($\pm$ 1L/day).

Hypercalcaemia



Description

Corrected serum Ca $2+ > 2.65\text{mmol/L}$. Causes include:

Hyperparathyroidism, malignancy, sarcoidosis, drugs, Vitamin D intoxication especially in renal patients



Signs and Symptoms

- Polyuria, polydipsia, dysphagia, bone pain, renal colic
- Muscle weakness
- Confusion, hypotonia, dysarthria, coma, seizures



Investigations

- ECG- short QT interval, wide QRS complex, flat T, AV block, may have fatal arrhythmias
- Serum Calcium U+Es, albumin, Magnesium, Phosphate, ALP, Serum electrophoresis
- PTH
- X-RAYS
- Frequent association with hypokalemia increasing risk of arrhythmias.



Treatment

- Hydrate with Normal Saline 500mls/hr until Urine out $> 200\text{mls/hr}$ then reduce 100-200mls per hour.
- Furosemide 1mg/kg only when the patient has been hydrated or if in cardiac failure

- Hemodialysis or peritoneal Dialysis with low Calcium dialysate. Hemodialysis preferred.
- Prednisolone 40mg daily especially for Vitamin D intoxication, sarcoidosis, multiple myeloma, metastasis
- Pamidronate 60-90mg in 500-1000mls Normal Saline infusion over 4-6hrs. Should be effective within 48hrs Monitor and replace K⁺ and Mg²⁺.

5.10.3.2. Catheter-Related Bloodstream Infections (CRBSI)



Description

Intravenous catheters inserted into central veins such as the internal jugular vein, subclavian vein or femoral vein provide the only and vital access for hemodialysis for patients with no arterio-venous fistulas. Introduction of catheters including venous and urinary catheters increases the risk of bloodstream infections.

In most cases CRBSI can be prevented by simple interventions:

- Hand hygiene
- Using full barrier precautions during the insertion of central venous catheters,
- Cleaning the skin with chlorhexidine,
- Avoiding the femoral site if possible
- Removing unnecessary catheters including urinary catheters as soon as possible



Investigations

Two sets of blood cultures obtained from two different sites and another drawn from the central venous access site



Treatment

- Patients with central venous accesses and new fevers should be evaluated for CRBSI, with the catheter as the source of the infection unless otherwise excluded by patient examination and investigations. The following minimum evaluations should be done.
- Thorough patient history and examination including the central line insertion sites to assess for superficial thrombophlebitis and insertion site abscess
- If you suspect bacteremia/sepsis remove catheters and culture the tip to guide antibiotic treatment required.
- Empiric antibiotics guided by local microbiology and susceptibility of organisms
- Vancomycin 1gm IV stat dose and thereafter dosed according to renal function for empiric treatment of Methicillin-Resistant Staphylococcus aureus, Coagulase-Negative Staph, Enterococci species
- For patients unable to tolerate Vancomycin due to deteriorating renal function, switch to Linezolid for the treatment of MRSA and resistant Enterococcus

- Fourth Generation Cephalosporins (Cefepime 2gm IV Stat) or Carbapenems (Doripenem or Meropenem) should be initiated for empiric gram-negative bacteremia such as Pseudomonas that may be resistant to routinely used gram-negative antibiotics.
- If cultures are positive for fungal elements particularly Candida albicans, initiate Caspofungin until sensitivity results are available and switch to Fluconazole if susceptible. Remove the central line immediately in the case of candidemia.

5.10.3.3. Glomerular Disorders



Description

- Glomerular diseases presentation;
- Asymptomatic hematuria (glomerular hematuria characterized with dysmorphic RBCs)
- Hematuria can be microscopic or macroscopic (for example PIGN or IGAN)
- Asymptomatic Proteinuria (requires 24 hour protein or UPCR or ACR)
- Nephrotic syndrome
- Nephritic syndromes; acute nephritic syndrome, RPGN, chronic GNC

Nephrotic syndrome



Description

At least 3.5g proteinuria in 24hrs , generalized oedema, low serum albumin, hypercholesterinemia and presence of urine oval fat bodies. Causes include:

- Classified as Primary or secondary or based on histology findings
- Minimal change disease
- Membranous nephropathy
- Focal segmental glomerulosclerosis (FSGS)
- Membranoproliferative glomerulonephritis (MPGN)
- Lupus Nephritis
- Diabetic nephropathy
- Amyloidosis



Signs and Symptoms

- Facial swelling worse in the morning
- Frothy urine
- Oedema

- Usually normal BP
- Urine dipstick >2 + proteinuria, hematuria rare except in FSGS



Investigations

- Kidney biopsy is needed for light microscopy, immunofluorescence (IF) and electron microscopy (EM)
- Early referral to Nephrologist important



Treatment

- Treatment should be in line with the KDIGO guidelines for glomerular diseases
- The principal for glomerular disease is to determine if the etiology is primary or secondary in nature.
- Salt restriction
- No need for protein restriction in our setting
- Furosemide 80-120mg/day (aim 0.5-1L/day)
- Proteinuria lowering drugs
- Titrate dose depending on proteinuria
- ACEI/ARBs: -e.g Enalapril/Losartan (refer to hypertension for dosages)
- Lipid-lowering /Anti-cholesterol drugs: A statin or statin/ezetimibe for example Simvastatin 10-40mg daily or atorvastatin 10-20mg daily
- Anti-coagulation (INR 2-3)
- Only if albumin < 20g/l, bedridden, very rapid diuresis, otherwise do not use routinely –Warfarin daily

Pathological Classification

Minimal change disease (MCD)



Description

Pathologically no glomerular changes on light microscopy but podocytes are effaced on electron microscopy presents with nephrotic syndrome;. Causes include:

- Idiopathic
- Secondary; NSAIDS, bee sting, lymphomas



Treatment

- Idiopathic MCD
- ACEI/ARB are not used initially in MCD

- Immunosuppression drugs should be initiated in conjunction with a specialist
- In children, nearly 95% will respond to steroid; with about 25% no relapse, about 25% occasional relapse, and about 50% frequent relapses
- Second line therapy for children include CNI/Cyclophosphamide or CNI or Rituximab
- Follow a treatment algorithm for paediatric treatment for MCD
- In adults, steroid is first line therapy. In patient's intolerant to steroids, CNI (Tacrolimus) or MMF or cyclophosphamide or Rituximab is indicated in line with KDIGO treatment algorithm
- Prednisone, 1 mg/kg daily or 2 mg/kg QOD in the morning for a minimum of 8 weeks. (If the response is after 8 weeks, treat for another 2 weeks after response)
- Taper 5 mg/day every 3-4 days to 30, then use QOD, taper 5 mg/dose/week to 0.
- If relapse while tapering (steroid dependent) retreat with 4-week course.
- If relapse off steroids, retreat with 4-week course.
- If the patient remains steroid-dependent or has > 3 relapses/year can use low dose prednisone (10-15 mg) for a year to maintain remission,
- If using more than 0.3-0.4 mg/day of prednisone long term, treat with cyclophosphamide 2 mg/kg PO for 12 weeks. Steroid resistance is usually defined as no response after 16weeks of 1 mg/kg. Note: Caution of using cyclophosphamide in females.

Membranous Nephropathy



Description

Pathologically immune deposits are visible just above or within the glomerular basement membrane Presents with nephrotic syndrome. Immune causes include:

- Primary (previously called idiopathic) –75- 80% and common in adult Caucasians. Has presence of anti-PLA2R antibodies in circulation that are detectable in nearly 80%
- Secondary causes of MN
- Infections -HBV, HCV, syphilis, schistosomiasis, malaria
- Drugs- penicillamine, NSAIDS, Captopril, Gold
- Malignancies- lung, breast, thyroid, GI
- Autoimmune: - SLE, Thyroid disease



Treatment

Supportive therapy consists of ACEI/ARBs, salt restriction, diuretics etc. Patients are classified into low, medium and high risk Membranous nephropathy:

Table 135: Approach to therapy based on the risk of progression (6-month observation)

Feature/risk	Low risk	Medium risk	High risk
	<i>Preserved GFR Uprot < 3.5 g/d and Salb > 3.0 g/dL Asymptomatic</i>	<i>Preserved GFR Uprot 4–8 g/d despite 6 mo optimal supportive care PLA2R-ab > 50 RU/mL</i>	<i>Decreased GFR and/or Uprot > 8 g/d, sustained despite optimal supportive care × 3–6 mo Salb < 2.5 g/d PLA2R-ab > 150 RU/mL, especially if levels are increasing</i>
Risk ESRD (10 years)	< 10%	55%	66-80%
Supportive therapy	<i>Conservative Therapy ACEI/ARB</i>	<i>Steroids MMF Rituximab or CNI</i>	<i>Steroids, MMF Rituximab or cyclophosphamide/ steroids</i>

CTX* - cyclophosphamide, CSA** - cyclosporine, MMF*** - Mycophenolate
Treatment should be guided with KDIGO guideline and algorithm

NB: Patients on immunosuppression therapy will require prophylaxis against TB, CP/PJP, and fungal infections for at least for 3 months as indicated below.

Soniazid 300mg od po

Co-trimoxazole (single dose) 960mg OD PO

Fluconazole 100-200mg OD PO –

Do not initiate immunosuppression if sepsis is suspected or present

Focal Segmental Glomerulosclerosis (FSGS)



Description

Pathologically < 50% of all glomeruli affected and of the affected glomeruli, < 50% of their tuft is affected. Presents commonly with Nephrotic syndrome, asymptomatic hematuria and proteinuria. It can be classified as:

- Primary and previously called Idiopathic
- Secondary FSGS causes
 - o Collapsing (HIV), collapsing (non-HIV)
 - o Low birth weight. prematurity
 - o Obesity
 - o Sick cell anaemia,
 - o Anabolic steroids, Heroin, Lithium, pamidronate



Treatment

General measures for Nephrotic syndrome

- If patients with FSGS lesion on kidney biopsy and has nephrotic syndrome; Likely patient has primary FSGS:
 - Treat with immunosuppression
 - Genetic testing should be considered if not responding
- If patient has FSGS on kidney biopsy:
 - examine for other underlying secondary forms of FSGS
 - Do not commence the patient on immunosuppression
 - Supportive therapy
 - Initial treatment consists of steroids and CNI.
- If the patient is not responding or intolerant to steroids;
 - CNI and MMF should be considered
 - Conservative therapy (ACEI/ARB)
 - Exclude secondary causes
 - Prednisone, 1 mg/kg daily (or 2 mg/kg alt days) for 12-16 weeks (20% CPR at 8 weeks, 50% at 16weeks)
 - May go to 6 months if no steroid contraindication and/or bad prognostic signs are present.
- If clinical remission (CR) continue for 2 weeks and taper over 2-3 months using QOD regimen. If urine protein increases to >2.0 gm/day, start CSA.
- If no response at all by 16 weeks, taper and start CSA.
 - Steroid resistance is usually defined as no response after 4 months of 1 mg/kg prednisone.
- If the disease is non-immunologic such as genetic, drug-induced or viral, use only low dose steroids (0.15 mg/kg) with a calcineurin inhibitor).
 - Guidelines for use of cyclosporine
 - Do not use if GFR <40ml/min or severe interstitial or vascular disease on biopsy.
 - Use 3-5 mg/kg in divided doses and monitor trough levels (100-200 ng/ml).
 - Use concomitant low dose prednisone (0.15 mg/kg, maximum 15mg) until remission.
 - Treat for 6 months after a CR or 12 months after a Partial Remission (PR) occurs and taper slowly over several months. The relapse rate is determined by the duration of therapy.
 - Tacrolimus is an alternative to cyclosporine

Complete Remission Reduction of proteinuria to 3.5 g/dL (or 35 g/L)

Partial Remission Reduction of proteinuria to 0.3–3.5 g/day or urine PCR 300–3500 mg/g (or 30–350 mg/mmol) and a decrease >50% from baseline Relapse Proteinuria >3.5 g/day or urine PCR >3500 mg/g (or 350 mg/mmol) after complete remission has been achieved or an increase in proteinuria by >50% during partial remission

Steroid-Resistant Persistence of proteinuria >3.5 g/day or urine PCR >3500 mg/g (or 350 mg/mmol) with less than 50% reduction from baseline despite optimal steroid therapy for 16 weeks

CNI-Dependent Relapse occurring during or within 2 weeks of completing cyclosporine or tacrolimus therapy for >12 months CNI, Calcineurin inhibitor; FSGS, focal segmental glomerulosclerosis

Steroid-Dependent Relapse occurring during or within 2 weeks of completing glucocorticoid therapy

- Indications for use of Cyclosporine
 - Steroids are contra-indicated
 - Proteinuria does not diminish by 50% or more after 4 months of steroids.
 - FSGS due to HIVAN
 - General measures
 - cART
 - May add prednisolone after six months if the maximum dose of ACEI reached but still proteinuric.

Membranoproliferative Glomerulonephritis (MPGN)



Description

Glomerular disease with subendothelial immune deposits forming a double basement membrane or a dense basement membrane. Causes include:

- Idiopathic
- HCV, HBV, Infective endocarditis, Shunts, abdominopelvic sepsis



Signs and Symptoms

- Nephrotic syndrome – see Description above
- Nephritic syndrome – see Description below



Treatment

- General measures for the treatment of Nephrotic syndrome
- Treat secondary cause

LUPUS Nephritis



Description

Glomerular disease as a result of chronic autoimmune, multisystem, inflammatory connective tissue disorder of unknown cause (SLE)



Signs and Symptoms

- Nephrotic syndrome – see Description above
- Nephritic syndrome – see Description below
- Rapid progressive glomerulonephritis – see Description below
- Asymptomatic proteinuria or and hematuria
- Proteinuria or hematuria without any other renal symptoms
- Chronic glomerulonephritis
- Disease with irreversible damage to the kidney. GFR will not improve despite intervention but may delay further drop in GFR



Investigations

- Should meet criteria for the diagnosis of Lupus and look for systemic features; CNS (psychosis, fits), Cardiac (pericarditis), Respiratory (pleuritis), hematologic (Thrombotic microangiopathy, leukopenia), rheumatologic (arthritis), dermatologic (malar rash, discoid rash, photosensitivity, mucosal ulcers) renal (hematuria, proteinuria) immunologic (low C3/C4), GIT (serositis), ANA, ds DNA, anti-Sm
- Should have 4 of the 11 manifestations
- Biopsy needed for LUPUS as histological diagnosis defines treatment



Treatment

Depends on histological staging (stage 1-6) and 2 do not need immunosuppression

Stage 2 may need treatment if 24hr protein >1g. then give prednisolone 20-40mg/day for 1-3months and taper to 5-10mg/day

Stage 5 follow guidelines for membranous nephropathy.

Stage 6 damage already done and do not need active immunosuppression but follow measures for the management of CKD.

Stage 3 and stage 4

Induction phase treatment for 24 weeks with:

- Mycophenolate Mofetil (MMF) 1- 1.5g bd or
- IV Cyclophosphamide 0.5-1.0g/m² monthly
- Plus oral prednisolone 60mg/day (1mg/kg) with taper
- Do not initiate immunosuppression if sepsis suspected or present.
- Prophylaxis
- INH 300mg od PO

- Co-trimoxazole (single dose) 2 tab od PO
- Fluconazole 100-200mg od PO. Give at least for 3months
- Maintenance up to at least 18 months
- MMF 1 – 1.5g bd PO or
- Azathioprine 1-3mg/kg/day po
- IV cyclophosphamide 0.5-1.0g/m² every 3 months – Plus prednisolone 5-10mg/day

Diabetic Nephropathy



Description

Persistent microalbuminuria or proteinuria on albusstick or dipstick respectively and or urine albumin: creatinine ratio. Persistent means tests should be done three months apart.



Signs and Symptoms

- Asymptomatic proteinuria, microalbuminuria
- Body swelling
- No clinical signs on general examination
- Pedal Edema, facial puffiness
- Presence of Diabetic neuropathy and retinopathy makes the diagnosis of nephropathy more likely
- Classical presentation of diabetic nephropathy does not require renal biopsy but atypical presentation need a renal biopsy. These include:
- Rapid drop in GFR over a few days to weeks
- Diabetic with hematuria
- Proteinuria in presence of HIV, Hepatitis B, SLE, small vessel vasculitis (ANCA positive)



Treatment

- General Measures of managing Nephrotic syndrome
- Target BP < 125/75
- Target HbA_{1c} < 6.5%
- Low dose aspirin 75-150mg daily
- Amyloidosis AL-primary
- AA- secondary

Nephritic syndrome



Description

The causes of Nephritic syndrome include:

- Reduced complement
- Post streptococcal Glomerulonephritis
- Shunt Nephritis
- Endocarditis
- SLE
- HCV
- Athero-emboli GN
- Normal compliment
- IgA
- HSP
- Anti-GBM
- ANCA positive GN



Signs and Symptoms

- History of sore throat especially children, features of lupus, purpura(HSP, HCV), peripheral neuropathy (HSP, HCV), pulmonary haemorrhage (ANCA), chronic sinusitis (ANCA), associated asthma (ANCA)
Mild proteinuria
- Hematuria
- High blood pressure
- Acute reduction in GRF
- Some oedema



Investigations

- ANA, ANCA, ds-DNA, ASOT, DNase, HBsAg, AntiHCV, anti-GBM, RPR, C3, C4
- Renal biopsy except for post-streptococcal



Treatment

- Post streptococcal
 - Supportive, BP control , Antibiotic , Fluid management
 - Dialysis when indicated
- Prognosis good
 - ANCA positive/Anti-GBM
 - See under Rapid Progressive Glomerulonephritis
 - Systemic Lupus Erythematosus • See Lupus Nephritis
 - Others (HBsAg, HCV, IgA, HSP, Shunt nephritis)
 - Treat cause

Asymptomatic hematuria/proteinuria



Signs and Symptoms

- Isolated proteinuria/hematuria with no other features like hypertension, Edema, renal dysfunction, etc.
- Common Causes in our setting
- Diabetes Mellitus
- SLE
- HIVAN
- FSGS
- UTI
- IgA/HSP



Treatment

Reassure patient and follow up according to underlying disease

Rapid Progressive Glomerulonephritis



Description

Rapid Progressive GN (crescentic GN) is renal failure occurring over days/weeks, with proteinuria: usually <3g/day, hematuria: red cell casts, Blood pressure often normal May have other features of vasculitis. Renal failure progress to CKD if no immediate intervention.

RPGN occurs with severe glomerular injury leading to glomerular capillary rupture and accumulation of plasma and inflammatory cells into the Bowmans capsule leading to formation of the crescent. It can be classified as:

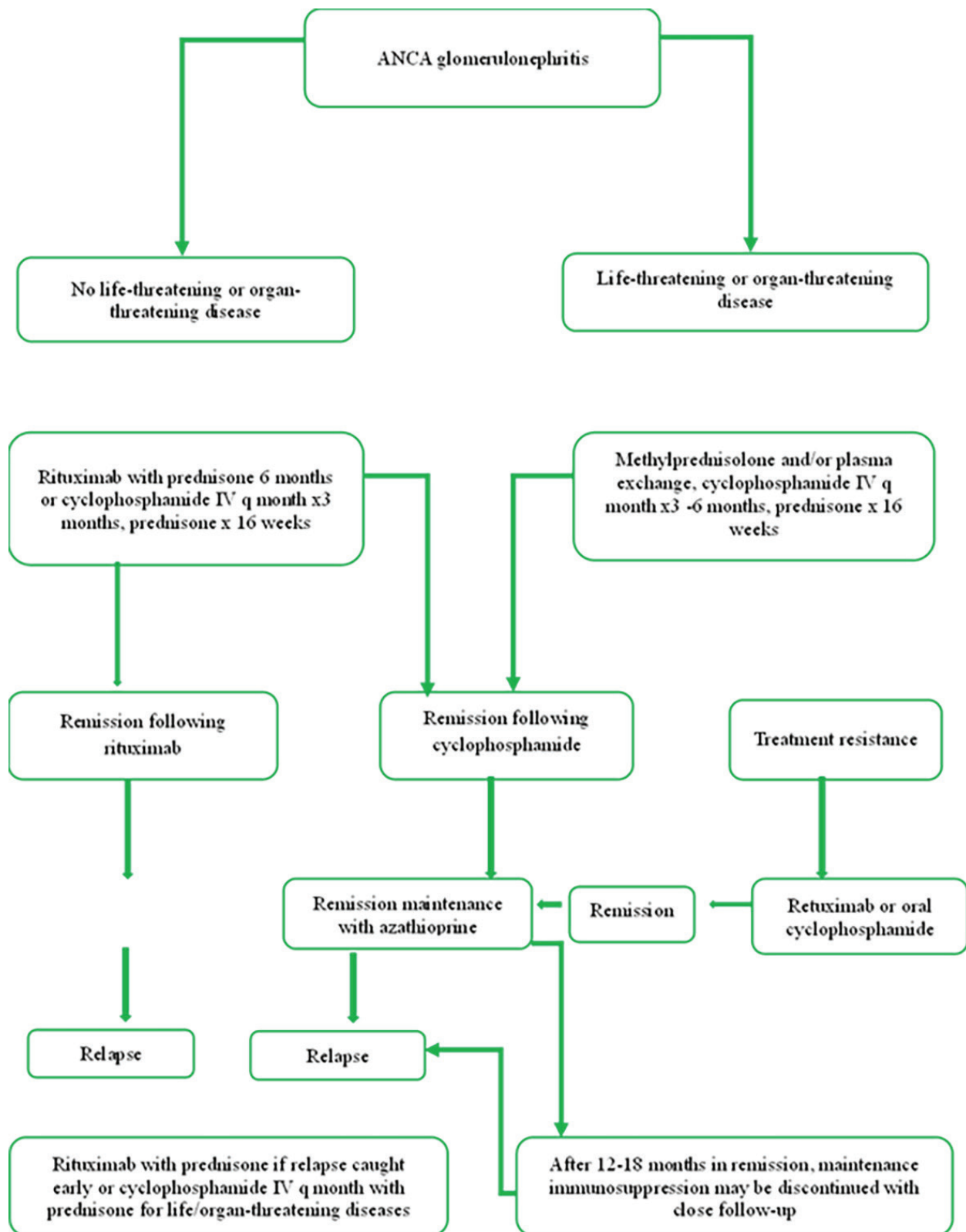
- immune complex mediated; lupus Nephritis, HBV
- anti GBM RPG
- Pauci immune RPGN; occurring in ANCA associated vasculitis. ANCA vasculitis is a multi-system disease consists of anti-neutrophil antibodies targeting neutrophil antigens; Proteinase 3 (PR3) and myeloperoxidase (MPO). ANCA affects capillaries, venules, arterioles and small arteries. Common cause of RPGN can be classified as:
 - o Microscopic polyangiitis (MPO)
 - o Granulomatosis with polyangiitis (GPA)
 - o Eosinophilic Granulomatosis with Polyangiitis (EGPA)



Treatment

- Anti-GBM RPGN
- Prednisolone 60 mg/day and reducing
- Cyclophosphamide 2mg/kg/day and adjusted for white cell count
- Plasma exchange (50ml/kg to a maximum of 4L daily for 14 days or until antiGBM antibodies are undetectable).Treat for 6 months
- Immune complex RPGN
- Except for Streptococcal, treat as in 3 except plasma exchange may not be indicated
- ANCA positive RPGN
- Methylprednisolone 7mg/kg for 3days and then prednisolone 1mg/kg/day for weeks then taper with either
- Cyclophosphamide 0.5g/m² IV monthly for 6 months OR
- Cyclophosphamide 2mg/kg PO for 6-12 months
- Plasma exchange for patients with lung haemorrhage and renal dysfunction
- Co-trimoxazole prophylaxis.

Figure 15: Rapid Progressive Glomerulonephritis



ADULTS CONDITIONS

5.10.3.4. Hypertension

(See detail on hypertension under section 5.6.1)

Malignant hypertension



Description

BP >180/120 mmHg

Fundal changes/encephalopathy

Proteinuria or increased urea/creatinine

Thrombotic microangiopathy

The common causes malignant hypertension include:

- Chronic kidney disease (small kidney on U/S)
- Acute Nephritis
- Renal vascular disease (one kidney 1.5cm than the other kidney on U/S)
- Scleroderma renal crisis
- Cocaine
- Other endocrine diseases: - Conn's, Cushing's syndrome, etc.



Signs and Symptoms

- As above but look for signs of possible aetiology
- Suspect in elderly Diabetics (atherosclerotic) and young women (fibromyoplasia)



Investigations

- FBC- thrombocytopenia
- Peripheral smear – RBC fragments
- Urinalysis
- U+Es
- Specific tests to rule out aetiology like kidney sonar, MRI angiogram to rule out renovascular disease



Treatment

Check under cardiovascular disorders

ACEI should be given if scleroderma

Renal vascular disease needs referral to a specialist if suspected and BP unresponsive

Increase of serum creatinine $<30\mu\text{mol/l}$ from baseline should not prompt withdrawal of ACEI but monitor closely

If dialysis needed peritoneal dialysis preferred to allow possible recovery. Recovery may take up to several months.

Hypertension or kidney disease in pregnancy



Description

(See HYPERTENSION IN PREGNANCY FOR OTHER DETAILS)

- Effects of Pregnancy on kidney
 - Hemodynamic changes lead to hyperfiltration
 - Presence of HTN, Uremia
- Facts that may predict deterioration
 - Proteinuria
 - Intercurrent pregnancy-related illnesses e.g. Pre-eclampsia
 - Possibility of permanent loss of function Kidney on pregnancy
- Effects of Kidney disease on pregnancy
 - Risk of pre-eclampsia
 - Prematurity
 - IUGR
 - LUPUS Versus Pre-Eclampsia/Eclampsia
 - Other conditions that may present like pre-eclampsia or eclampsia or HELLP need to be considered.

Table 136:Differentials of Kidney Disease in Pregnancy

	Lupus	Lupus Flare	Pre-Eclampsia
PROTEINURIA	+	+	+/-
HTN	+	+	-
RBC CASTS	+	- +/-	+
AZOTEMIA	+		
C3/C4	+		
ABNORMAL LETs	-		
LOW PLTS	+		
LOW WBC	+		
		-	

Thrombotic microangiopathy disorders

Thrombotic thrombocytopenic purpura

Hemolytic Uraemic syndrome

Acute Fatty Liver of Pregnancy

Other conditions that may mimic HELLP in pregnancy

Table 137: Other conditions that may mimic HELLP in pregnancy

	HELLP/Eclampsia	AELP	TIP	HUS
<i>Hypertension</i>	80%	25-50%	<i>Occasional</i>	<i>Present</i>
<i>Renal Dysfunction</i>	<i>Mild to moderate</i>	<i>Moderate</i>	<i>Mild to moderate</i>	<i>Severe</i>
<i>Fever/Neurological signs/</i>	++	0	++	0
<i>Onset</i>	<i>3rd trimester</i>	<i>3rd trimester</i>	<i>Anytime</i>	<i>Postpartum</i>
<i>Platelet count</i>		<i>Low</i>	<i>Low</i>	<i>Low</i>
<i>LFTs</i>	<i>High</i>	<i>Very high</i>	<i>Usually</i>	<i>Usually normal</i>
<i>PTT</i>	<i>Normal high</i>	<i>to</i>	<i>High</i>	<i>Normal</i>
<i>Antithrombin</i>	<i>Low</i>	<i>Low</i>	<i>Normal</i>	<i>Normal</i>

LUPUS and PREGNANCY

- Poor Outcomes
- Active disease at conception
- Disease first appearing in pregnancy
- HTN, Azotemia in 1st trimester
- High titres of lupus anticoagulant,
- Antiphospholipid antibodies
- Antiphospholipid antibody in pregnancy
- Increase fetal loss
- Venous and arterial thrombosis
- Renal vasculitis
- Thrombotic microangiopathy
- Pre-eclampsia
- Treatment- ASA, Heparin

5.10.3.5. Renal And Pancreatic Transplant

Criteria for Renal or/and Pancreatic Transplant



Description

- ESKD patients who meet the following criteria will be suitable for recommendation for Renal or/and Pancreatic Transplant:
 - o No malignancy or free of malignancy for at least 5 years
 - o No serious cardiovascular disease or ischemic heart disease

- o (minimum Ejection Fraction of 40%)
- o No Major pulmonary disease
- o No major restriction or obstruction
- o No major urological disease
- o No major psychiatric illness
- o BMI < 35 kg/m²
- o Low preformed antibodies (PRAs). High PRAs are associated with the following – Multiple pregnancies
- o Multiple blood transfusions
- o Prior failed transplant
- o GI disorders should have been addressed
- o PUD
- o Pancreatitis
- o Diverticulitis
- o Infections
- o HIV patients can be transplanted as long as they meet the following:
 - o CD4 > 200 copies/ml
 - o On HAART for at least 6 months
 - o VL undetectable
 - o Adherence with cART
- All other active infections should be treated first
- Special considerations should be taken for HBV and HCV
- Should not be a smoker or chronic alcoholic



Investigations

- Serum/blood
- HIV test
- HBsAg
- Anti-HCV
- Anti-CMV
- Anti-EBV
- Anti-HTLV-1
- RPR
- Blood group
- PRAs
- X match for CDC and flow cytometry

- Imaging/Invasive
- CXR, Doppler US of femoral/iliac veins
- ECG, VCU , Gastroscopy
- Doppler of carotids for Diabetics
- Other tests will be dependent on the condition of patients
- Other aspects that patient need to meet which are dependent on dialysis adequacy
- CaPO4 product should be acceptable
- PTH within recommended levels
- Hb 11-12g/dl
- Potassium normal

A checklist should be done the day before transplant to make sure the candidate is ready if possible do the tests.

Repeat HIV test as well unless already HIV positive Patients should be fully examined the day before transplant and ensure no comorbidity

- Stop-or-go Strategy for Evaluation of a Potential Living Donor
 - Blood group determination: Stop if incompatible with recipient blood group....
 - Plasma Urea, creatinine; proteinuria; urinary sediment: Stop if abnormal
 - Viral tests: HBV, HCV, HIV Stop if positive
 - Renal ultrasound: stop if solitary kidney
 - HLA A, B, DR, DP and DQ typing
 - CDC Crossmatch; FC crossmatch: Stop if positive (T-cell positive X match with IgG)
- Full medical evaluation of the potential donor
 - BMI, blood pressure, cardiac evaluation (at least EKG and ultrasound)
 - Aorto-iliac CT scan, and renal angiography; urography
 - Measurement of GFR: Cr51-EDTA, iohexol, or other methods
 - Blood glucose, HbA1c, cholesterol, microalbuminuria
 - Liver enzymes, alkaline phosphatases, gGT
 - Gynecologic evaluation: mammography, uterine cervix smear
 - Prostate evaluation, clinical and PSA
 - Evaluation of skin, lung, thyroid, infectious diseases, etc.
 - Psychologic/ psychiatric evaluation
 - Validation by urologist and anesthesiologist
- The best kidney donor
 - Iso blood group and HLA identical
 - Less than 50 years
 - Normal BP (< 140/90 mmHg)
 - BMI < 25 Kg/m²
 - GFR > 80 ml/min/ 1.73m²

- o Proteinuria < 300 mg/day; microalbuminuria <30mg/d
- o No hematuria
- o No diabetes nor dyslipidemia
- o No cardiac disease or history of cancer
- o No infectious (viral) disease
- **Immunosuppression in Live-donor Kidney Transplant patients**
 - o Immunosuppression can be started PRIOR to transplantation, e.g. one week before; this aims at achieving efficient immunosuppression.
 - o This might result in avoiding induction therapy with ant lymphocyte preparations or monoclonal anti-IL2 receptor antibody
 - o The HLA matching (D/R) can sometimes be very good, thereby allowing “lighter” immunosuppression, e.g. avoiding the use of calcineurin inhibitors
 - o There is no cold ischemia time: thus the risk of delayed graft function is almost nil, decreasing the risk of acute rejection
- **Preoperative Investigations**
 - o FBC, urea, serum creatinine, sodium, potassium, PT/aPTT, liver function tests
- **Immunosuppression protocols**
 - o Pre-operative Investigations
 - o Calcineurin inhibitors (Cyclosporine OR Tacrolimus) plus antiproliferative agent (azathioprine-AZA- OR mycophenolate mofetil – MMF) with OR without steroids
 - o With or without induction therapy: anti-lymphocyte agents –ATG- OR anti-IL2 receptor monoclonal antibodies, e.g. basiliximab, daclizumab
 - o Calcineurin inhibitors can be avoided (from the beginning or after a few months) provided there is the use of mTOR-inhibitors such as sirolimus or everolimus.
- **Induction**
 - o Basiliximab 20 mg pre-operative and day 4
 - o Methylprednisolone 500mg-1000mg day 0 (in operating theatre)
 - o MMF or Azathioprine 1.5g or 1-3mg/kg/day respectively
 - o Cyclosporine 8-12mg/kg stat or Tacrolimus 0.15- 0.30mg/kg/day bd.
 - o Maintenance
 - o MMF 1.5g BD PO or Azathioprine 1-3mg/kg/day
 - o Cyclosporine or Tacrolimus (dose adjusted according to C-2 levels or Tacrolimus levels)
 - o Prednisolone 60mg first day and taper down fast as long as creatinine remains stable. By end of the month, the dose should be 20mg or less.
- **Prophylaxis**
 - o INH 300mg od for 6 months
 - o Valacyclovir 450mg bd PO (depending on CMV status of “donor and recipient”) for 3 months
 - o Nystatin suspension 10mls od PO for 3months
 - o Amphotericin B oral suspension for 3 months
 - o Co-trimoxazole 960mg od PO for 6 months

- o Tacrolimus or Cyclosporine levels to be done daily till discharge then twice weekly then weekly, fortnightly and so on.
- o Kidney ultrasound and renogram will be routine within 5 days of transplant
- o Acute rejection will be defined based on an increase in serum creatinine or amylase (urine as well) and renal biopsy.
- o Rejection will be managed under the direct supervision of a Nephrologist but will require induction agents like ATG or Methylprednisolone or/and modification of maintenance regimen.
- **Fertility and Pregnancy post-transplant**
 - o Fertility restored
 - o Pregnancy outcomes improve if renal function is normal and hypertension absent
 - o Pregnancy accelerates graft loss
 - o Advisable to wait for 2 years
 - o So that renal function stabilises
 - o Lowest doses of Immunosuppressive
 - o Cyclosporine, prednisolone, Azathioprine safe, MMF no experience.

5.11

ANAEMIA AND NUTRITIONAL CONDITIONS

5.11.1. Anaemia



Description

This is a condition characterised by low Haemoglobin concentration in an individual to below the normal range for that individual's age and sex.

- 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

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 B12 deficiency.
- Infiltration or replacement of the bone marrow.
- Abnormal Hb or red cells.
- Haemolysis.

NB: Anaemia is most often due to iron deficiency



Investigations

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 B12 deficiency is the most likely cause.



Referral Criteria

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

Iron Deficiency Anaemia (IDA)



Description

Anaemia due to iron deficiency. Common causes of iron deficiency are chronic blood loss, poor iron absorption or poor nutritional intake.



Signs and Symptoms

- Pica
- Dry skin

- Abnormality of nails – pale, fragile nails with longitudinal stripes
- Tiredness
- Weakness
- Dizziness
- Shortness of breath
- Headache
- Palpitations
- Visual disturbances



Investigations

- Full blood count (FBC) **PLUS** Blood Smear
- Low MCV and MCH (mean cell Hb – hypochromia) – **note** that this often normal in early stages.
- Hypochromic microcytic anaemia and pencil cells often reported.
- Confirm with low ferritin.
- Investigate for cause of iron deficiency.
- Consider upper and lower endoscopies in high-risk patients (all males and postmenopausal female patients) and patients not responding to treatment.



Treatment

Oral iron supplementation

- Treat underlying cause.
- Ferrous sulfate 200mg 12 hourly
- Children < 5 years of age: Iron 1–2 mg/kg/dose of elemental iron (PO) 8 hourly with meals
- Infants from 6 weeks: If < 2.5 kg at birth:
- Ferrous lactate (PO) 0.3 mL daily until 6 months of age.

OR

Ferrous gluconate syrup (PO) 0.8 mL daily until 6 months of age.

OR

- Ferrous fumarate 200 mg 12 hourly.
- Continue with treatment for 3 months once Hb has normalised to replace iron stores.

Consider the use of Parenteral Iron if there is failure to respond to Oral iron therapy due to the following:

- Lack of response after three months of oral iron therapy
- Non-adherence

- Continued blood loss
- Wrong diagnosis
- Malabsorption
- Patients on haemodialysis and erythropoietin therapy
- mixed deficiency; concurrent folate or vitamin B12 deficiency.
- Parenteral iron
- Iron sucrose, IV, 200mg in 200 mL sodium chloride 0.9%, over 30 minutes, given on alternate days until the total dose has been given (not to exceed 1.2g/week)

OR

Low molecular weight iron dextran, administered as a single dose.

Determine total dose of iron required (total dose up to 20 mg/kg body weight).

Note: Start with test dose - 25 mg in 100 ml sodium chloride 0.9%, infused over 15 minutes and observe the patient for 1 hour.

If there is no adverse drug reaction, administer the remaining dose in

500 mL of sodium chloride 0.9%, 0.9% over 4-6 hours. Observe the patient for 1 hour after the infusion.

Red cell concentrate transfusion is indicated in patients with:

anaemia leading to cardiac failure or severe dyspnoea;

active, ongoing bleeding; or

where correction of anaemia is required prior to performing an urgent invasive procedure or surgery.

Macrocytic or Megaloblastic Anaemia (Vitamin B12 Deficiency)



Description

Anaemia with large red blood cells is commonly due to folate or vitamin B12 deficiency.



Investigations

- FBC will confirm macrocytic anaemia.
- Elevated MCV
- White cell count and/or platelet count may also be reduced.
- Blood Smear: oval macrocytes, hypersegmentation of neutrophils, thrombocytopenia with giant platelets.
- If there is a poor response to folate, a serum vitamin B12 should be done.



Treatment

- Folic acid deficiency:
- Folic acid (PO) 5 mg daily until Hb is normal
- NB: Folic acid given to patients with vitamin B12 deficiency can mask the situation and eventually lead to neurological damage, unless vitamin B12 is also given.
- Vitamin B12 deficiency
- Vitamin B12, IM:
- 1 mg daily for 5 days, then weekly for a further 3 doses
- Follow with 1 mg every second month for life in patients with pernicious anaemia.



Referral Criteria

- Chronic diarrhoea
- Poor response within a month of treatment
- Macrocytic anaemia, of unknown cause

Haemolytic Anaemia



Description

- Anaemia due to destruction of red blood cells. Destruction may be due to extracellular factors such as auto-immunity or mechanical factors, e.g. disseminated intravascular coagulation (DIC), hypersplenism, mechanical heart valves.
- Abnormalities of the cell membrane, e.g. hereditary spherocytosis.
- Enzymes, e.g. G6PD deficiency.
- Haemoglobin abnormalities, e.g. sickle cell anaemia, thalassaemia.
- Thrombotic thrombocytopenic purpura is a life-threatening emergency, if treated early. Immediate referral to specialist unit for plasma infusion or exchange is necessary



Investigations

- Evidence of haemolysis: anaemia, reticulocytosis, decreased haptoglobin, increased lactate dehydrogenase (LDH) and unconjugated hyperbilirubinaemia.
- Blood Smear: Spherocytes often reported
- Coombs' test (direct antiglobulin) is usually positive with autoimmune haemolysis.
- HIV status.



Treatment

- Treat the underlying cause.
- X-match and transfuse in severe and symptomatic haemolytic anaemia and when blood is available.
- Because of high red cell turnover, supplement with:
- Folic acid, oral, 5 mg daily.
- Autoimmune haemolytic anaemia (Treat under specialist supervision)
- Prednisone, oral.
- Initial dose: 1 mg/kg daily, until Hb stable and >10 g/dL.
- Taper slowly and monitor Hb at least once weekly.
- Glucocorticoids should be tapered slowly, when there is normalization of the haemoglobin and LDH. The patient should be monitored for recurrence following cessation of treatment.
- In G6PD deficiency, avoid drugs known to cause haemolysis, including aspirin, sulphonamides (including cotrimoxazole), dapsone and primaquine.
- In patients with cold agglutinins all transfusions must be given through a blood warmer to avoid cold-induced haemolysis.



Referral Criteria

- If inadequate response
- Haemolysis remains severe for 3 weeks at prednisone doses of 1 mg/kg,
- If remission cannot be maintained on low doses of prednisone
- If patient has intolerable adverse effects or contraindications to glucocorticoids.
- Refer to specialist for second-line treatment

Aplastic Anaemia



Description

Pancytopenia due to a hypoplastic bone marrow. Most common causes are direct effect of HIV, medication, secondary opportunistic infections, malignancies and nutritional deficiencies. Many cases are idiopathic.



Signs and Symptoms

- Pallor
- Purpura

- Petechiae /bleeding
- Frequent or severe infections
- Pancytopenia



Investigations

- FBC and Blood Smear (FBC indicates different degrees of: anaemia, thrombocytopaenia and leucopaenia).
- Vitamin B12 and red cell folate.
- Appropriate investigation to exclude opportunistic infections.
- Bone marrow trephine and aspiration in selected patients (where no other cause is found, in patients with persistent pancytopenia) to exclude infiltration with opportunistic infections, malignancies.



Treatment

Ceftriaxone IV 1 g daily.

Plus

Gentamicin IV 6 mg/kg daily

Plus:

Vancomycin IV 30mg/kg as a loading dose. Follow with 20 mg/kg/dose 12 hourly.

If fever develops after 48 hours of admission:

(Choice of antibiotic will depend on local susceptibility patterns).

Carbapenem with activity against *Pseudomonas*, e.g.:

Meropenem, IV, 1 g 8 hourly

OR

Imipenem/cilastatin, IV, 500/500 mg 6 hourly.

Note: Ertapenem is not recommended because it is not effective for *Pseudomonas* species, which are important pathogens in this setting.

OR

Piperacillin/tazobactam, IV, 4.5 g 8 hourly

AND

Amikacin, IV, 15 mg/kg daily **OR**

Cefepime, IV, 2 g 12 hourly.

NB: If no response after 5–7 days: (In discussion with a Clinical Haematologist or Infectious Disease specialist).

ADD

Amphotericin B, IV, 1 mg/kg daily in dextrose 5 % over 4 hours.

Ensure adequate hydration to minimise nephrotoxicity. Duration of therapy:

If neutrophil count increases to $>0.5 \times 10^9/L$, continue for 2 days after fever has settled.

If neutrophil count remains $>0.5 \times 10^9/L$, continue for 7 days after fever has settled.



Referral Criteria

All cases – consult with haematologist/oncologist.

5.11.2. Iodine Deficiency Disorders (IDDA)



Description

Iodine is an essential component of the thyroid hormones (Triiodothyronine-T3) and Tetraiodothyronine-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.



Signs and Symptoms

- 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



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.
- Iodinated oil, 400mg (PO) repeated after one to two years
- Lugol's solution, 3 drops (21 mg) once
- Use of iodated salt (strategy for control of iodine deficiency worldwide)

5.11.3. Vitamin Deficiencies

Vitamin A Deficiency (VAD)



Description

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.



Signs and Symptoms

- 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



Treatment

- For Prophylaxis
- Vitamin A (retinol), oral, every 6 months up to the age of 5 years.

Table 138: Vitamin A Prophylaxis Doses

Age range	Dose units	Capsule 100,000U	Capsule 200,000U
Infants 6 – 11 months	100,000	1 capsule	-
Children 12 months – 5 years	200,000	2 capsules	1 capsule

For Treatment

Children 0–5 years of age, with:

Severe under nutrition/malnutrition

Persistent diarrhoea

Any of the clinical signs of vitamin A deficiency

Measles

Vitamin A (retinol), oral, every 6 months up to the age of 5 years.

Table 139: Vitamin A Treatment Doses

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 capsules	1 capsule

Vitamin B Deficiencies



Description

A condition in which some of the B group vitamins are deficient. This occurs commonly in malnutrition and alcoholism.



Treatment

- For all forms of vitamin B deficiencies
- Vitamin B complex PO 2 tablets 3 times daily for one week, then 1 tablet daily for 3 months.

Vitamin B3/Nicotinic Acid Deficiency (Pellagra)



Description

Pellagra is a condition associated with nicotinic acid deficiency. It is usually accompanied by other vitamin deficiencies.



Signs and Symptoms

- Diarrhoea
- Dementia
- Dermatitis with darkening of sun-exposed skin



Treatment

- For severe deficiency
 - Children: Nicotinamide PO 50 mg 8 hourly for one week.

- o Adults: Nicotinamide PO 100 mg 8 hourly for one week.
- For mild deficiency
 - o Children: Nicotinamide, oral, 50 mg daily for one week.
 - o Adults: Nicotinamide, oral, 100 mg daily for one week.



Referral Criteria

On failure to respond to the above treatment.

Vitamin B6/Pyridoxine Deficiency



Description

Commonly presents as signs of peripheral neuropathy



Signs and Symptoms

- Tingling sensation
- Burning pain or numbness of the feet



Treatment

- For deficiency
 - o Children: Pyridoxine 12.5mg (PO) daily for 3 weeks.
 - o Adults: Pyridoxine, 25 mg (PO) daily for 3 weeks.
- For medicine-induced neuropathy
 - o Children: Pyridoxine, 50mg (PO) daily for 3 weeks.
 - o Adults: Pyridoxine, 200mg (PO) daily for 3 weeks.

Then followed by: Pyridoxine, 25mg (PO) daily as maintenance dose (for patients on TB therapy/isoniazid)



Referral Criteria

- Failure to respond.
- Children.

Vitamin B1/Thiamine Deficiency (Wernicke Encephalopathy and Beriberi)



Signs and Symptoms

- Confusion
- Short term memory loss
- Paralysis of one or more of the ocular muscles or ophthalmoplegia
- Nystagmus
- Ataxia
- Peripheral neuropathy
- Cardiac failure



Treatment

- Thiamine 100mg IV; then 50mg daily IM/IV until consuming regular balanced diet
- Thiamine PO, 100 mg daily.

Vitamin B12 (Cobalamin) Deficiency

(See section on megaloblastic anaemia)

5.11.4. Other Deficiencies

Vitamin C (Ascorbic acid) Deficiency



Signs and Symptoms

- Periodontal haemorrhage
- Swelling and pain of long bones due to sub- periodontal haemorrhage
- Loosening of teeth and lesions of the gums leading to infections in the mouth.



Treatment

- Vitamin C tablets (Ascorbic acid) 200mg 4 times daily.
- Until symptoms disappear.

Vitamin D Deficiency



Signs and Symptoms

- Deficiency leads to rickets, recognized by:
- Softening of bones resulting in bowing of legs or knock-knees.
- Thickening of the ends of bones.



Treatment

- Vitamin D, 1000-5000 units/day orally for a period of 6 weeks to 3 months.
- Exposure to sunlight

Severe Acute Malnutrition (SAM)

(Refer to Management of Diarrhoea in Children)

5.12 DERMATOLOGICAL CONDITIONS



Description

Can be infectious or non-infectious. Infectious dermatological conditions can be classified according to the cause of infection or infestation:

- Bacterial infections
- Fungal infections
- Viral infections
- Parasitic infestations

5.12.1. Bacterial Infections

5.12.1.1. Acne



Description

This is a condition caused by blocked sebaceous glands. It usually begins at or after puberty. The most affected parts are the face, neck, back and chest.



Signs and Symptoms

Occurs in mild form as blackheads and whiteheads (open comedones and closed comedones) and more severe form as nodular lesions, with or without infection



Treatment

According to the severity of disease. Can be classified as mild, moderate, or severe. Mild forms treated with topical antibiotic and topical retinoid. Moderate form treated with the topical agents in the mild form plus oral doxycycline, minocycline, or azithromycin. The severe form is treated with an oral retinoid. Avoid retinoids in pregnancy.

Pharmacological

- Benzoyl peroxide gel 2.5-10% topically 1- 2 times daily
- Tretinoin cream 0.025% - 0.1% topically, preferably at night
- clindamycin cream can apply twice daily.
- Doxycycline, 50-100mg orally daily
- Isotretinoin 0.5-1mg/kg orally. Often given as monotherapy for severe acne. Avoid in pregnancy. Confirm that the patient is not pregnancy before initiating the treatment.

5.12.1.2. Abscess



Description

This is a collection of pus in the dermis and subcutaneous fat layer of the skin. It occurs as a result of infection of the hair follicles commonly caused by Staphylococcus aureus.



Signs and Symptoms

The skin surrounding the affected hair follicle becomes red, hot, swollen and tender to touch. In severe cases, there will be fever and involvement of the local lymph nodes



Treatment

Supportive

- Encourage patient to maintain good general hygiene

- Apply hot compression 3-4 times daily until abscess is ready for draining.

Pharmacological

Cloxacillin

- Adults; 250 - 500mg orally. 6 hourly for 5 days,
- Children; 125 - 250mg orally 6 hourly five days

OR

Erythromycin

- Adults: 250 - 500mg orally 6 hourly for 5 days,
- Children: 125-250mg orally 6 hourly for 5 days

Surgery

- Incision and drainage
- In cases of multiple abscesses, non-response to antibiotic therapy or an abscess in a diabetic, refer to a specialist

5.12.1.3. Impetigo



Description

This is a superficial infection of the epidermal layer of the skin by aureus commonly, but Streptococcus species may also be involved. Painful vesicles and pustules break down to form golden -honey coloured scabs or crusts. Impetigo starts on the face and may spread to the neck, hands and legs. It usually occurs in children.



Treatment

Supportive

- Keep fingernails short
- Soak and clean pustules with water and soap

Pharmacological

- Mupirocin ointment TDS for 5 days, for mild forms of the non-bullous form in children.
- Cloxacillin, orally:
 - o Adults: 250 - 500mg 6 hourly for 5 days
 - o Children: 125 -250mg 6 hourly for 5 days or
- Erythromycin, orally:
 - o Adults: 250 - 500mg 6 hourly for 5 days
 - o Children; 125 -250mg 6 hourly for 5 days
- The patient should be referred to the next level if there is no improvement after 2 weeks

5.12.1.4. Eczema



Description

Eczema is an inflammatory rash which may be due to endogenous or exogenous factors.

Classification of Eczema

- Endogenous
 - o Atopic (inherited disposition)
 - o Seborrhoeic
 - o Asteatosis
 - o Discoid (nummular)
 - o Unclassified
- Exogenous
 - o Allergic contact dermatitis –Primary irritant dermatitis –photodermatitis

Atopic eczema



Description

This is a condition characterised by an itchy, rough, dry skin. In babies, it occurs mainly in the areas surrounding the knees, elbows and neck whereas in older children and adults it can occur on any part of the body. The itching is intense at night and could become chronic and infected. Where possible the causative factor should be determined before commencing treatment.



Treatment

Supportive

- Recommend 100% cotton clothing
- Keep skin hydrated with Oil bath and short baths
- The patient should avoid scratching

Pharmacological

- Emollient cream, topically 1-3 times daily

OR

- Tacrolimus ointment (0.03% for children, and 0.1% for adults), topically 1 to 2 times a day. Can be used for a longer duration than steroids.
- Triamcinolone cream or Betamethasone 1%, topically twice daily for 7 days (for severe or non-responsive cases)

OR

- Hydrocortisone in, topically twice daily for 7 days ss

NB: A cocktail can be made by mixing 3 tubes of triamcinolone or the alternative in a 500g of emollient cream)

Cetirizine or Chlorpheniramine for very itchy cases

Avoid known irritants e.g. soap, woollen clothing. If there is no improvement in the acute condition after 2 weeks refer to a specialist.

Seborrhoeic eczema



Description

This is a condition characterized by thick adherent scales presenting as a diffuse scaly scalp (dandruff). It may also affect other parts of the body which tend to be oily e.g. facial skin nasolabial folds, eyebrows, eyelashes, external ears, and centre of the back. Variable pruritis and vesicular or scaly lesions may be present.

Infantile seborrhoeic eczema occurs in early infancy 24 weeks after birth. Begins with cradle cap (scaly scalp surrounding the anterior fontanelle), spreads to the face, axilla, neck and nappy area. The rash is non-itchy and gets better without leaving marks.



Treatment

- Triamcinolone cream or Hydrocortisone 1% cream, topically twice daily
 - o Maintenance: once or twice a week as required
- Tacrolimus 0.03% or 0.1% cream can be used once daily for 4 weeks
- Zinc oxide cream, topically 1-3 times daily after bathing especially in the nappy area or
- Aqueous cream, topically 1-3 times daily after bathing.
- Antifungal cream such as Miconazole twice a day when fungal elements seen on microscopy.
- Ketoconazole shampoo twice to three times weekly

To reduce scaling and itching of the scalp use keratolytic or antifungal containing shampoos once or twice weekly. Refer patients who do not respond to treatment or have acute oozing eczema to a specialist.

5.13.2. Fungal Infections



Description

Superficial fungi live in the stratum corneum and feed on the keratin. They are called dermatophytes and belong to 3 genera as follows: Microsporum, Trichophyton, and Epidermophyton, respectively. More than 40

species are currently recognized with 10 causing human infection. They are transmitted from person to person by direct body contact or by fomites e.g. combs. They can also be transmitted from animals such as cats and dogs (zoophilic) or from the soil and plants (geophilic) The infections are named according to the body parts affected as follows:

- Tinea pedis – feet
- Tinea corporis – body
- Tinea capitis – scalp and hair
- Tinea manus – hands
- Tinea unguium – nails
- Tinea cruris – groin area covering the T of the genital area extending behind along the gluteal cleft
- Tinea facialis – face
- Tinea barbae – beard area
- Tinea versicolor
- Cutaneous candidiasis

5.12.2.1. Tinea pedis (athlete's foot)



Description

This is a contagious fungal infection of the foot caused by Trichophyton mentagrophytes and T. rubrum most commonly.



Signs and Symptoms

- Itching of the foot
- Burning or stinging lesions with scaling borders between the toes
- Vesicular eruptions with white scaling between the 4th or 5th toes or the instep of the sole
- May be accompanied by vesicles on the palms and sides of fingers called 'id' reaction. The vesicles do not contain fungus and get better when the fungus is treated



Investigations

Scrape the scales from the infected site and put on a glass slide with a drop of 20% KOH. On microscopy branching, fungal hyphae are seen.



Treatment

Supportive

- Keep feet dry all the time
- Wear open footwear
- Wear cotton socks, if need be, Change socks daily

Pharmacological

- Miconazole 2% cream, topically twice daily for 3 to 4 weeks
- Continue treatment for 2 weeks after the symptoms have cleared.
- Oral antifungals can be used, e.g. Griseofulvin and Terbinafine for more severe or unresponsive cases

5.12.2.2. Tinea corporis (ringworm of body, trunk and limbs)



Description

This is a condition which can be acquired from animal (*Trichophyton verrucosum*, *Microsporum canis*) or human contact (*T. rubrum*). It is characterised by itchy lesions appearing as scaly greyish patches with raised borders. It can affect any part of the body, with the most commonly affected parts being the arms, groin, buttocks, waist and the area under the breasts.



Treatment

Supportive

- Maintenance of general hygiene
- Avoid sharing of personal items such as towels and clothes

Pharmacological

- Miconazole cream 2%, topically twice daily for 2 to 6 weeks.
- Terbinafine 250mg O.D. oral for about 4 weeks

OR

- Griseofulvin 500mg O.D. oral up to 2 weeks after lesions disappear. On average 4 weeks administration.

5.12.2.3. Tinea capitis (scalp ringworm)



Description

This is a fungal infection of the scalp which is especially common in children. It is caused by Trichophyton species – violaceum in Africa and Asia, T. rubrum in Europe. Non-inflammatory invasion of the hair shaft can occur due to Microsporum audouinii transferred by contact with barber shears, hats or M. canis from pets.



Signs and Symptoms

- Diffuse scaling of the scalp with no hair loss
- Circular scaly patches in the scalp with associated alopecia (hair loss)
- In severe cases, a boggy swollen mass with discharging pus and exudates called Kerion is due to animal fungus.



Investigations

Remove scales and broken hairs with a blunt scalpel and put it on a slide with Potassium Hydroxide 20%. The hair shaft is seen under the microscope full of fungal spores.



Treatment

Supportive

- Maintenance of good general hygiene
- Avoid sharing of personal items such as towels and clothes
- Antifungal shampoo can be used as adjuvant treatment.

Pharmacological

Griseofulvin:

- *Adults:* 500mg orally daily as a single dose or in divided doses (in severe infection dose may be doubled, reducing when the response occurs)
- *Children:* 10mg/kg body weight daily as a single dose or in divided doses continue till two weeks after the lesions disappear and hair is growing.

5.12.2.4. Cutaneous Candidiasis



Description

This is an infection of the skin caused by Candida albicans a yeast fungus which is a normal commensal occupying the gut. Under certain circumstances such as diabetes or other endocrine diseases or

immunosuppressive states, it becomes pathogenic. The infection usually occurs in the skin folds such as, around the groin area, under the breasts, in the nail folds and axilla. In chronic or severe cases suspect HIV/AIDS.



Signs and Symptoms

Moist, white curd-like papules and plaques form which are easily scraped off leaving red and raw-looking patches with clear edges.



Investigations

Scrape off white patch and place on a glass slide with a drop of Potassium hydroxide (**KOH**). **Hyphae and yeast are seen.**



Treatment

Supportive

- The patient should be advised to keep the skin dry
- Long-term antibiotic use should be avoided

Pharmacological

- Miconazole cream 2%, topically twice daily.
- Continue treatment for 14 days after lesions have healed.
- For nail infections, apply under occlusive dressing.
- Patients not responding to topical applications should be referred to a specialist.

5.12.2.5. Pityriasis versicolor



Description

Pityriasis versicolor, also known as tinea versicolor, is a common fungal infection of the skin caused by *Malassezia* yeasts. It typically presents as small, discoloured patches on the skin, often on the chest, back, shoulders, and upper arms. These patches can vary in colour from white, pink, tan, to brown, and may be slightly scaly or itchy. Pityriasis versicolor thrives in warm, humid climates and is more common in adolescents and young adults.



Treatment

Pharmacological

- Topical antifungal creams or lotions containing substances like ketoconazole, terbinafine. These medications work to eliminate the fungus causing the infection.
- Antifungal shampoos containing ketoconazole or selenium sulfide, which are effective in treating tinea versicolor on the scalp and hairline.
- 6-20% salicylic acid cream, a keratolytic
- Oral antifungal medications such as fluconazole or itraconazole may be prescribed for severe or widespread cases of tinea versicolor that do not respond to topical treatments.
- Medicated cleansers or soaps containing antifungal agents may also be recommended for daily use to help prevent recurrence of the infection.

5.13.3. Viral Skin Infections

- Chickenpox
- Herpes zoster
- Herpes simplex

5.13.3.1. Chickenpox



Description

This is a condition caused by the Varicella zoster virus (VZV). It is a common childhood infection. It is characterized by an itchy rash, which appears first on the trunk and spreads out to other parts of the body. Papules and crusts form within a few days. Fever may be present. When the blisters occur, they are in crops. The rash lasts 2 to 4 weeks. The condition is usually more severe in the elderly.



Investigations

Diagnosis is usually done clinically.



Treatment

Pharmacological

- Calamine lotion, topically twice daily
- Chlorpheniramine, adults; 4mg orally twice daily, children up to 10 years; 2mg orally twice daily

- Acyclovir, 400mg orally 5 times daily for 7 days
- Paracetamol, adults; 500mg - 1g orally 3-4 times daily, children; 10-20mg/kg orally 3-4 times daily

Note: Advise patient to avoid sun exposure and bathing until the lesions start drying

5.12.3.2. Herpes Zoster



Description

This is a condition caused by the resurgence of the Varicella zoster virus. It is characterised by burning pain before the vesicular rash appears. The rash is always unilateral and does not cross the midline (see section on malignancies).



Treatment

Pharmacological

- Paracetamol 500mg - 1g orally 3 - 4 times daily.
- Acyclovir 5%, topically 4 hourly for 10 days.
- Acyclovir 800mg orally 8 hourly daily for 7 days.
- Carbamazepine 200-400mg orally 8 hourly daily or
- Gabapentin 300-600mg 8 hourly PO. (for post herpetic neuralgia)
- Treat secondary bacterial infection with appropriate antibiotics.
- Severe neuralgia should be referred to a neurologist.

5.12.3.3. Herpes Simplex



Description

This is a condition caused by Herpes simplex virus (HSV) type 1 characterised by a vesicular rash around the mouth or genitalia. It is characterized by grouped vesicles on an erythematous base.



Treatment

Pharmacological

- Acyclovir 400mg four times daily for 5 to 7 days
- 5% Acyclovir cream, 4 hourly.

NB: For recurrent episodes, refer to the current National STI guidelines

5.12.4. Parasitic Infestations



Description

Parasitic infestations of the body include:

- Pediculosis
- Scabies

5.12.4.1. Pediculosis (Lice)



Description

This is the infestation of the hair or body with lice. Hair infestation (*Pediculus humanus var capitis*) is characterised by eggs (nits) which appear as small white specks attached to the hair. Body infestation (*P. humanus corporis*) is characterised by bite marks. Both hair and body infestations cause itching. Eczema may be present. The lice usually live in cloth folds. An infestation of the pubic area called *Pediculosis pubis* is caused by the crab or pubic louse *Phthirus pubis* transmitted during close physical contact which may be sexual in nature.



Treatment

Supportive

- The whole family should be examined and treated if possible
- Bed linen and clothes should be washed in warm water and dried in the sun
- Maintenance of good personal hygiene.

Pharmacological

- 5% permethrin cream. Apply to affected parts or entire body for 8-14 hours then wash off.
- Permethrin 1% cream
- 25% benzyl Benzoate lotion can also be used.

5.12.4.2. Scabies



Description

This is an infestation of the skin by mites, *Sarcoptes scabiei*, which burrow the skin causing lesions where the female rests and lays eggs. The most common sites are skin folds, wrists, in between fingers and axilla. The main characteristic is intense itching which worsens at night.



Treatment

Supportive

- Moisturizing the skin regularly
- Avoiding triggers like stress and certain foods
- Protecting the skin from trauma, and
- Managing stress through techniques like meditation or therapy.
- Phototherapy, involving exposure to ultraviolet light, is also a common treatment option.
- All members of the family should be examined and treated (if possible).
- Clothes and bedding should be washed in warm water and dried in the sun.
- After treatment, only clothes washed as above should be worn.
- Discourage scratching.

Pharmacological

- Benzyl Benzoate 25% applied all over the body from the neck downwards. Leave to dry and repeat without bathing after 24 hours. Wash off on the third day. A third application may be required. (Not recommended in children, pregnancy and breastfeeding mothers) or
- Permethrin cream 5%, applied all over the body from the neck down to the feet. Wash off after 8 to 24 hours
- For children apply all over the body including the face, neck, scalp and ears
- If hands are washed with soap within 8 hours of application, the cream should be re-applied

NB: Regular follow-ups with a dermatologist are essential to monitor and adjust treatment as needed.

5.12.5. Systemic Lupus Erythromatosis/ Discoid Chronic Erythromatosis



Description

Systemic Lupus Erythematosus (SLE) is a chronic autoimmune disease that can affect various organs and systems in the body, characterized by periods of flare-ups and remissions. It often presents with symptoms like joint pain, skin rashes (such as the classic butterfly rash on the face), fatigue, and fever.

Discoid Lupus Erythematosus (DLE) is a subtype of lupus that primarily affects the skin, causing coin-shaped lesions with scaling and scarring. Unlike SLE, DLE usually spares internal organs and tends to be milder, though it can cause significant cosmetic and functional issues if untreated. Treatment for both conditions involves medications to manage symptoms and suppress the immune system.



Treatment

Treatment for Systemic Lupus Erythematosus (SLE) and Discoid Lupus Erythematosus (DLE) involves a combination of medications and supportive measures.

Supportive

- Sun protection to minimize skin rashes and photosensitivity.
- Regular exercise and a balanced diet to maintain overall health.
- Avoidance of triggers such as stress and certain medications.
- Regular monitoring by healthcare providers for disease activity and complications.

Pharmacological

- Nonsteroidal anti-inflammatory drugs (NSAIDs) or corticosteroids for managing inflammation and pain.
- Antimalarial drugs like hydroxychloroquine 200mg to 400mg to reduce symptoms and prevent flares.
- Immunosuppressants such as methotrexate, azathioprine, or mycophenolate mofetil to suppress the immune system.
- Biologic agents like belimumab, which specifically targets immune cells involved in SLE.

5.13 MALIGNANCIES

5.13.1. Leukaemias



Description

These are diseases characterised by the proliferation of a single malignantly transformed progenitor cell in the haemopoietic system. Leukemia develops from the serial acquisition of somatic mutations in hematopoietic stem and progenitor cells with the capacity to self-renew and propagate the neoplastic clone.

Leukaemia is classified according to the morphological cell type involved and the speed of evolution of the disease:

- Acute Lymphoblastic Leukaemia (ALL)
- Acute Myelogenous Leukaemia (AML)
- Chronic Lymphatic Leukaemia (CLL)
- Chronic Myeloid Leukaemia (CML)

Acute Lymphoblastic Leukaemia (ALL)



Description

Acute Lymphoblastic Leukaemia (ALL) is caused by an accumulation of lymphoblasts in the bone marrow and is the most common malignancy of childhood, although it can occur at any age. Acute lymphoblastic leukaemia, B cell or T cell, is subclassified by the World Health Organization (WHO 2016) according to the underlying genetic defect of bone marrow failure.



Signs and Symptoms

- Anaemia (pallor, lethargy and dyspnoea)
- Neutropenia (fever, malaise, features of mouth, throat, skin, respiratory, perianal or other infections)
- Thrombocytopenia (spontaneous bruises, purpura, bleeding gums and menorrhagia)
- Organ infiltration
- Tender bones
- Lymphadenopathy
- Moderate splenomegaly, hepatomegaly and meningeal syndrome (headache, nausea and vomiting, blurring of vision and diplopia)
- Fundal examination may reveal papilloedema and sometimes haemorrhage
- Many patients have a fever at presentation, which usually resolves after starting chemotherapy



Investigations

- FBC, platelets, differential
- Characteristic leukaemic cells in blood and bone marrow
- CSF Assay
- Additional tests include conventional cytogenetic analysis (i.e., karyotype), appropriate molecular-genetic and/or fluorescence in situ hybridization (FISH) testing, and flow cytometry immunophenotyping.
- For adult patients with suspected or confirmed B-ALL, ensure testing for t(9;22) (q34.1;q11.2) and BCR-ABL1
- Chemistry profile (LFTs, U/E + Creatinine, LDH, Uric acid)
- Disseminated intravascular coagulation (DIC) panel i.e. Prothrombin Time (PT), Activated Partial Thromboplastin Time (APTT), Fibrinogen, D-Dimer, and Platelet Count.
- Tumor lysis syndrome panel i.e. LDH, potassium, creatinine, CMP and uric acid level
- Computed tomography/magnetic resonance imaging (CT/MRI) of head with contrast, if neurologic symptoms

- Lumbar puncture
- CT of chest with contrast (for patients with T-ALL) and mediastinal mass
- Testicular exam
- Consider echocardiogram or cardiac scan, especially in patients with prior cardiac history and prior anthracycline exposure or clinical symptoms suggestive of cardiac dysfunction.
- Human Leukocyte Antigen (HLA) typing (except for patients with a major contraindication to hematopoietic cell transplant)

Treatment

Treatment follows Induction, Consolidation (Intensification), and Maintenance phases.

Treatment recommendations commonly used for Acute Lymphoblastic Leukaemia - Philadelphia chromosome-negative (Ph-) ALL in the older adult (age ≥ 40 y):

- Standard multiagent chemotherapy regimen (daunorubicin, vincristine, prednisone, pegaspargase, cyclophosphamide)
- Consider dosage reduction in patient ≥ 60 y (evaluate end-organ reserve, end-organ dysfunction, and performance status) or with substantial comorbidities

Ph+ ALL in the older adult (age ≥ 40 y):

- Chemotherapy (eg, hyper-CVAD) plus TKI; consider allogeneic stem cell transplantation if an appropriate donor is available and the patient has a good performance status and no or limited comorbidities; if transplantation is not feasible, continue multiagent chemotherapy and a TKI
- Consider TKI plus corticosteroids in patient ≥ 65 y (evaluate end-organ reserve, end-organ dysfunction, and performance status) or with substantial comorbidities

Ph- ALL (age 15-39 y):

- Paediatric-style intensive multiagent chemotherapy regimen

Ph+ ALL (age 15-39 y):

- Chemotherapy plus TKI, followed by allogeneic stem cell transplantation if an appropriate donor is available; if transplantation is not feasible, continue multiagent chemotherapy and a TKI

Frequently used treatment regimens

Standard-intensity regimens (older adults):

Hyper-CVAD/methotrexate-cytarabine includes the following:

Cycles 1, 3, 5, and 7 (3-4 wk between cycles):

- Cyclophosphamide 300 mg/m² IV over 2h every 12 h for six doses starting on day 1 plus mesna 600 mg/m²/day continuous IV infusion on days 1-3, starting 1 h before plus
- Vincristine 2 mg IV on days 4 and 11 plus doxorubicin 50 mg/m² IV on day 4 plus dexamethasone 40 mg PO on days 1-4 and 11-14

Cycles 2, 4, 6, and 8 (3-4 wk between cycles):

- Methotrexate 200 mg/m² IV over 2 h followed by 800 mg/m² IV over 22 h on day 1 plus
- Cytarabine 3 g/m² (1 g/m² for patients older than 60 y) IV over 2 h every 12 h for four doses starting on day 2 plus
- Leucovorin 15 mg every 6 h for eight doses beginning 12 h after the completion of methotrexate infusion, and increased to 50 mg IV every 6 h if methotrexate levels are >20 µmol/L at 0 h, are >1.0 µmol/L at 24 h, or are >0.1 µmol/L at 48 h after the end of methotrexate infusion, until levels are < 0.1 µmol/L plus
- Methylprednisolone 50 mg IV every 12 h on days 1-3

Maintenance chemotherapy (for up to 2 y):

- 6-mercaptopurine 50 mg PO 3 times daily plus methotrexate 20 mg/m² PO weekly plus vincristine 2 mg IV monthly plus prednisone 200 mg PO daily for 5 d monthly (with vincristine)

Supportive care during hyper-CVAD:

- Ciprofloxacin 500 mg PO BID (or levofloxacin 500 mg po daily) plus
- Fluconazole 200 mg PO daily (or alternative azole) plus
- Acyclovir 200 mg PO BID (or valacyclovir 500 po daily) plus
- Filgrastim (G-CSF) 10 µg/kg SC daily, starting on day 5 of hyper-CVAD and on day 4 of high-dose methotrexate and cytarabine

Acute Myelogenous Leukaemia



Description

The proliferation of myeloid cells in the bone marrow and blood. This has got unfavourable prognosis and increases with age. AML develops from sequential acquisition of key mutations within the hematopoietic stem cell compartment. Disease evolution is acute with rapid progression within two weeks.



Signs and Symptoms

Clinical features are primarily due to Bone marrow failure and include the following:

- Anaemia presenting as weakness, lethargy, breathlessness, lightheadedness, and palpitations.
- Immunoparesis characterized by infections of the chest, mouth, perianal, skin. Fever, malaise and night sweats are common.
- Thrombocytopenia manifesting as purpura, menorrhagia and epistaxis, bleeding gums, rectal, retina and DIC.
- Signs of leucostasis characterized by hypoxia, retinal haemorrhage, confusion, or diffuse pulmonary shadowing.
- Leukemic Infiltration presenting as gum hypertrophy, skin infiltration, bone pain, Hepatomegaly and splenomegaly.
- Coagulopathy secondary to DIC



Investigations

The presence of $\geq 20\%$ blast cells in the bone marrow or peripheral blood.

- Immunophenotyping



Treatment

Treatment is divided into induction chemotherapy and post remission therapy (< 60 years & fit for intensive therapy).

AGE < 60 years INDUCTION ELIGIBLE

Favorable-risk Cytogenetics

- Induction-Cytarabine 200 mg/m² continuous infusion x 7 days with Daunorubicin 60 mg/m² x 3 days and a single dose of Gemtuzumab Ozogamicin 3 mg/m² given on day 1, or day 2, or day 3, or day 4 (CD33-positive)
- Consolidation-Cytarabine 1.5–3 g/m² every 12 hours x 6 days

FLT3/ITD/TKD mutated with intermediate/poor-risk Cytogenetics

- Cytarabine 200 mg/m² continuous infusion x 7 days with Daunorubicin 60 mg/m² x 3 days and oral Midostaurin 50 mg every 12 hours, days 8–21 (FLT3-mutated AML)

AGE ≥ 60 years

Favorable-risk Cytogenetics

- Induction-Cytarabine 200 mg/m² continuous infusion x 7 days with Daunorubicin 60 mg/m² x 3 days and a single dose of Gemtuzumab Ozogamicin 3 mg/m² given on day 1, or day 2, or day 3, or day 4 (CD33-positive)
 - Consolidation-Cytarabine 1.5–3 g/m² every 12 hours x 6 days
- OR

FLT3/ITD/TKD mutated with intermediate/poor-risk Cytogenetics

- Cytarabine 200 mg/m² continuous infusion x 7 days with Daunorubicin 60 mg/m² x 3 days and oral Midostaurin 50 mg every 12 hours, days 8–21 (FLT3-mutated AML)
- OR

Unfavorable-risk cytogenetics

- Venetoclax once daily (100 mg day 1, 200 mg day 2, and 400 mg day 3 and beyond) PO and Azacitidine 75 mg/m² SC or IV (days 1–7 of each 28-day cycle)
- OR
- Venetoclax once daily (100 mg day 1, 200 mg day 2, and 400 mg day 3 and beyond) PO and Decitabine 20 mg/m² IV (days 1–5 of each 28-day cycle)

OR

- Low-intensity therapy (Azacitidine 75 mg/m² SC or IV (days 1–7 of each 28-day cycle or Decitabine 20 mg/m² IV (days 1–5 of each 28-day cycle)
- IDH1 or IDH2 mutation-Ivosidenib once daily (500mg) PO and Azacitidine 75 mg/m² SC or IV (days 1-7 or day 1-5, 8-9 of each 28-day cycle.

Further Management

- Blood and platelet transfusion
- Barrier nursing
- I.V. antibiotics
- Antifungals

Chronic Lymphatic Leukaemia (CLL)



Description

Chronic lymphocytic leukemia (CLL)/Small lymphocytic lymphoma (SLL) is a monoclonal lymphoproliferative disorder originating from B-cell lymphocytes and characterized by the progressive accumulation of leukemic cells or morphologically mature but dysfunctional B-cell lymphocytes in the peripheral blood (especially in CLL), bone marrow or lymphoid tissue (especially in SLL).



Signs and Symptoms

The majority of patients are often asymptomatic while 5 to 10% of patients present with the following:

- Fever of >38.0 degrees Celsius (°C) for >2 weeks with no evidence of infection
- Unintentional weight loss $\geq$ 10% of body weight over the last 6 months
- Drenching night sweats with no evidence of infection
- Recurrent infections such as pneumonia, herpes simplex labialis and herpes zoster
- Early satiety and/or abdominal discomfort
- Extreme fatigue and lethargy
- Mucocutaneous bleeding and/or petechiae
- Localized/generalized lymphadenopathy in cervical, supraclavicular, and axillary lymph nodes. The nodes are firm, non-tender, rubbery, round and freely mobile.
- Non-tender splenomegaly
- Hepatomegaly
- Pallor
- Petechiae



Investigations

- *Peripheral blood smear:*
- Lymph node biopsy.
- *Immunophenotype analysis by peripheral blood flow cytometry:* B-cell antigens (CD19, CD20, CD21, CD23, and/or CD24); and T-cell antigen (CD5).
- *Serum immunoglobulins and free-light chains*
- FISH analysis for chromosomal abnormalities (t(11;14), del(11q), del(13q), trisomy 12, and del(17p). Molecular analysis for IGHV mutations if preferred.
- *Others at initial workup:* reticulocyte count, serum indirect bilirubin, a direct Coombs test, beta-2 microglobulin, lactate dehydrogenase, uric acid and CT scan to assess bulky disease.



Treatment

The only curative treatment is allogeneic hematopoietic stem cell transplant.

Very high-risk disease

Chemoimmunotherapy is not recommended due to low response rates and early relapse associated with 17p deletion and/or TP53 mutations.

First line:

- Ibrutinib (420 mg PO once daily) until progression (all ages)
- Ibrutinib plus rituximab (375mg/m² on Day 1 of each cycle) until progression (younger patients)
- Venetoclax (400 mg PO daily for 5 weeks) plus obinutuzumab (1000mg IV on Day 1,2,8,15 of the first cycle then only on Day 1 on following 6 cycles) for one year (all ages).
- Venetoclax until progression (all ages)
- Acalabrutinib (100 mg PO every 12 hours), until progression (all ages)
- Zanubrutinib (160 mg PO twice daily or 320 mg PO once daily)

Second line:

- Acalabrutinib (100 mg PO every 12 hours)
- Ibrutinib (420 mg PO once daily)
- Venetoclax plus rituximab (400 mg PO daily for 5 weeks)

Others: Idelalisib +/- rituximab, lenalidomide +/- rituximab.

High-risk disease

Preferred choice is targeted therapy, avoid chemoimmunotherapy due to poor response outcomes. In patients ≥ 65 years and/or < 65 years, treat with:

First-line:

- Ibrutinib (420 mg PO once daily) until progression (all ages)
- Ibrutinib plus rituximab (375mg/m² on Day 1 of each cycle) until progression (younger patients)
- Venetoclax (400 mg PO daily for 5 weeks) plus obinutuzumab (all ages)
- Acalabrutinib (100 mg PO every 12 hours) +/- obinutuzumab until progression (all ages)
- Zanubrutinib (160 mg PO twice daily or 320 mg PO once daily) (all ages)

Second-line:

- Acalabrutinib (all ages)
- Ibrutinib (all ages)
- Venetoclax plus rituximab (all ages)
- Zanubrutinib (all ages)

Standard-risk disease

Administer targeted therapy or chemoimmunotherapy

- Fludarabine 25mg/m² IV over 30 minutes on days 1-3
- Cyclophosphamide 250 mg/m² IV over 10-30 minutes on days 1-3.
- Rituximab 375 mg/m² at increasing rates of 50mg/h until a rate of 400 mg/h is reached on day 1.
- Increase dosage of rituximab to 500 mg/m² from cycles 2-6, while dosing for fludarabine and cyclophosphamide remains standard.
- Bendamustine (100 mg/m² IV over 30 minutes on days 1–2 of a 28-day cycle for up to 6 cycles) plus rituximab (BR) (older patients >65 years).
- Ibrutinib single agent or in combination with rituximab or obinutuzumab (younger patients)
- Chlorambucil as a single agent or plus obinutuzumab, rituximab, or ofatumumab (older patients).
- Acalabrutinib (100 mg PO every 12 hours) (all ages).

Further Management

Provide supportive therapy before, during and after treatment:

- Give anti-infective prophylaxis in patients receiving purine analogues or bendamustine-based chemoimmunotherapy.
- Herpes virus prophylaxis with acyclovir. Give prophylaxis for hepatitis B virus (HBV) and cytomegalovirus (CMV) in high-risk patients. In patients who are HBsAg-positive with active disease (PCR+) and receiving treatment, entecavir is the preferred choice. Adefovir, telbivudine, and tenofovir are also acceptable alternatives. For all patients receiving anti-CD20 antibody therapy, hepatitis B surface antigen (HBsAg) and Hepatitis B core antibody (HBcAb) testing is recommended.
- Tumor lysis syndrome (TLS) prophylaxis; Critically assess patients for symptoms of TLS

Consider TLS prophylaxis in patients with:

- High tumor burden or bulky lymph nodes
- Elevated white cell count
- Spontaneous TLS

- Pre-existing hyperuricemia
- Renal disease or renal involvement by tumor and receiving treatment with Venetoclax, Lenalidomide and Obinutuzumab

If TLS is anticipated treat prior to chemotherapy using

- Aggressive hydration
- Allopurinol or Febuxostat beginning 2-3 days before chemotherapy and continued for 10-14 days. Alternatively, give Rasburicase at 3-6 mg.
- Blood product support with irradiated blood products

Autoimmune cytopenias (AICs)

- Autoimmune hemolytic anemia (AIHA); confirm diagnosis with reticulocyte count, haptoglobin, and direct antiglobulin test (DAT). If hemolysis is therapy induced i.e., fludarabine, withdraw treatment.
- Immune thrombocytopenic purpura (ITP); evaluate bone marrow for cause of thrombocytopenia
- Pure red cell aplasia (PRCA); evaluate bone marrow for cause and screen for viral causes i.e., parvovirus B19, herpes virus.

Treat with:

First line: Corticosteroids (prednisone 1 mg/kg/day or 3 to 4 weeks; alternative dexamethasone 40 mg/day for 4 days, 2-6 cycles, every 2-4 weeks).

Second line: Rituximab (375 mg/m² weekly * 4 weeks) or other new targeted therapy such as BTK inhibitors (ibrutinib, acalabrutinib, zanubrutinib) PI3K inhibitors (idelalisib), BCL2 inhibitors (venetoclax), if available.

Third line: Cytotoxic immunosuppressors such as azathioprine and cyclosporin.

Others:

- Eltrombopag or romiplostim for ITP, splenectomy and high-dose intravenous immunoglobulin (IVIG) 1-2 g/kg as one bolus dose or over 4 to 5 days, new generation monoclonal antibodies such as ofatumumab and obinutuzumab, if available.
- Thromboprophylaxis in high-risk patients and patients receiving lenalidomide. Administer aspirin 75mg daily if platelets > 50 x 10¹²/L.
- Annual dermatologic skin screenings for non-melanoma skin cancers. Consult a dermatologist for rare complications of monoclonal antibodies such as mucocutaneous reactions including paraneoplastic pemphigus, Stevens-Johnson syndrome, lichenoid dermatitis, vesiculobullous dermatitis, and toxic epidermal necrolysis.



Complications

- Skin lesions or otherwise known as Leukemia cutis mainly involve the face and manifest as papules, macules, plaques, ulcers, blisters, or nodules. Atypical skin lesions necessitate for a skin biopsy
- Autoimmune hemolytic anemia
- Richter syndrome or Richter transformation; transformation of CLL/SLL or indolent lymphoma into an aggressive large B-cell lymphoma.

- Increased risk of infection due to lack of functional B cells
- Bone marrow failure due to neoplastic B-cell infiltration

Chronic Myeloid Leukaemia (CML)



Description

Chronic Myeloid Leukemia (CML) is a myeloproliferative disorder characterised by mutation of the BCR-ABL1 oncogene.



Signs and Symptoms

- Anaemia, massive splenomegaly and cachexia.
- Abdominal swelling and discomfort with associated early satiety as result of massive splenomegaly.
- Hyperviscosity and constitutional symptoms



Investigations

- Full blood count (FBC)
- Peripheral blood smear (PBS)
- Bone marrow aspirate (BMA)
- Cytogenetic studies such Fluorescence in situ hybridisation (FISH) or molecular techniques such as polymerase chain reaction (PCR).



Treatment

The first line treatment for chronic phase CML is Imatinib. Imatinib is usually started at a dose of 400mg daily and titrated to treatment response and adverse effects

For patients who fail Imatinib, higher generation TKIs include:

- Dasatinib at starting dose of 50mg daily.
- Nilotinib at starting dose of 300mg twice daily, to be given 12 hours apart.
- Bosutinib at starting of dose of 400mg daily
- Ponatinib at starting dose of 45mg daily.

All the above TKIs are titrated to achieve treatment goals and to reduce the adverse effects as per drug profile.

Hydroxyurea has a role as cytoreductive therapy, especially for patients with very high white cells in order to prevent hyperviscosity syndrome as definitive treatment with TKIs is awaited.

HLA matched bone marrow transplant is a treatment option for young patients who have failed on higher generation TKIs and are either in the blast or accelerated phases.

5.13.2. Multiple Myeloma



Description

Multiple Myeloma (MM) is a malignant neoplasm of plasma cells producing a monoclonal immunoglobulin. The plasma cells accumulate in bone marrow, leading to bone destruction and marrow failure.



Signs and Symptoms

- Bone disease presenting as bone pain (usually back) or pathological fracture or loss of height due to vertebral compression fractures.
- Anaemia manifesting as weakness and fatigue
- Hypercalcemia characterized by polydipsia, polyuria, nocturia due to nephrogenic Diabetes Insipidus
- Immunoparesis manifesting as recurrent infection
- Symptomatic hyperviscosity presenting as visual impairment, Mental slowing, oronasal bleeding
- Spinal cord compression due to Extramedullary plasmacytoma or compression fracture presenting as lower limb paralysis or weakness, urine or faecal incontinence, paraesthesias
- Unexplained and unintentional weight loss
- Asymptomatic paraproteinaemia detected on routine testing



Investigations

- Serum quantitative immunoglobulins, serum protein electrophoresis (SPEP), serum immunofixation electrophoresis (SIFE)
- 24-h urine for total protein, urine protein electrophoresis (UPEP), and urine immunofixation electrophoresis (UIFE)
- Serum free light chain (FLC) assay
- Whole-body low-dose CT scan or FDG PET/CT
- X-rays for skeletal survey
- Unilateral bone marrow aspirate and biopsy for immunohistochemistry (IHC) and/or flow cytometry

- Plasma cell fluorescence in situ hybridization (FISH)
- FBC with differential count, Peripheral blood smear
- Serum BUN/creatinine, electrolytes, liver function tests, albumin, calcium, serum uric acid, serum LDH, and beta-2 microglobulin.

Diagnostic criteria

- $\geq 10\%$ plasma cells or plasmacytoma plus any one of the CRAB or Myeloma-related organ or tissue impairment i.e. Hypercalcaemia, Renal failure, Anaemia, lytic Bone lesions
- $\geq 60\%$ Plasma cells are Diagnostic of MM regardless of other findings



Treatment

Standard risk myeloma

Transplant eligible

4 cycles of VRd (Bortezomib, Lenalidomide, Dexamethasone) followed by stem cell collection, early or delayed Haematopoietic Cell Transplant (HCT)

- Bortezomib $1.3\text{mg}/\text{m}^2$ SC or IV once daily on Days 1,8,15
- Lenalidomide 25mg PO once daily on days 1 through to 14
- Dexamethasone 40mg PO once daily on Days 1,8,15
- Early Autologous HCT ---HCT is done immediately after 4 cycles of VRd followed by at least 2 years of Lenalidomide maintenance.
- Delayed HCT-- Continue VRd for 8-12 cycles then autologous HCT, followed by Lenalidomide maintenance for at least 2 years

Transplant ineligible

- 8 to 12 cycles VRd followed by Lenalidomide maintenance for stable patients

OR

- 8 to 12 cycles VTd follower by Thalidomide & Dexamethasone maintenance
- Bortezomib $1.3\text{mg}/\text{m}^2$ SC or IV once daily on Days 1,8,15
- Thalidomide 100-200 mg P O once daily on days 1 through to 28
- Dexamethasone 40mg P O once daily on Days 1,8,15

OR

VCd until progression or intolerable toxicity

- Bortezomib $1.3\text{mg}/\text{m}^2$ SC or IV once daily on Days 1,8,15,22
- Cyclophosphamide $300\text{mg}/\text{m}^2$ P O once daily on days 1,8,15, 22
- Dexamethasone 40mg P O once daily on Days 1,8,15,22

OR

Rd until progression

- Cycles 1 & 2 Daratumumab $16\text{mg}/\text{kg}$ IV days 1,8,15,22

- Cycles 3-6 Daratumumab 16mg/kg days 1,15
- Subsequent cycles 16mg/kg day 1
- All cycles Lenalidomide 25mg PO once daily on days 1 through to 21
- All cycles Dexamethasone 40mg P O once daily on Days 1,8,15,22

OR

Rd until progression for frail patients until progression or intolerable toxicity

- All cycles Lenalidomide 25mg PO once daily on days 1 through to 21
- All cycles Dexamethasone 40mg P O once daily on Days 1,8,15,22

OR

Td until progression or intolerable toxicity

- Thalidomide 100 to 200mg PO once daily on days 1 through to 28
- Dexamethasone 40mg PO once daily on Days 1,8,15,22

High risk myeloma

Transplant eligible

- 4 cycles KRd or VRd followed by stem cell collection, then early single or double autologous HCT followed by proteasome inhibitor-based maintenance
- Cycle 1 Carfilzomib 20mg/m² IV on Days 1 and 2, then 27mg/m² IV on days 8,9,15,16
- Cycles 2-12 Carfilzomib 27mg/m² IV on days 1,2,8,9,15,16
- Lenalidomide 25mg P O once daily on days 1 through to 21
- Dexamethasone 40mg P O once daily on Days 1,8,15,22

Transplant ineligible

- 8 to 12 cycles VRd followed by Bortezomib-based maintenance

Solitary Plasmacytoma

Radiation therapy (RT) is the intervention of choice for solitary plasmacytoma – 40-50 Gy in 1.8–2.0 Gy fractions [20–25 total fractions]) to involved field.

Further management

All patients receiving primary myeloma therapy should be given bisphosphonates or denosumab

- Zoledronic acid 4mg IV monthly
- Denosumab 60mg 6 monthly

All patients receiving primary myeloma therapy should be given DVT prophylaxis

- Aspirin 75mg daily

OR

- LMWH (equivalent to enoxaparin 40 mg daily)

OR

- Rivaroxaban 10 mg daily
OR
- Apixaban 2.5 mg twice daily
OR
- Dabigatran 150mg daily
- Warfarin (target INR 2.0–3.0)
- Pneumocystis jiroveci pneumonia (PJP), herpes zoster, and antifungal prophylaxis is recommended if high-dose dexamethasone is used.
- Herpes zoster prophylaxis is recommended in all patients treated with Proteasome Inhibitors and Daratumumab.
- Pneumococcal conjugate vaccine should be given followed by the pneumococcal polysaccharide vaccine one year later

5.13.3. Lymphomas

Lymphomas are malignant tumours of the lymphoreticular system and are classified into Hodgkin's disease and non- Hodgkin's lymphoma.

Hodgkin's Disease (HD)



Description

The lymphoid tissue on biopsy shows malignant lymphoid cells with Dorothy Reed Sternberg cell. It is classified as:

- Nodular Lymphocyte predominant HD
- Classic HD
- Nodular Sclerosing
- Mixed Cellularity
- Lymphocyte depleted
- Lymphocyte rich



Signs and Symptoms

- Fever
- Weight loss
- Night sweats
- Loss of appetite

- Pruritis
- Pallor
- Pain in the infiltrated tissue (Alcohol-induced)
- Enlarged lymph nodes
- Hepato-splenomegaly



Investigations

- History and physical examination
- Excision biopsy
- FBC, ESR, LDH, LFTs, U/Es
- CT neck, chest, abdomen and Pelvis
- HIV and CD4 count
- Pregnancy test
- PET CT Scan (Gold standard)
- For advanced-stage disease bone marrow aspiration and trephine



Treatment

The choice of treatment is determined by the stage of the disease.

Chemotherapy ABVD regimen:

- Doxorubicin 25mg/m² D1 & 15 IV
- Bleomycin 10 international units/m² D1 & 15 IV
- Vinblastine 6mg/m² D1 & 15 IV
- Dacarbazine 375mg/m² D1 & 15 IV Repeat every 28 days

OR

The BEACOPP regimen may be used in advanced disease or early-stage disease with poor prognostic factors

- Bleomycin 10,000 international units/m² Day 8
- Cyclophosphamide 1250mg/m² Day 1
- Doxorubicin 35mg/m² Day 1
- Etoposide 200mg/m² Day 1, 2, 3
- Prednisolone 40mg/m² Day 1-14 Oral
- Procarbazine 100mg/m² Day 1-7 Oral
- Vincristine 1.4mg/m² (max 2mg) Day 8
- G-CSF 1 dose day 9-13

Non-Hodgkin's Lymphoma (High Grade B Cell Lymphomas)



Description

This is a heterogeneous group of lymphoreticular malignancies. These lymphomas may be associated with HIV/AIDS. It can be classified as:

- Low-grade Aggressive
- Highly Aggressive



Signs and Symptoms

See under Hodgkin's disease.



Investigations

- History and physical examination with attention to node bearing areas including waldeyers ring and size of liver and spleen
- Excision biopsy
- FBC, ESR, LDH, LFTs, U/Es, Uric acid
- B-2 macroglobulin
- HIV and CD4 count
- Pregnancy test
- Hepatitis B
- CT neck, chest, abdomen and Pelvis
- Echo Cardiogram
- PET CT Scan (Gold standard)
- For advanced-stage disease bone marrow aspiration and trephine
- HIV and CD4 count
- Conduct immunohistochemistry panel CD20, CD3, CD5, CD10, CD21, CD45, BCL2, BCL6, Ki-67
- Flow cytometry with peripheral blood and/or biopsy specimen kappa/lambda, CD45, CD3, CD5, CD19, CD10, CD20
- Karyotype or FISH for MYC
- Consider chromosomal microarray for 11q aberrations
- Lumbar puncture for the highly aggressive or if at risk for CNS involvement.



Treatment

- Stage I & II - 3 cycles R-CHOP Chemotherapy PLUS consolidation radiotherapy to 30 - 36Gy
- Stage III & IV – R-CHOP chemotherapy 6 -8 cycles and radiotherapy to local residual disease/bulky disease

Regimens

R-CHOP

- Rituximab 275mg/m² D1 IV
- Cyclophosphamide 750mg/m² D1 IV
- Doxorubicin 50mg/ m² D1 IV
- Vincristine 1.4mg/ m² D1 IV (maximum of 2mg)
- Prednisolone 100mg PO D1 - 5
- Repeat every 21 days

R-CVP

- Rituximab 375mg/m² D1 IV
- Cyclophosphamide 400 - 600mg/ m² D1 IV
- Vincristine 1.4mg/ m² D1 IV (maximum of 2mg)
- Prednisolone 100mg PO D1 - 5 Repeat every 21 days

Highly Aggressive NHL

Burkitt's Lymphoma



Description

This is a highly aggressive NHL, which presents mainly in children, with a jaw swelling, abdominal mass, ovarian mass and CNS involvement.



Investigations

- As in Non-Hodkins Lymphoma as stated above.
- In addition, CSF examination is done at the first intrathecal treatment.



Treatment

This is associated with tumour lysis syndrome, so IV pre-hydration and allopurinol must be given before starting chemotherapy

Regimen

- Patients with localised disease receive 3 cycles of CODOX - M.
- Patients with multiple site involvements are treated with CODOX-M alternating with IVAC and intrathecal therapy for 4 cycles each.
- CODOX-M + Rituximab and CODOX-M alternating with IVAC
- CODOX-M + Rituximab
- Cyclophosphamide 800mg/m² D1 and 200mg/m² D2-5 IV
- Vincristine 1.5mg/m² D1 IV (max 2mg)
- Doxorubicin 40mg/m² D1 & 8 IV
- Methotrexate 1.2g/m² continuous IV infusion on D10, then 240mg/m² IV each hour over 23hrs
- Folinic Acid 192mg/m² IV D11 starting from the 12th hour of Methotrexate infusion, then 12mg/m² IV every 6hrs for next 48hrs
- G-CSF (Filgrastim) support starting on day 13 until granulocyte count is above 1 x10⁹/L

CNS prophylaxis

- Cytarabine 30mg/m² IT D1 & 3
- Methotrexate 12mg/m² IT D15 (Not more than 20mg total dose)
- Hydrocortisone 20mg/m² D1, 3 and 15
- Folinic Acid

IVAC

- Ifosfamide 1.5g/ m² IV D1 - 5
- Etoposide 60mg/ m² IV D1 - 5
- Cytarabine 2g/ m² IV every 12hrs for D1 and 2
- Filgrastim start on D7 till absolute granulocyte count is over 1x 10⁹/ L.

CNS prophylaxis

Methotrexate 12mg/ m² IT D5

Folinic Acid 15mg orally stat on D6.

5.13.4. Carcinoma of the Breast**Description**

This is a malignancy of the breast and there are various types.

**Signs and Symptoms**

- Lump in the breast
- Nipple discharge

- Change in breast size
- Nipple inversion
- Skin changes - orange-like appearance ('peau d' orange')
- Axillary, Infraclavicular and supraclavicular lymphadenopathy



Investigations

- History and physical examination
- Pathology review
- Bilateral breast u/s/Mammography
- Core biopsy or excision biopsy
- Do oestrogen and progesterone receptor status, Her2 neu status and KI67 index
- CXR
- FBC and ESR, LFTs, U/Es, LDH
- For patients with raised ALP, LDH S/S of bone or liver involvement do ultrasound of abdomen and bone scan.
- CT Scan Chest if suspected pulmonary symptoms and CT scan abdomen if elevated ALP, LFTs or abdominal symptoms.
- HIV Test
- Pregnancy Test
- Echocardiogram – if patient receiving Adriamycin or Trastuzumab



Treatment

This depends on the stage of the disease.

Early Breast cancer

- Breast-Conserving Treatment: wide local excision with axillary dissection, then Adjuvant Radiation therapy and/or chemotherapy

OR

- Modified Radical Mastectomy with an axillary dissection. Adjuvant Chemotherapy and radiotherapy will depend on the histopathological findings (stage).

Locally Advanced Breast Cancer – must be treated with all modalities (Surgery, Chemotherapy and Radiation therapy)

Metastatic Breast Cancer – Hormone therapy if receptor positive. Single agent chemotherapy if in organ crisis or receptor negative

Regimens

Chemotherapy

- AC – Doxorubicin 60mg/m² IV D1 and Cyclophosphamide 600mg/m² IV D1 repeat every 21 days for 4 cycles followed by T-Paclitaxel 75mg/m² every 21 days for 4 cycles.

OR

- CarboTax-Carboplatin AUC 5 and Paclitaxel 75mg/m² repeat every 21 days for 6 cycles for TNBC.

OR

- CAF – Oral cyclophosphamide 100mg/m² D1 – 14, Doxorubicin 30mg/m² IV D1 and D8, and 5 Fluorouracil 500mg/m² IV D1 and D8. Repeat every 28 days for 6 cycles

OR

- FAC – 5 Fluorouracil 500mg/m² IV D1 & 8, Doxorubicin 50mg/m² IV D1, and cyclophosphamide 500mg/m² IV D1. Repeat every 21 days for 6 cycles

OR

- CMF - Cyclophosphamide 100mg/m² PO D1 – 14, Methotrexate 40mg/m² IV D1 & 8, and 5 Fluorouracil 600mg/m² IV D1 & 8 every 28 days for 6 cycles

OR

- TAC – Docetaxel 75mg/m² D1 IV, Doxorubicin 50mg/m² IV D1, and Cyclophosphamide 500 mg/m² 01 IV every 21 days for 6 cycles.

Radiotherapy

- Usual dose in the curative setting is 2Gy per fraction to 50Gy with a boost of 2Gy per fraction to 12 - 16Gy.
- Radiotherapy can also be used in the treatment of painful local bone metastasis, spinal cord compression, brain metastasis and for local disease on the chest wall etc.

Hormone Therapy

- Premenopausal -Tamoxifen 20mg PO daily for 5-10years
- Postmenopausal-Anastrozole 1mg PO daily.
- Targeted Therapy-Transtuzumab 8mg/kg IV Cycle 1 then 6mg/kg IV repeat every 21 days for 1 year

5.13.5. Cervical Cancer



Description

This is a cancer of the cervix. Approximately 80% are SCC. Nearly 20% are adenocarcinomas and less than 5% other histologies (Neuroendocrine, melanoma, lymphoma).



Signs and Symptoms

- Irregular PV bleeding
- Per vaginal discharge
- Lower abdominal pain
- Backache
- Dyspareunia
- Nodule, ulcer, or fungating growth



Investigations

- History and physical examination
- Cervical biopsy pathology review
- FBC, U/Es, LFTs HIV and CD4 count and viral load
- Consider EUA
- Cystoscopy and proctoscopy as indicated
- CECT of the chest/abdomen/pelvis to evaluate for metastatic disease and nodal staging for stage IB3 and above or neck/chest/abdomen/pelvis FDG-PETCT scan if available
- Consider MRI pelvis with contrast



Treatment

This depends on the stage of the cancer

- Surgery for stage IB2 or less.
- Note: Surgery should not be done in cases with stage IB3 and above.
- Chemoradiation for stages IB3 – IVA. There is no role of chemotherapy alone in local disease
 - o 2Gy per fraction to 46 - 50Gy of External beam radiation therapy (EBRT) with Brachytherapy to a total of 75 - 85GY to point A.
 - o Chemotherapy is given concurrently with the radiation using Cisplatin 40mg/m² IV weekly or 80mg/m² 3 weekly or Carboplatin AUC2 weekly in patients with renal impairment.

Recurrent or metastatic disease (IVB)

First line combination systemic therapy

- Cisplatin/paclitaxel
- Carboplatin/paclitaxel

NB: Cisplatin/etoposide or Carboplatin/etoposide for small cell NECC

Single agent therapy

- Cisplatinum, Carboplatinum or paclitaxel
- Radiotherapy to the pelvis 10Gy S/S (once or repeated after a month) for local palliation.
- Pembrolizumab or Bevacizumab may be administered as single agent or in combination with chemotherapy for recurrent or metastatic disease



Complications

- Anaemia
- Sciatic pain
- Backache
- Incontinence of urine or faeces
- Sepsis
- Uraemia

5.13.6. Ovarian Cancer



Description

These are malignancies of the ovaries. They are classified as:

- Epithelial Ovarian Cancer 65%
- Germ Cell Ovarian Cancers 25%
- Stromal Tumours 5%



Signs and Symptoms

- Pelvic mass
- Lower abdominal pain
- Abdominal distension
- Ascites



Investigations

- History and physical examination
- Ultrasound of abdomen and pelvis

- CXR
- CT scan Chest, abdomen and pelvis
- FBC, U/Es, LFTS
- CA 125
- AFP and β HCG if <30 yrs old to help rule out germ cell tumor
- Definitive diagnosis confirmed by Histology



Treatment

- Primary treatment is surgery (maximal de-bulking)
- Adjuvant Treatments
 - o Early Stage low risk - stage IA and 1B grade 1 &2, (less than 10% recurrent risk) No further treatment after maximal surgery
 - o Early-Stage High Risk - Stage IA and 1 B with grade 3 or clear cell histology, stage IC and Stage II disease (20-35% recurrence risk); these require:
 - Carboplatin AUC 5 - 7 IV and Paclitaxel 175mg/m² IV 21-day cycles for 3 - 6 cycles,
 - OR
 - Cisplatin 75mg/m² IV and Paclitaxel 735mg/m² IV infusion over 24 hours (Neurotoxic)
 - o *Advanced Disease stage:*
 - As for early-stage but for 6 - 8 cycles. Interval de-bulking as indicated.
- If patient refuses chemotherapy: whole abdominal radiotherapy (WART) 30 Gy at 1.5 Gy/# + pelvis and PA LN boost to 45 Gy. Block kidneys at 15 Gy and liver at 25 Gy.

NB: Renal, bowel and hepatic toxicity limits use of WART vs chemotherapy in present scenario. Radiotherapy generally only for local recurrence or palliation

Recurrent Ovarian Cancer

Systemic therapy

- *Platinum sensitive disease:* Carboplatin, paclitaxel as above, +/-Bevacizumab 7.5mg/kg Day 1 plus maintenance bevacizumab for up to 12 cycles
- *Platinum resistant /refractory disease:* Single agent chemotherapy- Liposomal doxorubicin, topotecan, gemcitabine, or oral Etoposide
- Olaparib as indicated and if available

5.13.7. Endometrial Cancer



Description

These are cancers that arise from the Uterus. They are classified as:

- Epithelial – Adenocarcinoma, adenosquamous, papillary serous

- Stromal tumours – Sarcomas of the uterus

Prognosis and adjuvant treatment are dependent on the grade, histology and stage of cancer.



Signs and Symptoms

- Postmenopausal bleeding
- Bleeding between periods
- Pelvic pain



Investigations

- History and physical examination
- Endometrial biopsy and expert pathology review
- FBC, U/Es, LFTs
- Consider CA-125
- CXR
- Abdominal and pelvic ultrasound
- CT abdomen/pelvis/chest
- MRI pelvis if suspected extrauterine involvement or not going to surgery
- Consider HER immunohistochemistry
- Estrogen and progesterone receptor testing
- Molecular analysis including POLE mutations, microsatellite



Treatment

Primary treatment is surgery

- TAH and BSO peritoneal inspection, fluid cytology, plus or minus pelvic lymphadenectomy (usually for grade 2/3).
- Radical hysterectomy if cervical involvement.

For patients who refuse surgery or are medically inoperable:

- Curative radiotherapy is indicated.
- Adjuvant treatments depend on stage, grade, and histology
- Radiotherapy with either vaginal brachytherapy alone or in combination with external beam radiation therapy at 2Gy to 50Gy.

Systemic therapy includes:

- Hormonal Therapies with Medroxyprogesterone acetate 400 – 800mg PO twice weekly, Tamoxifen 20mg daily
- Chemotherapy Carboplatin and Paclitaxel as for Ovarian cancer. Add trastuzumab for HER 2 positive cancers
- Pembrolizumab after prior platinum therapy for MSI-H/dMMR

5.13.8. Prostate Cancer



Description

This is a malignancy of the prostate gland. The patient is usually elderly, but the condition may occur in young men. Common histological type is adenocarcinoma



Signs and Symptoms

- Prostatism - hesitancy, poor stream, frequency in passing urine, dribbling of urine, and urinary retention
- Bone pain due to metastases



Investigations

- History and physical examination including a DRE
- PSA any value above 4mg/mL requires core biopsy
- Core biopsy i.e. 6 cores from each side and well labelled. The pathologist must give a Gleason Score. # cores involved and % cores involved
- FBC, U/Es and creatinine, CMP, LOH, LFTs, and ESR
- CXR
- Trans-rectal ultrasound morphology
- Bone Scan for unfavourable intermediate risk and high risk or if symptoms
- Outflow obstruction tests; bladder ultrasound, urine flow rates, Intra Venous Urogram (IVU)
- CECT of the chest/abdomen/pelvis to evaluate metastatic disease
- MRI of the pelvis to evaluate extent of local disease



Treatment

Depends on prognostic grouping, i.e.

Low risk:

The four options of treatment in this group are:

- Curative Radiotherapy

- Brachytherapy
- Radical Prostatectomy
- Active Surveillance. No adjuvant Androgen deprivation (ADT).

Favorable Intermediate risk:

- As in low risk

Unfavourable and high-risk/Intermediate risk

- Treat like high-risk but w/reduced duration of Androgen Deprivation Therapy (ADT)
- EBRT (prostate and prox. SVs) hypofx or conv. Fx to >74GY EQD2
- 4-6 mos ADT prior to radiotherapy
- 2-3 years ADT
- Transurethral resection of the prostate (TURP)
- If patient has significant urinary symptoms prior to RT okay to undergo w/ 6-8 weeks healing time before RT
- Can start ADT prior to TURP

Metastatic disease, options include:

- Surgical castration (Bilateral Subcapsular Orchidectomy) and some patients may require transurethral resection of the prostate
- Medical castration with LHRH agonists Goserelin or leuprolide plus an antiandrogen is given two weeks before Goserelin is commenced.
 - Chemotherapy with Docetaxel 75mg/ m2 IV repeat 21 days for 6 cycles with prednisolone.
 - As per STAMPEDE TRIAL: ADT +docetaxel > ADT alone. Abiraterone + ADT > ADT alone. Abi + ADT > doce + ADT in terms of bPFS but other endpoints were not SS
 - Abiraterone: 1000 mg orally once daily in combination with prednisone 5 mg orally 2 times daily)
- Enzalutamide may be used in place of abiraterone or after failure with abiraterone
- Cabazitaxel, Olaparib and pembrolizumab as indicated
- Bone antiresorptive therapy with denosumab or zoledronic acid should be added for those with bone metastasis
- Radiotherapy to treat painful bony metastasis including spinal cord compression.

5.14.9. Testicular Tumours



Description

These are malignant growths that arise from the testis. It is a common malignancy in males aged between 15-34 years. They are classified:

- Seminoma GCT (60%): B-HcG can be slightly elevated in 15% of cases (~100 IU/L) but never AFP

- (Non-Seminomatous Gem Cell Tumors) NSGTs (30-35%): B-HCG (>10,000) and AFP (>10,000)
- Others: Non-GCTs = lymphoma or sex-cord stromal tumors
- Mixed GCT and NSGT



Signs and Symptoms

Testicular mass, that is either painful or painless.



Investigations

- History and physical examination
- Testicular ultrasound
- HCG, alpha fetoprotein, LOH
- FBC, U/E's, LFT's,
- CXR
- CT of abdomen and pelvis



Treatment

All treatments start with radical transinguinal orchiectomy w/ high ligation of spermatic cord (both seminoma and non-seminoma: never biopsy) then repeat tumor markers. Further treatment depends on the stage and histological type.

Seminomas

Seminomas IA-IB (N0 and S0)

- Active Surveillance (preferred in expert hands)
- Single agent, single dose carboplatin AUC 5-7(see formula) or 400mg/m²
- EBRT (para-aortic nodes only); 20Gy/10fx

IIA (N1 up to S1)

- EBRT para-aortic nodes and ipsilateral iliac (dogleg): 20Gy/10fx + boost GTV to 30 Gy

OR

- BEP chemo x 2-3 cycles, or EP x4 cycles

IIB (N2, up to S1)

- Chemo preferred, BEP x 2-3 cycles or EP x4 cycles

OR

- EBRT to para-aortic and ipsi iliac (dogleg): 20Gy/10fx + boost GTV to 36 Gy if LN is less than 3cm

Stage IIC or III (any N3, M1, or S2-3 disease)

- BEP x3 or EP x4 cycles

BEP regimen for stage II-III

- Bleomycin 30 units IV D1, 8 & 15
- Etoposide 100 mg/m² D1 -5 IV,
- Cisplatin 20mg/m² D1 - 5 IV every 21 days.

Non-seminoma (no role for RT except for palliation)

IA-IB

- Surveillance
- RPLND
- BEP x1

Stage IIA

- If markers negative, RPLND or BEP x3 or EP x4
- If markers positive BEP x3 or EP x4

Stage IIB -III

- BEP x3 or EP x4

5.13.10. Vulval Cancer



Description

These are cancers that arise from the vulva and are mostly Squamous Cell Carcinomas



Signs and Symptoms

- Pruritus
- Watery discharge
- Bleeding
- Mass
- Pain
- Ulceration.



Investigations

- History and physical examination (vaginal, rectal, pelvic and inguinal LN exam)
- Biopsy including pap smear and colposcopy and proctoscopy for bladder and rectal involvement

- CXR
- EUA
- FNA of suspicious LN
- FBC, U/ Es and LFTs
- HIV and CD4 count and viral load



Treatment

All patients must be seen and assessed at the combined Gynaecology and Oncology meeting to plan treatment

Primary treatment

- Surgery with 1cm margin of resection of the vulval lesion and inguinal lymphadenectomy (for DOI >1 mm or G3 or LVSI: all stage IB+ pts).
- Definitive chemoradiation for inoperable patients, refused or medically inoperable patients. Radiotherapy 1.8Gy per fraction to 66-70Gy concurrent with chemotherapy

Adjuvant treatment

- Indications for Post-op RT to the primary: Positive Margin (<1 cm clinical margin; <0.8 cm fixed margin). LVSI, DOI >5 mm – 10 mm (continuous). Size >4 cm, Infiltrative pattern
- Indications for RT to the Nodes: cLN+, 0–1 pLN+, ECE
- Indications to add chemo (chemoradiotherapy): T2–3, N+ 1.8Gy per fraction to a total of 60-65Gy
- Preoperative chemoradiation is indicated for patients with central disease within 1cm of vital structures, fixed bulky positive or ulcerating nodes or inoperable primaries to downsize them for operability. Radiotherapy 46-50Gy split course with surgical assessment after

Regimens

- Cisplatin chemotherapy in combination with Radiation therapy

5.13.11. Penile Cancer



Description

This is cancer that arises from the penis. Most of these are squamous cell carcinomas.



Signs and Symptoms

- Penile nodule
- Mass
- Ulcer which is non-healing.



Investigations

- History and physical examination
- Biopsy of ulcer or mass
- CXR
- FBC, U/Es
- HIV and CD4 count, viral load
- CT abdomen/pelvis



Treatment

- Surgery: in the form of circumcision, excision, partial or total penectomy (need 1–2 cm margin).
NB: Need 5 cm for sexual intercourse and 3 cm to urinate standing
- Followed with bilateral inguinal node dissection if T1B and above.
- Pelvic dissection if ≥ 2 inguinal nodes.
- Radiotherapy: curative radiotherapy may be used in young patients who still want to preserve penile function.
- Circumcision with brachy (<4 cm)
 - o 65 Gy HDR interstitial (preferred)
 - o 60 Gy mold
- Chemotherapy is given concurrent with radiotherapy (50Gy WPRT +10–20 Gy boost) using Cisplatin 25mg/m² D1 - 4 IV and D28 - 32 and 5-Fluorouracil 400 mg/m² D1 - 4 and D28 - 32 IV.

5.13.12. Non-Melanoma Skin Cancer

Squamous Cell Carcinoma of the Skin



Description

This is a cancer of the squamous cells of the skin.



Signs and Symptoms

- Plaque or nodule on the skin
- Non-healing ulcer



Investigations

- History and physical examination including:
 - Complete skin examination
 - Regional lymph node examination
- Biopsy (if more than superficial lesion, inclusion of deep reticular lesion preferred)
- Imaging studies as indicated for suspicion of locally extensive or metastatic disease
- FNA of palpable lymph nodes or positive lymph nodes on imaging studies.



Treatment

Depends on extent of disease

- Field cauterisation
- Topical 5 - Fluorouracil
- Surgery: Excision with adequate margins and post op margin assessment and regional lymph node dissection if positive lymph nodes.
- Radiotherapy with or without concurrent cisplatin.

For recurrent or metastatic disease

- Pembrolizumab preferred
- OR
- Carboplatin and paclitaxel

Basal Cell Carcinoma



Description

This is cancer derived from the epidermal basal cell layer. It is more common in elderly people and Caucasians.



Signs and Symptoms

- Nodule
- Skin thickening
- Ulcer with rolled-up margins



Investigations

- History and physical examination
- Biopsy



Treatment

- Early removal by curettage
- Cryotherapy
- Cauterization
- 5% Fluorouracil cream
- Excision with adequate margins
- Radiotherapy

For patients in whom surgery would result in poor cosmesis and function, radiotherapy is the treatment of choice.

5.13.13. Melanoma



Description

This is a neoplasm arising from melanocytes. It is the commonest of fatal skin cancer. Some melanomas arise in pre-existing moles.



Signs and Symptoms

- Rapid enlargement of a pigmented lesion
- Bleeding
- Increasing variegated pigmentation
- Ulceration
- Persistent itching
- Small satellite lesions around the principal lesion
- Local regional lymph node involvement

- ABCDE are suspicious symptoms of lesions that are progressing to melanomas
 - o Asymmetry
 - o Borders are irregular
 - o Colour variegation
 - o Diameter greater than 6mm
 - o Evolving lesion



Investigations

- History and physical examination with attention to locoregional area, draining lymph nodes and complete skin examination
- Excisional biopsy or full-thickness wedge/ punch biopsy
- Imaging to evaluate specific signs or symptoms or in patients with microscopic satellites on biopsy or wide local excision histology
- FBC, U/Es, LFTs, LDH



Treatment

- Prompt excision with wide margins with local regional lymph node dissection
- Metastatic or unresectable disease
- Radiotherapy for palliation
- Immunotherapy- Combination checkpoint blockade preferred (nivolumab and ipilimumab) or pembrolizumab or nivolumab
- Chemotherapy with single agent Dacarbazine either 200mg/m² D1 -5 or 750 - 800mg/m² IV D1 every 3 weeks

5.13.14. Kaposi's Sarcoma

This is cancer arising from capillary endothelial cells associated with HHV8. The common type is Endemic KS, however, in Zambia we commonly see Epidemic type which is associated with HIV infection.



Signs and Symptoms

- Purple (dark) papules, nodules, patches and plaques on the skin and mucosa
- Lymphadenopathy
- Woody oedema of the legs
- Visceral involvement



Investigations

- History and physical examination including complete skin, oral and lymphnode examinations and documentation of oedema and evaluation of for suspected opportunistic infections
- Biopsy of Lesion (skin, mucosal or lymph nodes)
- HIV and CD4 and viral load
- FBC, U/Es, LFTs
- Stool haemocult in the setting of advanced disease
- CXR
- Chest CT with contrast and bronchoscopy if unexplained pulmonary symptoms or findings on CXR
- Abdomen pelvis CT with contrast if and endoscopy if symptomatic or positive haemocult
- Pregnancy testing if childbearing
- Echocardiogram if anthracycline planned



Treatment

Depends on extent of disease: limited vs extensive

Limited disease

- If asymptomatic observe and start ART for people living with HIV
- If symptomatic, give Radiotherapy, Intralesional Chemotherapy or Systemic Chemotherapy

Advanced Disease

Note: Initiation of ART may result in IRIS within 3-6 months. However, ART should not be delayed or discontinued unless life threatening IRIS develops. Reconstitution of immune function is important for obtaining and maintaining control or remission of Kaposi's Sarcoma

- Systemic Chemotherapy
- Radiation therapy for localized disease

Chemotherapy regimens

First Line

- Liposomal Doxorubicin 20mg/m² IV every 14 days
- OR**
- Paclitaxel 100mg/m² every 14 days OR 135mg/m² every 21 days to the best response.

Other regimens

- ABV: Adriamycin (Doxorubicin 20mg/m² IV Day 1, Bleomycin 15 IU IV Day 1, Vincristine 1.4mg (2mg max) 3 weekly
- Repeat cycle every 14 - 21 days tapered to the best response (response is therefore individualized).

Note: Do not exceed 450mg/ m² Doxorubicin (Adriamycin) total/absolute dose. Use BV only after 6 cycles of ABV.

5.13.15. Oesophageal Carcinoma



Description

This is a malignancy that arises from the oesophagus. The majority are Squamous cell carcinomas. Adenocarcinomas arise commonly from the lower third (gastro-oesophageal junction).



Signs and Symptoms

- Progressive dysphagia
- Pain
- Odynophagia (painful swallowing)
- Weight loss
- Regurgitation
- Vomiting



Investigations

- History and physical examination
- Barium swallow as needed
- Oesophagoscopy and biopsy
- CXR
- FBC, U/Es, LFTs
- For lesions less than 5cm, do CT scan, chest and Abdominal ultrasound
- Endoscopic ultrasound
- Pulmonary Function tests if planning surgery
- Nutrition evaluation
- Bronchoscopy if tumor is above carina (at ~25 cm) and M0 to rule out a tracheoesophageal fistula



Treatment

For lesions less than 5cm

- Definitive surgery – Oesophagectomy vs Endoscopic mucosal resection (EMR) for primarily operable tumours (Tis-T1bN0)

- Preoperative chemo-radiation followed by surgery (non-Cervical) by week 6 for those requiring downsizing (T2-T4a or N+) for those requiring downsizing

For lesions 6 – 10cm, cervical tumour, if decline surgery or not candidate for surgery

- Curative chemo-radiation 50-50.4 Gy at 1.8-2Gy per fraction
- Chemotherapy
 - o Cisplatin 40mg/m² IV weekly concurrent with radiotherapy.

OR

- o 5-Fluorouracil 400mg/m² IV D1-4 with Cisplatin 75mg/ m² IV D1 repeated every 21 days concurrent with radiation therapy.

Lesions more than 10cm and all patients who have lost more than 10% of their body weight will require.

- Palliative treatments
- Surgery i.e. dilatation, stenting, bypass
- Radiation therapy with external beam alone, brachytherapy alone or a combination of these

NB: For dysphagia palliation, radiotherapy is preferred over stent or chemoradiotherapy

5.13.16. Colorectal Carcinoma



Description

Cancer of the large bowel.



Signs and Symptoms

- Rectal bleeding
- Mucoïd rectal discharge
- Alternating constipation with diarrhea
- Intestinal obstruction
- Anaemia
- Weight loss



Investigations

- History and physical examination including a digital rectal examination which should document: distance from verge, circumference, total length, sphincter function

- Double-contrast barium enema
- Proctosigmoidoscopy and colonoscopy with BIOPSY
- Pathology review
- FBC, u/Es, LFTs, CEA, PSA for males
- Ultrasound of abdomen and pelvis Transrectal ultrasound
- CT Scan Chest, abdomen and pelvis, +/- MRI
- Consider PETCT if potentially resectable metastatic disease
- Additional molecular testing as indicated-
- RAF and BRAF mutations
- HER 2 amplifications
- MMR or MSI status



Treatment

The mainstay of treatment is surgery (colectomy with en-bloc removal of regional lymphnodes (a minimum of 12 lymphnodes are required to determine N stage)).

Adjuvant treatment for colon cancer

- Stage I and II: no further treatment after surgery but require follow up with a yearly colonoscopy
- Stage III and IV will require adjuvant chemotherapy

Additional treatment for rectal carcinoma

- Preoperative short-course radiotherapy: 5Gy daily for 5 days followed by surgery one week later.
- Preoperative long course chemo-radiation
- Post-operative chemo-radiation

Chemotherapy regimen:

Chemotherapy with concurrent chemoradiation

- FL: 5-Fluorouracil 400mg/m² IV; Leucovorin 20mg/m² IV 30 minutes before 5-FU for 4 days week 1 and week 5 of radiotherapy

Adjuvant or neoadjuvant chemotherapy (FOLFOX-4)

- Oxaliplatin 85mg/m² D1 only IV given as a 2-hour infusion
- Leucovorin: 200 mg/m²/day given as a 2-hour infusion repeated for 2 consecutive days
- 5-Fluorouracil: bolus 400 mg/m² and a 22-hour continuous infusion of 600 mg/m², repeated for 2 consecutive days

mFOLFOX-6

- Oxaliplatin 85mg/m² D1 only IV given as a 2-hour infusion
- Leucovorin, 400 mg/m², given as a 2-hour intravenous infusion on day 1

- Bolus 5-Fluorouracil, 400 mg/m², on day 1 followed by a continuous infusion 5-Fluorouracil of 2,400 mg/m² for 46-48hrs

CAPOX

- Oxaliplatin 130 mg/m² IV in 250 to 500 mL of D5W over 2 hours
- Capecitabine 1000mg/m² PO twice daily for 14 days.

FOLFIRI

- Irinotecan 180 mg/m² IV in 500 mL of D5W over 1 hour 30 min
- Leucovorin 400 mg/m² IV in 250 ml D5W over 1 hour 30 min
- Fluorouracil 400 mg/m² IV push, after leucovorin, THEN
- Fluorouracil 2400 mg/m² IV over 46 h in D5W to a total volume of 230 mL by continuous infusion at 5 mL/h

Additional depending on indication- Cetuximab, panitumumab, bevacizumab, trastuzumab

5.13.17. Gastric Cancer



Description

This is a cancer of the stomach. Most of the gastric cancers are adenocarcinomas.



Signs and Symptoms

- Dysphagia, Post-prandial fullness, Heartburn, Indigestion, Loss of appetite, Weight loss
- Abdominal discomfort and fullness, Hematemesis and melaena, Anaemia



Investigations

- History and physical examination
- Endoscopy with biopsy
- FBC, U&Es, LFTs, CEA
- Barium meal
- CXR
- CT scan of the abdomen
- Endoscopic ultrasound

- Nutritional assessment
- Other tests as indicated- HER 2, MSI, MMR. PDL-1



Treatment

- Surgery - Is the primary treatment. Subtotal or total gastrectomy with adequate lymphadenectomy and negative margins.
- Radiotherapy
- Adjuvant Chemoradiation for stage 1B and above
- Definitive chemoradiotherapy for medically unfit or unresectable patients
- Palliative radiotherapy
- Tis-1aN0: endoscopic resection or gastrectomy alone
- T1b: surgery alone
- T2+ or N+

Chemotherapy

- Perioperative chemotherapy + surgery (5-FU and cisplatin x 4 cycles →surgery →5-FU and cisplatin x 4 cycles OR FLOT regimen 4 cycles preoperative and 4 cycles post-operative).
- Preoperative CRT (infusional 5-Fluorouracil concurrent with RT or Capecitabine) + surgery

FLOT regimen

- 5-Fluorouracil 2600mg/m² iv continuous infusion over 24hrs on day 1
- Leucovorin 200 mg/m² iv on day 1
- Oxaliplatin 85mg/m² iv on day 1
- Docetaxel 50mg/m² iv day 1
- Cycled every 14 days
- Targeted therapy depending on indication- Trastuzumab, Pembrolizumab)

5.13.18. Pancreatic Cancer



Description

This is a cancer of the pancreas. It is an adenocarcinoma.



Signs and Symptoms

- Upper abdominal pain,
- Vomiting

- Obstructive jaundice
- Pruritis
- Weight loss
- Symptoms of Diabetes Mellitus
- Migratory thrombophlebitis
- Upper abdominal mass
- Palpable gall bladder



Investigations

- History and physical examination
- Endoscopic ultrasound and/ERCP/ biopsy
- FBC, LFTs, U & Es, CEA, CA 19-9 blood glucose
- CT scan (pancreatic protocol): IV and oral contrast. Arterial and venous phase. 2–3 mm cut at level of the pancreas, MRI.



Treatment

- Surgery: Definitive - Mainstay of treatment (Whipple's procedure):
- Resection → chemo (gem x 5c or 5-FU/leuc or gem/cap) for resectable cases.
- Neoadjuvant chemotherapy (5-FU + Leucovorin + Irinotecan + Oxaliplatin (FOLFIRINOX) or Gemzar based- Gemcitabine + albumin bound paclitaxel) or Gemcitabine + Cisplatin +/- radiotherapy then surgery for borderline cases
- Palliative surgery for advanced cases - Endoscopic or Percutaneous biliary stent, Open biliary enteric bypass.
- Radiotherapy- Post-operative 5-FU-based chemoradiation (45-54Gy at 7.8-2Gy/day) followed by systemic Gemcitabine
- Localised unresectable disease and good performance status - Concurrent 5FU bolus with leucovorin or continuous infusion 5FU or gemcitabine alone. 5FU - based chemoradiation (50-60Gy at 1.8-2Gy /day)
- Localised unresectable disease and good performance status - Concurrent 5FU based chemoradiation (50-60Gy at 1.8-2Gy /day)
- Palliation of pain and metastases.

Chemotherapy for adjuvant therapy or metastatic disease

- FOLFIRINOX
- Gemcitabine + albumin-bound paclitaxel
- Gemcitabine alone if poor PS.

5.13.19. Anal Cancer



Description

This is a cancer of the anal canal. Anal cancer can be classified as:

- Squamous
- Cloacogenic (transitional)
- Adenocarcinoma
- Others – Paget's disease, basal cell, melanoma, lymphoma



Signs and Symptoms

- Bleeding
- Anal pain
- Pruritis
- Palpable mass
- Change in bowel habit
- Chronic anal condition
- Haemorrhoids
- Fistula
- fissure



Investigations

- History and physical examination including DRE, inguinal LN evaluation gynaecologic exam including cervical cancer screening in women
- EUA, Anoscopy, Proctoscopy, Biopsy of the primary tumour
- FNA/biopsy of clinically suspicious inguinal nodes
- CXR
- Chest, Abdominal pelvic CT scan + MRI pelvis
- FBC, U&Es, LFTs, HIV, CD4 and viral load



Treatment

Surgery

- Wide local excision – Only in tumours <2cm which is well differentiated, and preservation of anal function assured

- Abdominal perineal resection – is reserved only for salvage of patients who have failed chemoradiotherapy

Combined modality therapy

- Chemoradiation is the standard primary treatment option with doses of 45-60Gy
- 5-Fluorouracil 400mg/m² Day1-4 and Day 22-25 of radiotherapy
- Mitomycin-C 10mg/m² Day 1 only.
- Mitomycin may be substituted by Cisplatin especially in HIV positive patients.

Metastatic Disease

- Carboplatin AUC 5 IV Day 1 and Paclitaxel 175mg/m² IV day1
- Repeat every 21 days

5.13.20. Astrocytomas



Description

These are glial tumours (astrocytomas and oligodendrogliomas) that arise from supportive tissues in the CNS and represent over 400 out of all CNS tumours in adults. In childhood, astrocytomas predominate. They are classified as:

- Low-grade astrocytomas include WHO grade I (fibrillary, pilocytic) and II (astrocytoma)
- High-grade astrocytomas include WHO Grade III (anaplastic) and IV (glioblastoma multiforme)



Signs and Symptoms

- Headache (usually persistent)
- Nausea, vomiting
- Poor balance and coordination
- Seizures, Hemi- or para-paresis
- Visual disturbances



Investigations

- History and physical + neurological examination
- MRI Brain preferred
- Contrast Brain CT
- Radionuclide brain scan



Treatment

The mainstay of treatment is complete surgical resection where possible for both low and high grade astrocytomas.

Low-grade astrocytomas

- Complete resection followed by observation
- In incomplete resection, observation or adjuvant chemotherapy and/or radiation therapy is considered

High-grade astrocytomas (anaplastic or glioblastoma multiforme)

- Complete surgical resection followed by radiotherapy alone or concurrent with Temozolomide

Chemotherapy:

Single-agent regimens

- Carmustine (BCNU) 80 mg/m² IV D1-3 every 6-8 weeks
- Lomustine (CCNU) 130 mg/m² PO D1 every 6-8 weeks

Combination chemotherapeutic regimens

PCV

- Procarbazine 60mg/m² PO D8-21
- Lomustine 110 mg/m² PO D1
- Vincristine 1.4 mg/m² IV D8 & D29
- Repeat every 6-8 weeks (max 10 courses)

P E

- Cisplatin 30 mg/m² IV D 1-3
- Etoposide 150 mg/m² IV D 1-3
- Repeat every 3 weeks 6-8 courses

Radiotherapy using 3D conformal radiation therapy technique

- Low-grade gliomas 1.8Gy per fraction to 50.4Gy
- High-grade gliomas 1.8Gy per fraction to a total of 54 – 59.9Gy.

5.13.21. Lung Cancer



Description

This is a malignancy that arises from lung parenchyma. It can be classified as:

- Small Cell Lung Cancer (SCLC)

- Non-Small Cell Lung Cancer (NSCLC) this includes squamous cell, adenocarcinoma and large cell carcinoma.



Signs and Symptoms

- Cough, Bloodstained sputum , Breathlessness , Chest pain Difficulty breathing , Weight loss , Horse voice , Unresolving pneumonia ,
- Paraneoplastic syndromes
- SIADH secretion
- Hypercalcaemia
- Myopathy
- Cerebellar degeneration
- Myasthenic syndrome



Investigations

- History including smoking and occupational history and physical examination
- Exposure to infectious agents including TB and fungal agents
- CXR
- Histology Sputum Lung Biopsy FNAB or open lung biopsy Pleural cytology or pleural biopsy
- Lymph node biopsy via a Mediastinoscopy or mediastinotomy
- FBC, U/Es LFT s LOH, CMP
- CT chest and upper abdomen
- PET scan
- Molecular targets for analysis- EGFR, ALK. BRAF, KRAS, PDL-1



Treatment

SCLC

- *Limited Stage disease:* - concurrent chemoradiation with Cisplatin and Etoposide and Radiation therapy at 1.8Gy BO to 45Gy. This is followed by prophylactic cranial irradiation for complete responders
- *Extensive Stage disease:* chemotherapy with Cisplatin and Etoposide followed with consolidation radiotherapy for patients with a near total or partial response.
- *Others as indicated–*
 - o Long-acting octreotide or lanreotide as indicated
 - o Everolimus

NSCLC

The treatment depends on the stage:

- *Stage I, II and IIIA*: Surgery is mandatory followed with 4 cycles of adjuvant chemotherapy with Cisplatin + Etoposide or Carboplatin + Vinorelbine, or Cisplatin + Gemcitabine. In completely resected NSCLC radiation therapy to 60Gy is reserved for those with positive lymph nodes or resection margins.
- *Locally advanced*: is treated with chemoradiation to 66Gy concurrent with Cisplatin based chemotherapy
- *Metastatic disease*: is treated with chemotherapy and radiotherapy is used in this situation for palliation.

Neoadjuvant Systemic Therapy in Patients Who Are Candidates for Immune Checkpoint Inhibitors:

- Nivolumab 360 mg and platinum-doublet chemotherapy every 3 weeks for 3 cycles

Platinum-doublet chemotherapy options include:

- Carboplatin AUC 5 or AUC 6 day 1, paclitaxel 175 mg/m² or 200 mg/m² day 1 (any histology)
- Cisplatin 75 mg/m² day 1, pemetrexed 500 mg/m² day 1 (nonsquamous histology)
- Cisplatin 75 mg/m² day 1, gemcitabine 1000 mg/m² or 1250 mg/m² days 1 and 8 (squamous histology)
- Cisplatin 75 mg/m² day 1, paclitaxel 175 mg/m² or 200 mg/m² day 1 (any histology)

Chemotherapy regimens for patients who are not candidates for cisplatin-based therapy

- Carboplatin AUC 5 or AUC 6 day 1, pemetrexed 500 mg/m² day 1 (nonsquamous histology)
- Carboplatin AUC 5 or AUC 6 day 1, gemcitabine 1000 mg/m² or 1250 mg/m² days 1 and 8 (squamous histology)
- Pembrolizumab 200 mg and cisplatin-based doublet therapy every 3 weeks for 4 cycles and then continued as single-agent pembrolizumab as adjuvant therapy after surgery

Systemic Therapy Following Previous Neoadjuvant or Adjuvant System Therapy

- Cisplatin 75 mg/m² day 1, gemcitabine 1000 mg/m² days 1 and 8 (squamous histology)
- Cisplatin 75 mg/m² day 1, pemetrexed 500 mg/m² day 1 (nonsquamous histology)

5.13.22. Nasopharyngeal Carcinoma



Description

This is a carcinoma that arises from the nasopharynx commonly the Iossa of Resen-muller. It can be classified as:

- Keratinising squamous cell carcinoma WHO type I
- Non-keratinizing squamous cell carcinoma WHO type II.
- Undifferentiated squamous carcinoma or lymphoepithelial carcinoma WHO type III.



Signs and Symptoms

- Nasal voice
- Nasal congestion and obstruction
- Nasal bleeding
- Neck swellings/lymphadenopathy
- Cranial nerve palsies
- Other CNS signs
- Bone pain and/or tenderness



Investigations

- History and physical examination including nasopharyngeal fiberoptic exam
- FBC, U/Es, LFTs
- CT Scan whole brain and base of the skull to the clavicle and chest
- MRI with contrast BOS to clavicle
- Biopsy of nasopharynx and FNA neck nodes
- Dental, speech, nutrition, swallowing evaluation
- Audiometry
- Ophthalmologic and endocrine evaluation as indicated



Treatment

The mainstay of treatment of NPC is radiotherapy.

- *Stage I & II:* Curative radiation therapy to 70Gy at 1.8 – 2GY per fraction.
- *Stage III:* Chemoradiation to 70Gy with Cisplatin 75–100mg/kg IV 3 weekly starting with day 1 of radiation treatment and currently this is followed with cycles of Cisplatin and 5-Fluorouracil
- *For metastatic disease* pembrolizumab with cisplatin and 5 FU

5.13.23. Other Head and Neck Cancer

- Sites
- Larynx
- Oral cavity
- Oropharynx

- Nasal cavity and paranasal sinuses
- Salivary gland tumours
- All these sites have unique symptoms and signs



Treatment

Depends on the stage-

- *Stage I & II:* Surgery or curative radiation therapy produce equivalent results but differ in the side effect profile.
- *Stage III:* has three options of treatment
 - o Surgery followed with postoperative radiation therapy plus or minus chemotherapy
 - o Curative chemoradiation for organ sparing
 - o Radical radiotherapy for medically challenged patients who cannot stand chemotherapy

5.13.24. Thyroid Cancer



Description

These are malignancies that arise from the thyroid gland. There are four categories based on the WHO classification:

- Differentiated Thyroid Cancer:
 - o Papillary Adenocarcinoma
 - o Follicular Adenocarcinoma.
- Medullary thyroid carcinoma
- Anaplastic thyroid carcinoma
- Malignant lymphomas of the thyroid.



Signs and Symptoms

- Thyroid nodule – found incidentally or during routine physical examination
- Lump in the neck
- hoarseness of voice if recurrent laryngeal nerve involved or extension to the larynx,
- Dysphagia if an oesophageal extension is present.
- Neck nodes, Haemoptysis , Cough , Chest pain , Bone pain
- Diarrhoea due to calcitonin, serotonin or prostaglandin production in those with MTC.



Investigations

- History and examination
- ENT exam
- Ultrasound of the neck FNAB is recommended at this stage
- CXR, FBC, CMP, U/E's and LFT's
- Preoperatively
- Routine use of CT scan, MRI and PET scan is not recommended
- Thyroglobulin level not recommended
- Postoperatively
- All patients with papillary and follicular cell carcinoma must have an initial ¹³¹Iodine diagnostic scan within 6 weeks post-surgery
- Ultrasound of the neck with Tg levels
- CT scan with contrast is contraindicated
- Non-contrast CT chest can detect pulmonary metastasis – PET scan is useful in patients with increased Tg levels and a negative ¹³¹Iodine uptake scan
- MRI - useful post-op in all forms of thyroid cancer to detect local recurrence



Treatment

- Surgery is the definitive treatment for all the histological types mentioned previously. This must be a near or total resection with a central neck dissection done plus posterior lateral neck dissection if these nodes are involved.
- For OTC, surgery is followed by radioactive iodine therapy in selected cases. ATC require adjuvant radiotherapy and/or chemotherapy after surgery. MTC a thyroidectomy is followed by genetic testing of the individual and family members.
- Radio-active Iodine ¹³¹I Therapy: this is indicated in all OTC patients with a positive RAI uptake scan at 6 weeks post-operatively, in which case 100 - 150mCi is given orally. This achieves 85 - 95% complete ablation of residual thyroid tissue.
- A repeat whole-body scan is done at 5 - 10 days post-¹³¹Iodine therapy. Start thyroid replacement and at 3 months do TSH and Thyroglobulin and at 6 months repeat ¹³¹Iodine uptake scan. This is repeated every 6 months until all thyroid tissue is ablated including metastatic areas.
- Radiation therapy: is used for inoperable tumours, and in palliation of symptomatic metastatic areas.
- Chemotherapy: the preferred agent is Doxorubicin and is indicated in ATC only postoperatively.

5.14 EYE CONDITIONS

5.14.1. The Red Eye



Description

This is characterised with the reddening of the eye caused by the following with or without pain:

- Iritis
- Corneal Foreign Body
- Acute Glaucoma
- Corneal Ulcers
- Penetrating and Perforating Eye Injuries
- Conjunctivitis (allergy, chemical, viral, bacterial)

Iritis



Description

It is the inflammation of the Iris.



Signs and Symptoms

- Deep-seated eye pain
- Decreased vision
- Redness of the eye
- Light intolerance
- Watery eye
- Pink ring of blood vessels around the cornea – ciliary flush
- Small white spots on the back of the cornea – keratic precipitates
- Iris may be stuck to the lens – posterior synechiae



Treatment

- Atropine 1% Eye ointment twice daily
- Betamethasone 1% eye drops, or

- Hydrocortisone 1% eye drops, or
- Dexamethasone 0.1% eye drops, or Prednisolone 1% eye drops 1-2 times a day

Corneal Foreign Body



Description

This is the presence of a foreign body on the cornea.



Signs and Symptoms

- Red eye
- Watery eye discharge
- Difficulty to keep the eye open
- Pain
- Distorted vision
- Foreign object may be seen on the cornea



Treatment

- Apply a drop of 2% Lignocaine onto the affected eye
- Wipe away the foreign body with a wisp of sterile cotton wool on an orange stick
- If the foreign body does not come out easily refer to the nearest eye clinic where it may need surgical removal (with a hypodermic needle)
- Chloramphenicol 0.5% eye drops 1 drop every 2 hours, then reduce the frequency as the infection is controlled.
- Pad the eye for 24 hours

Acute Angle Closure Glaucoma



Description

This is an acute increase in the intraocular pressure brought about solely by the closure of the anterior chamber angle by the peripheral iris.



Signs and Symptoms

- Impaired vision
- Red eye

- Severe Periocular pain
- Nausea
- Vomiting
- Severe headache
- Ciliary flush
- Very, high Intraocular pressure (50 – 100mmHg)
- Hazy Cornea Bathroom window glass type of cornea (mid dilated pupil)
- Iris Bombe, Flare, Dilated Iris vessels
- Painful hard eye



Investigations

Tonometry with a Schiotz or Perkins tonometer will show very high intraocular pressure



Treatment

The initial treatment to relieve the angle closure includes:

- Acetazolamide 500mg intravenously start, then 250mg 6 hourly
- Pilocarpine 4% 6 hourly
- Timolol 0.25–0.5% eye drops, instill one drop 12 hourly in the affected eye
- Paracetamol 500 – 1gm orally 6 hourly
- Mannitol (1-2g/kg body wt of 20% solution in water, given over 30 – 40 minutes, (60 drops per minute as a slow intravenous infusion) until intraocular pressure has been satisfactorily reduced

The Definitive Treatment - Permanently keep the angle open surgically by:

- Peripheral laser iridotomy
- Peripheral Iridectomy
- The surgery must be done to both eyes as the predisposing condition affects both eyes

Corneal Ulcers



Description

This is ulceration of the cornea commonly caused by either injuries or infections (Bacterial, Fungal, Viral)



Signs and Symptoms

- Red eye
- Severe pain

- Difficult to open eye in light (photophobia)
- Discharge, water or pus
- Disturbed vision
- Poor vision



Investigations

- Snellen testing - a white spot of the eye may be seen
- On retinoscopy – irregular light refraction Investigation
- Fluorescein staining of the cornea - the wound stains green
- Corneal swab for microscopy, culture and sensitivity



Investigations

- For all types of ulcers, prevent ocular pain with Atropine 1% once daily in the affected eye
- Infections: Bacteria corneal ulcers - use Tetracycline 1% eye ointment, or Chloramphenicol 1% eye ointment 3-4 times a day
- If not resolving within 2 weeks, then refer.

Fungal Ulcers



Description

Typically, you see main ulcer, with riders, and satellite ulcers around the main one. (This is seen occasionally. It may not be seen at all)



Treatment

- Povidone Iodine, 2%, four times daily in the affected eye
- Natamycin, 5% eye suspension given hourly for 7 days
- Econazole, 1% suspension for topical use
- Miconazole, 10mg/ml given subconjunctival or intravitreal given as 10microgram per ml
- Amphotericin B 0.05-0.2% can be made from IV injection and instil every 5 minutes during the first hour and 30 - 60minutes until clinical picture changes. (protect from light- use amber coloured bottle)

Viral ulcers, Herpes Simplex



Description

Typical characteristic - on Fluorescein 1% or 2% staining a dendritic corneal ulcer (branching)



Treatment

- Acyclovir eye ointment (suspension) five times daily in the affected eye for about 21 days.

Note: If this has a very high association with HIV/AIDS, steroids are contraindicated.

Ophthalmia Neonatorum



Description

Presents 2 – 4 days postpartum in the neonate



Signs and Symptoms

- Hyperacute conjunctivitis with pus, with or without a membrane
- Severe swelling of both eyes



Treatment

- Penicillin G 50,000 IU in 2 divided doses for 7 days– Systemic
- Penicillin eye drops 1 hourly both eyes

Penetrating and Perforating Eye Injuries



Description

Penetrating wounds are injuries of the eyeball that result from a sharp object. They typically have a wound of entry and a wound of exit. There may or may not have a retained foreign body.

Perforating wounds are injuries of the eyeball that have only one wound of entry, there also may have a retained foreign body.



Signs and Symptoms

- History injury present
- Red eye
- Painful eye
- Soft eye
- The eye may be shrunken due to loss of volume
- There may be subconjunctival haemorrhage.
- Pigment discolouration of the conjunctiva in the area of the wound
- Foreign Body may be seen.



Investigations

- X-ray orbit – to rule out intraocular foreign body.
- Ocular ultrasound
- Cranial CT scan



Treatment

- Tetanus toxoid
- I.V antibiotic preferably Cefotaxime 1g Stat Or
- Gentamycin 80m IV Stat
- Refer to the nearest eye unit promptly.

Conjunctivitis



Description

This is a bacterial infection of the conjunctiva. Conjunctivitis presents as the red eye without pain. It can be caused by viral or bacterial infections, as well as allergic reactions and chemical insults to the eye.

Bacterial Conjunctivitis



Signs and Symptoms

- Ocular discomfort – gritty sensation in the eye
- Eye discharge (pus)

- Diffuse conjunctival redness
- Red conjunctiva with discharge
- Normal vision (clear cornea)



Investigations

Fluorescein staining is negative



Treatment

- Tetracycline 1% eye ointment 3 – 6 times daily
- Supportive - Good personal hygiene to prevent re-infection Facial washing.

Viral Epidemic Haemorrhagic Conjunctivitis



Description

This is a viral infection of the conjunctiva and is associated with bleeding. The condition is very infectious and difficult to treat. It is often seen in families and epidemics.



Signs and Symptoms

- Pain
- Watery discharge
- Ocular discomfort
- Photophobia
- Sub conjunctiva haemorrhage (severe redness).
- Tender cervical lymph nodes, preauricular, submental groups
- Swollen conjunctiva
- Water discharge
- Normal vision



Treatment

- Tetracycline 1% eye ointment 3 times daily for 7 days
- Supportive: Patient hygiene – do not share face cloth Wash face and eyes



Complications

Secondary bacterial infection

Chemical Conjunctivitis



Description

It is an inflammation of the eye caused by a chemical substance such as car battery acid, Snake venom, Fluid from plants, Household cleaning chemicals. Alkali chemicals are more damaging to the eye than acids.



Signs and Symptoms

- Pain
- Redness
- Watering, Pus discharge if secondarily infected.



Investigations

Fluorescein staining will reveal the area of conjunctival corneal chemical erosion



Treatment

Emergency management

- Apply local anaesthetic – lignocaine 2% eye drops
- Wash the eye copiously with normal saline or tap water for about 30 minutes

Pharmacological

- Hydrocortisone 1% Eye Ointment. Apply 3-4 times daily
- Atropine eye drops 1% 2 times a day
- Tetracycline 1% eye ointment three times daily if infected

Other Medicines Used in Chemical Burns

- Vitamin C (Sodium ascorbate) 10% drops and a daily oral dose of ascorbic acid 1gm (assist in laying down of the corneal collagen)

- Collagenase inhibitors: L-cysteine and or Cenicillamine applied topically helpful in preventing corneal perforation
- Artificial tears: Prevents the effects of corneal drought. SNO tears, or Hypromellose 0.3%
- Bandage soft contact lenses prevent the formation of adhesions between eyelid and eyeball
- Sodium EDTA - Chelates calcium, a cofactor for the collagenase enzyme, thereby rendering the enzyme unavailable for corneal melting.

Late Treatment

- Division of adhesions between conjunctiva of the eye and eyelid.
- Place an eye shell between the divided bands during ball synechiealasis
- Conjunctiva grafting
- Eyelid surgery to correct the deformity
- Corneal grating after 6 - 12 months to allow for maximum resolution.

Allergic conjunctivitis



Description

Allergic inflammation of the conjunctiva. This condition is common but very difficult to treat. A positive family history of the atopic disease may be present



Signs and Symptoms

- Itchy eyes
- Ring of pale, fleshy, pink-grey tissue around the cornea
- Follicles on the tarsal conjunctiva (cobblestone type)



Treatment

- Hydrocortisone 1% eye drops 3-4 times a day
- Sodium Cromoglicate 2% eye drops 5 times daily

5.14.2. Trachoma



Description

This is an infection of the eye caused by Chlamydia Trachomatis. It is associated with poor hygienic conditions. The common fly is the major vector in the infection and re-infection cycle. It is one of the leading

causes of preventable blindness in the world. Characterized by an acute inflammation which appears in the first decade of life, slowly progressing until the disease becomes inactive during the 2nd decade of life. Last sequelae may not appear for many years.



Signs and Symptoms

- None
- Red eyes
- Ocular discomfort
- Follicles on the tarsal conjunctiva
- Eyelid conjunctival scarring
- In-turning of eyelids (entropion)
- Eyelashes rubbing on the cornea (Trichiasis) heading to corneal ulceration
- Corneal scars



Treatment

The SAFE strategy is proven in endemic areas:

- **S** -Surgery for stage 5
- **A** -Mass Antibiotic treatment - A single dose of Azithromycin 500mg. In children 10mg/kg body weight as stat dose.
- **F** - Face washing (use of clean and safe water)
- **E** - Environmental sanitation

5.14.3. Lumps and bumps on and around the eyeball



Description

Lumps and bumps on/and around the eyeball can be benign or malignant.

Common causes of benign lesions include Stye, Chalazion (eyelid cyst), Orbital dermoid cyst, Pinguiculae and Pterygia. While malignant lesions occur due to KS (Kaposi Sarcoma), Squamous cell carcinoma and Retinoblastoma.

Stye



Description

This is a small abscess caused by an acute staphylococcus infection of a lash follicle



Signs and Symptoms

- Painful lump on the lid margin
- Tender inflamed nodule or lump on the lid margin



Treatment

- None – usually undergoes spontaneous resolution
- Hot compresses
- Removal of associated eyelash and drain the pus
- Tetracycline eye ointment may be applied to prevent eyeball infection.

Tarsal Cyst (Chalazion)



Description

This is a cyst on the eyelid that results from blockage of the duct of tarsal glands. It is usually formed away from the lid margin.



Treatment

Incision and curettage (I & C).

Orbital Dermoid Cyst



Description

These are round, localized nodules or lumps in the upper temporal or upper nasal aspect of the orbit. They arise from a displacement of the epidermis to a subcutaneous location. Types include:

- Simple type – not associated with body defect, these are superficially located
- Complicated – deeply seated, with deep intra-ocular extension. Present later in life with a displacement of the eyeball



Investigations

- X-ray skull
- CT Scan to rule out an intraorbital extension



Treatment

- Surgery
- Total excision.

Pinguiacula



Description

This is a yellowish-white growth on the bulbar conjunctiva adjacent to the nasal or temporal aspect of the limbus. This type does not involve the cornea.



Treatment

- Leave alone, if asymptomatic
- If inflamed – red – Tetracycline 1% eye ointment 2 times a day for 7 days.

Pterygium



Description

These are conjunctival growths on the nasal or temporal conjunctiva that enlarge and encroach on the cornea. May cause a skin-like band over the cornea that may cover the pupil.



Signs and Symptoms

- May not cause any problem

- May be discomfort of the eyeball if the pterygium is inflamed.
- Redness of the conjunctiva growth that lies within the palpebral fissure.



Treatment

- Local Excision in case of progression towards the visual axis.
- Tetracycline 1% eye ointment if inflamed, post excision

Malignant

Kaposi Sarcoma of the Conjunctiva and Eyelid (See section on Malignancies)



Description

These are cancers arising from capillary endothelial cells. In the eye, they present clinically as a patchy or patches of elevated “haemorrhage” that do not resolve with time. It may be the first manifestation of AIDS. It may present on the conjunctiva or the eyelid.



Treatment

Referral to the nearest hospital (see the section on management of KS).

Squamous cell carcinoma of the conjunctiva



Description

This is a cancer of the eye arising from epithelial cells of the conjunctiva. May be associated with HIV/AIDS



Signs and Symptoms

- Sessile or papillary growth on the intrapalpebral area of the perilimbal conjunctiva
- In immuno- compromised patients, the tumour is aggressive, with deep infiltration in the orbit and eyeball
- Metastases occur to the preauricular and submandibular lymph nodes
- Early: Usually, nasal limbal fungating growth in the region of an underlying pingicula or pterygium.
- Late: Huge fungating tumour of the orbit with metastases to local lymph nodes.



Treatment

- Refer to the nearest eye specialist unit.
- Early presentation: Local excision with 2mm margin of the normal limbus. May use local Mitomycin C (antimitotic)
- Late presentation: If the whole eyeball is involved with extension into the orbit, and vision is lost - total exenteration.
- Chemotherapy - if systemically spread due to poor response to radiotherapy.

Retinoblastoma

(See Malignancies section 5.14).

5.14.4. Common Eye Diseases Associated with HIV/AIDS

Moluscum Contagiosum



Description

This is a viral infection caused by the cytomegalovirus commonly affecting children. The typical lesion is a pale, waxy elevated nodule on the eyelids.



Signs and Symptoms

The shedding of cell-laden with viral particles can produce chronic follicular conjunctivitis and superficial keratitis.



Treatment

- Expression of the contents of the nodule
- Heat cauterisation of the lesions.

Herpes Zoster Ophthalmicus



Description

This is an infection caused by the varicella-zoster affecting the ophthalmic division of the trigeminal vein. It is more common and more severe in patients with lymphomas and those being treated by radiotherapy or immunosuppressed individuals.



Signs and Symptoms

- Severe pain along the ophthalmic division of the trigeminal nerve VI) • Maculopapular rash along the VI that obeys mid facial line.
- Swelling of the affected part of the face
- Typical Herpes Zoster rash



Investigations

Clinical – the typical distribution of the Herpes Zoster rash



Treatment

- Oral acyclovir 800mg 5 times daily
- Oxytetracycline 3% + Hydrocortisone 1% eye drops OR
- Betamethasone 0.1% + Neomycin 0.5% eye drops OR
- Dexamethasone 0.1% + Chloramphenicol 1% eye drops 4-6 times daily
- Calamine lotion to the skin or Acyclovir 3% skin ointment
- ± systemic steroids (x-ray to rule out PTB) may activate TB in AIDS patients
- Acyclovir 3% eye ointment 5 times daily.



Complications

- Anterior uveitis
- Neurological: cranial nerve palsies, Optic neuritis, Encephalitis, Contra-lateral hemiplegia
- Severe facial skin scarring, Corneal opacification, Neuropathic keratopathy, Disciform keratopathy

Cytomegalovirus Retinitis (CMV)



Description

This is a rare chronic diffuse exudative infection of the retina caused by the CMV virus which occurs with rare exception, in patients with an impaired immune system caused by either AIDS, cytotoxic chemotherapy or long term immune suppression following organ transplantation.



Signs and Symptoms

- Poor vision
- Floaters
- Cotton wool spots
- Full-thickness retinal necrosis and oedema which starts peripherally or at the posterior pole
- Retinal bleeding, Retinal vasculitis
- The whole retina eventually involved
- Total retinal atrophy, Retinal detachment



Treatment

- Dihydroxypropoxymethyl guanine IV causes regression
- Ganciclovir IV infusion (induction) 5mg/kg 2 times a day for 12-21 days
- Maintenance dose 5 mg/kg wt daily until adequate recovery of immunity
- Foscarnet IV infusion, induction 60mg/kg every 8 hours for 2-3 weeks, then maintenance dose 60mg/kg daily increased to 90-120mg/kg if tolerated. If CMW progresses while on the maintenance dose repeat the induction dose. Treatment is needed for life.

5.14.5. Optics & Refraction (Refractive Errors and Low Vision)



Description

This is a deficiency in the refracting mechanism of the eye resulting in poor vision. The eye is designed to be able to perceive the light that falls within the visible part of the electromagnetic spectrum. The two parts of the eye that are responsible for image formation are:

- The Cornea – accounts for 2/3 of the refractive power of the eye.
- The Crystalline Lens which accounts for 1/3 of the refractive power of the eye as well as for the accommodative capacity.

Refractive Errors



Description

Types of refractive error:

- Myopia: Short-sightedness
- Hyperopia (Hypermetropia): Long-sightedness

- Aphakia: Poor vision that results from the absence of the crystalline lens
- Presbyopia: Difficult in reading in the elderly (above 40 years) that results from loss of the accommodative power of the lens
- Astigmatism: In this condition of the eye, the meridians of the eye are not equal, resulting in unequal refraction



Signs and Symptoms

- Poor vision
- Specific retinal reflex in line with the types of refractive error mentioned above on retinoscopy.



Treatment

Glasses, contact lenses, or reflective surgery sometimes

Low Vision (VA range of 6/18 – 6/60)



Description

This is a failure to attain a visual improvement of more than 6/18 in the better eye after being given the maximum conventional treatment for poor vision. In such a patient further improvement of vision can be achieved by using low visual aids.



Treatment

The types of low visual aids available are:

- Optical – High power reading glasses, magnifies (illuminating and non-illuminating), telescopes, closed-circuit television sets.
- Non-optical – Environmental modification aimed at further enhancing the corrected residue vision such as:
 - o Improving lighting
 - o Special reading stands
 - o Painting of the staircases to improve contrast
 - o Painting kitchen utensils for ease of identification
 - o Special cheque signing cards
 - o Talking watches, etc.

Refer such a patient to higher centers where appropriate aid can be provided.

Strabismus (Squint)



Description

This is ocular misalignment resulting from either an abnormality in binocular vision or anomalies of neuromuscular control of ocular motor motility. When eyes become dissociated (not aligned) then strabismus (squint) is present.

Orthophoria:

- This is when the ocular motor apparatus is in perfect equilibrium so that both eyes remain aligned (i.e. directed on the fixation point) in all positions of gaze and at all distances of the fixation point even when the fusion mechanism is disrupted such as when one eye is occluded. Orthophoria – describes “essentially straight eyes.”

Phorias:

- These are latent deviations (latent strabismus or squint) or is a deviation kept latent by the fusion mechanisms.

Tropias:

- Are manifest deviations. A deviation (squint) that is manifest at all times and is not kept under control by the fusion mechanisms



Treatment

All squinting patients should be referred to a specialist, preferably centers that have Ophthalmologists.

5.14.6. Systemic Eye Diseases

Hypertensive Retinopathy



Description

This is a condition that occurs when high blood pressure damages the retina's blood vessels.

Grading of Hypertensive retinopathy

- *Grade I:* Mild generalized arteriolar constriction. Broadening of the arteriolar light reflex and vein concealment.
- *Grade II:* More severe generalized as well as focal arteriolar constriction and deflection of veins at arteriolar/venous crossings.

- *Grade III:* Flame-shaped haemorrhages, cotton wool spots, hard exudates, copper-wiring of arterioles, banking of veins distal to the arteriolar/venous crossings and right-angled deflections of veins. *Grade VI:* Disc swelling and silver wiring of arterioles.



Treatment

Medical, Control of hypertension

Retinal Vein Occlusion



Description

Systemic hypertension is associated with an increased risk of both branch retinal vein occlusion and central retinal artery occlusion.



Treatment

- No effective treatment
- Control the hypertension
- Refer to an ophthalmologist
- Some patients develop secondary retinal neovascularization which requires pan-retinal laser photocoagulation (Ischaemic type of central retinal vein occlusion)

Retinal Artery Occlusions



Description

The patient may suffer attacks of amourosis fugax (transient absences of vision) or frank retinal artery occlusion as a result of the associated arteriosclerosis



Treatment

- Requires urgent management
- the patient should lie flat
- Firm Ocular massage – to lower intraocular pressure, and increase retinal blood flow
- Intravenous Acetazolamide 500mg stat to further lower the intraocular pressure

Ocular motor palsies



Description

Ocular muscle palsies may be found in patients with hypertension, even though hypertension is not the only cause of ocular muscle palsies. There are other causes like diabetes mellitus.



Treatment

- Medical control of hypertension
- May undergo spontaneous resolution

Dysthyroid Eye disease



Description

Dysthyroid eye disease is a syndrome of clinical and orbital imaging abnormalities caused by deposition of mucopolysaccharides and infiltration with chronic inflammatory cells of the orbital tissues, particularly the extraocular muscles. In general, the ocular features of Grave's disease and ophthalmic euthyroid graves' disease are similar, although they tend to be more asymmetrical in the latter stages.



Signs and Symptoms

- Eyelid signs:
 - Lid retraction
 - Lid lag
- Signs resulting from infiltrative ophthalmopathy
 - Conjunctival injection (redness)
 - Chemosis (swelling)
 - Superior limbic conjunctivitis
- Proptosis
- Optic neuropathy whose early sign is colour desaturation
- Restrictive myopathy



Treatment

- Non-specific (reassurance, head elevation to reduce the severity of periorbital oedema, taping of eyelids at night to protect the cornea, prismatic glasses to reduce diplopia)

- Diuretics such as Cyclopentiazide 0.5mg at night to reduce morning periorbital oedema.
- Hypromellose 0.3mg (artificial tears) or SNO tears
- In severe cases, Prednisolone 80-100mg/day, enteric-coated and after 48hrs taper by 5mg every 5th day. Treat for a maximum of 2-8 weeks and stop at 3 months
- Radiotherapy – used for patients who have systemic contraindications to steroids, refuse steroids, develop serious steroids side effect or a steroid resistance.
- Dose – 20gy to the posterior orbit given for over a 10 day period
- The response is usually evident within 6 weeks and maximum improvement evident by 4 months.
- Orbital decompression: if the patient develops severe exposure keratopathy, optic neuropathy or cosmetically unacceptable proptosis
- Surgery on Eyelids
- Tarsorrhaphy in uncontrolled exposure keratopathy
- To weaken muller's muscle for a patient with severe lid retraction. –Blepharoplasty

Diabetic Retinopathy



Description

This is a complication of diabetes where the blood vessels in the eye are damaged. The incidence of diabetic retinopathy is closely related to the duration of diabetes. Generally, it is more likely to occur after 5 years of onset of diabetes mellitus.

Poorly controlled patients develop the complication sooner. Diabetic Retinopathy is classified as Maculopathy, Preproliferative and Proliferative (PDR).



Signs and Symptoms

- Microaneurysms at the posterior pole, temporal to the macula.
- Dot and blot haemorrhage
- Cotton wool spots
- Intraretinal microvascular angioopathies and segmentation
- Arteriolar narrowing
- Hard exudates
- Diffuse retinal oedema
- Gradual impairment of central vision
- Difficult in reading small print
- Foveal oedema
- Early neovascularization is seen on the disc, or elsewhere on the retina (PDR)
- Late elevated new vessels, associated with a white fibrosis component (PDR)



Treatment

Well-controlled diabetes

- Treat associated high Blood pressure, anaemia, renal failure
- Monitor patients annually by retinal examinations. In some patients, spontaneous regression occurs when diabetes is well controlled
- Early referral to ophthalmologist for specific interventions such as Laser macular grid, Pan retinal photocoagulation

Advanced Diabetic Eye Disease



Signs and Symptoms

- Sudden onset of floaters
- Blurred vision from vitreous haemorrhage
- Dense Vitreous Haemorrhage
- Tractional retinal detachment
- Neovascular glaucoma



Treatment

Surgery - Vitrectomy with endolaser photocoagulation

5.14.7. Ocular Emergencies

Absolute Emergencies which include Chemical injury to the eye, Cornea Laceration and Hyphaema (Traumatic) require immediate intervention. Relative Emergencies such as Congenital cataract and Retinal detachment must be referred to the Specialists early.

Chemical Injury to the Eye

(See section under Red eye with pain).

Cornea Laceration



Description

Laceration of the Cornea



Signs and Symptoms

- History of injury, always ascertain the mode of injury
- Loss of vision following trauma
- Bleeding from the eye
- Obvious corneal laceration visible on direct light -examination of the eye
- Prolapsed iris is seen plugging the laceration
- The anterior chamber is flat with blood
- Eyeball is soft



Investigations

Examining under local anaesthesia lignocaine 2% eye drops, gently examine the eye under full aseptic condition. The laceration will be visible.



Treatment

Early Management

- Tetanus Toxoid 0.5ml Stat
- IM or IV Gentamycin 80mg stat, or Cefotaxime/Ceftriaxone 1gm Stat.
- Chloramphenicol 1% eye drops or Gentamycin 0.3% eye drops to affected eye start
- Light dressing (padding) of the affected eye
- Refer to a specialist.

Specialist Management

- Under lignocaine 2%, examine the eye gently to ascertain the wound shape.
- Exclude retained intraocular foreign body (x-ray or ultra-sound)
- Arrange for emergency repair, preferably under general anaesthesia.
- Suture the laceration under a microscope
- Reform the anterior chamber
- Sub-conjunctival injection of gentamycin 0.3ml + atropine 0.3ml + dexamethasone, 0.3ml
- Gentamycin, 0.3% eye drops 2 drops 4 times a day, or Chloramphenicol 1% eye drops 2 drops 4 times a day and keep eye padded.

Traumatic Hyphaema



Description

This is blood in the anterior chamber as a result of trauma, or very rarely spontaneous. If spontaneous, rule out intraocular malignancy or juvenile xanthogranuloma.



Signs and Symptoms

- History of injury, usually blunt type of trauma
- Poor vision
- Blood clots visible in the anterior chamber.



Treatment

- If the patient is a child admit in hospital and keep under observation. If left unattended, chances of a re-bleed are high resulting in intraocular pressure elevation and corneal staining
- If the anterior chamber is 1/3 full in an adult, can treat as an outpatient
- If the anterior chamber is full or 2/3 full, admit the patient
- Bed rest
- Betamethasone or Dexamethasone 0.1% eye drops four times a day
- Induce cycloplegia, with Tropicamide 1% eye drop twice daily or Atropine 1% eye drop once daily
- If intraocular pressure is elevated, use antiglaucoma drops, preferably Timolol 0.5% two drops or oral Acetazolamide 250mg tablets 4 times daily
- Use topical antibiotic to prevent or treat the associated infection
- Chloramphenicol 1% or Gentamycin, 0.3% eye drops

5.14.8. Glaucoma



Description

This is a group of diseases in which the intraocular pressure is sufficiently elevated to damage vision

Types

- Primary
- Secondary
- Congenital

Primary angle closure (congestive) Glaucoma

(See the section on Red eye with Pain)

Primary open-angle glaucoma (chronic simple glaucoma)



Description

This is a prolonged increase in ocular pressure. The result is complete damage to the optic nerve.



Signs and Symptoms

- Usually asymptomatic
- Gonioscopy – normal angle
- on Tonometry, Intra-ocular-pressure (IOP) will be raised, above 25mmHg
- Optic nerve cupping
- Visual field – trachoma type of visual field loss
- Late - When blind – Optic atrophy



Investigations

- Perimetry – Peripheral visual field analysis, either by confrontation or using Peripheral visual field analyzer
- Tonometry – Perkins or Goldman
- Gonioscopy – Normal angle
- Fundoscopy – optic disc cupping



Treatment

1st Line

- Timolol maleate 0.25% or 0.5% twice daily
- Rule out underlining cardiac or pulmonary malfunction

2nd Line

- Pilocarpine 2% or 4% eye drops 4 times daily
- Dipivefrine 0.1% eye drops twice daily

3rd line

- Latanoprost 50 micrograms/ml once or twice daily
- Acetazolamide 250mg (slow release) tablet once daily. Use only for a short while.
- Treatment is for life as long as the compliance stays good and as long as intraocular pressure is controlled. Ocular association of Primary open-angle glaucoma (POAG) (recommend to rule out glaucoma in any of these conditions:)
- High myopia
- Retinal vein occlusion
- Retinal detachment
- Pigmentary Retinopathy of retinitis pigmentosa type
- Systemic associations
- Diabetes Mellitus
- Dysthyroid ophthalmopathy

NB: Current practice recommends surgery as 1st line management because of poor compliance of treatment for life. Trabeculectomy (Filtration surgery) ± use Mitomycin C.

DO NOT DISCHARGE PATIENT. SEE AT LEAST TWICE YEARLY.

TO SAFEGUARD AGAINST SECONDARY CLOSURE OF THE FILTRATION BLEP.

Primary Congenital Glaucoma



Description

This is intraocular pressure elevation in a child, that manifest either at birth or a few years after birth due to a developmental anomaly of the formation of the eye anterior chamber angle.



Signs and Symptoms

- Lacrimation (usually mistaken for lacrimal duct closure)
- Light intolerance
- Large eye – Buphthalmos
- Misty looking cornea
- Haab's striae on the cornea (on slit-lamp microscopy)
- Cuped disc



Investigations

- Corneal diameters (7 – 11mm) 16 over 11mm, a reason to be suspicious
- Refraction: myopic

- Tonometry – Intraocular pressure will be high
- Fundoscopy – varying degrees of cupping



Treatment

- Surgical – Trabeculectomy
- Goniotomy

5.15

CONDITIONS OF THE EAR, NOSE AND THROAT

5.15.1. Conditions of the Ear

5.15.1.1. Cerumen Impaction



Description

Cerumen impaction occurs when earwax (cerumen) accumulates in the ear canal to a degree that may cause symptoms such as pain, hearing loss, or dizziness.



Signs and Symptoms

- Hearing loss
- Earache or fullness
- Tinnitus (ringing in the ear)
- Dizziness
- Cough (due to ear canal stimulation)



Treatment

Supportive

- *Manual Removal:* Performed by a healthcare professional using specialized tools.
- *Ear Irrigation:* Flushing the ear canal with warm water, performed by a healthcare professional.

- *Avoid:* Inserting objects like cotton swabs into the ear, which can push wax further in.

Pharmacological

- *Cerumenolytics:* Substances that soften earwax, making it easier to remove.
- *Saline Solution:* Can be used to irrigate and soften the wax.
- *Wax Softeners:* Docusate Sodium: Softens and breaks down earwax.
- *Dosage:* Instill 0.5 ml to 1 ml into the affected ear and leave for 15-30 minutes. Repeat if necessary.

When to Seek Professional Help

- If home treatments are ineffective.
- If you experience severe pain, discharge, or signs of infection.

Preventive Measures

- Regular cleaning of the outer ear with a washcloth.
- Avoid inserting objects into the ear canal.
- Use ear drops periodically if prone to wax build-up.

5.15.1.2. Otitis Externa (OE)



Description

Otitis externa is the inflammation or infection of the external auditory canal (EAC), the auricle, or both. This condition can be found in all age groups. Types of Otitis Externa:

- *Acute diffuse OE:* Most common form of OE, typically seen in swimmers.
- *Acute localized OE (furunculosis):* Associated with infection of a hair follicle.
- *Chronic OE:* Same as acute diffuse OE but is of longer duration (>6 weeks).
- *Eczematous OE:* Encompasses various dermatologic conditions that may infect the EAC and cause OE.
- *Otomycosis:* Infection of the ear canal from a fungal species (e.g., Candida, Aspergillus).



Signs and Symptoms

- Painful ear
- Ear fullness
- Hearing loss
- Occasionally discharging ear (weeping ear)
- Severe cases present with lymph node swelling around the ear and fever



Treatment

Supportive

- Keep the ear dry at all times.
- Plug with a cotton ball smeared with petroleum jelly when taking a bath.
- Avoid inserting anything into the ear (including ear buds).

Pharmacological

Pain Management:

- Paracetamol (Acetaminophen):
 - Adults: 500 mg to 1 g every 6-8 hours.
 - Children 6-12 years: 250-500 mg every 6-8 hours.
 - Children 1-5 years: 120-250 mg every 6-8 hours.
- Ibuprofen:
 - Adults: 200-400 mg every 8 hours.
 - Children 4-7 years: 150 mg every 8 hours (maximum 7.5-10 mg/kg daily).
 - Children 7-12 years: 200 mg every 8 hours (maximum 7.5-10 mg/kg daily).
- Diclofenac:
 - Adults: 50-100 mg every 12 hours.
- Topical Medications:
 - *Betamethasone Sodium Phosphate 0.1% Eye/Ear/Nose Drops*: Indicated for inflammation in otitis externa with eczema present. Instil 2-3 drops in the ear every 2-4 hours, reduce frequency when relief is obtained.
 - *Dexamethasone Sodium Phosphate 0.1%*: Indicated for inflammation in otitis externa with eczema present. Instil 2-3 drops every 2-3 hours, reduce frequency when relief is obtained. Caution: Use under expert supervision, avoid prolonged use.
 - *Ciprofloxacin 0.3% Ear Drops*: Indicated for acute localized OE and chronic OE.
 - Children 1-17 years: Apply 0.25 mL twice daily for 7 days.
 - Adults: Apply 0.25 mL twice daily for 7 days.
 - *Otic Clotrimazole 1% Solution*: Indicated for otomycosis.
 - Children and Adults: Apply 2-3 drops 2-3 times a day, continue for at least 14 days after disappearance of infection.
- Systemic Antibiotics: For severe otitis externa.
 - *Amoxicillin*: 25 mg/kg three times daily for 5-7 days.

If penicillin-hypersensitive:

- *Erythromycin*: 10-20 mg/kg orally twice daily.
- *Cephalexin*: 6.25 mg/kg orally every 6 hours.
- *Ciprofloxacin*: 10mg/kg orally every 12 hours
- Avoidance of Contributing Factors

5.15.1.3. Middle Ear Inflammatory Disease - Acute Otitis Media



Description

Acute otitis media is an infection behind the eardrum of an infective origin. It is extremely common in children.



Signs and Symptoms

- Fever
- Ear pain
- Rubbing the ear by infants and toddlers
- Pus drainage from the ear in some cases



Treatment

Pharmacological

Pain Management:

- *Paracetamol (Acetaminophen):*
 - Adults: 500 mg to 1 g every 6-8 hours.
 - Children 6-12 years: 250-500 mg every 6-8 hours.
 - Children 1-5 years: 120-250 mg every 6-8 hours.
- *Ibuprofen:*
 - Adults: 200-400 mg every 8 hours.
 - Children 4-7 years: 150 mg every 8 hours (maximum 7.5-10 mg/kg daily).
 - Children 7-12 years: 200 mg every 8 hours (maximum 7.5-10 mg/kg daily).
- *Diclofenac:*
 - Adults: 50-100 mg every 12 hours.

Antibiotics:

- Amoxicillin: 80-100 mg/kg/day.
 - Children < 2 years: 10-14 days.
 - Children > 2 years: 7 days.
 - Adults: 5 days.
- If penicillin-hypersensitive:
 - Erythromycin: 10-20 mg/kg orally twice daily.
 - Cephalexin: 6.25 mg/kg orally every 6 hours.

5.15.2. Conditions of the Sinus and Nose

5.15.2.1. Allergic Rhinitis



Description

Allergic rhinitis (hay fever) is an allergic reaction causing sneezing, congestion, itchy nose, and watery eyes. It is caused by allergens like pollen, pet dander, mold, and insects.



Treatment

Supportive

- Environmental control measures and allergen avoidance.

Pharmacological

Nasal Decongestant:

- *Xylometazoline Hydrochloride*: Indicated for nasal congestion.
 - o Child 6–11 years: 1–2 drops 1–2 times a day for a maximum of 5 days.
 - o Child 12–17 years: 2–3 drops 2–3 times a day for a maximum of 7 days.
 - o Adults: 2–3 drops 2–3 times a day for a maximum of 7 days.

Antihistamines: For mild allergic rhinitis.

- *Loratadine*: 10 mg once daily.
- *Cetirizine*: 10 mg once daily.

Nasal Corticosteroids:

- *Mometasone Furoate*: For prophylaxis and treatment of seasonal allergic or perennial rhinitis.
 - o Children 3–11 years: 50 mcg daily, sprayed into each nostril.
 - o Children 12–17 years: 100 mcg daily, increased to 200 mcg if necessary.
 - o Adults: 100 mcg daily, increased to 200 mcg if necessary.
- *Fluticasone*: For prophylaxis and treatment of seasonal allergic or perennial rhinitis.
 - o Children 4–11 years: 50 mcg once daily, increased to 50 mcg twice daily if necessary.
 - o Children 12–17 years: 100 mcg once daily, increased to 100 mcg twice daily if necessary.
 - o Adults: 100 mcg once daily, increased to 100 mcg twice daily if necessary.

5.15.2.2. Rhinosinusitis



Description

Rhinosinusitis is the inflammation of the nasal passages and sinuses extending beyond 7-10 days . It can be acute (lasting less than 4 weeks), subacute (4-12 weeks), chronic (over 12 weeks), or recurrent (four or more episodes per year).



Signs and Symptoms

- Runny nose
- Postnasal drip
- Nasal congestion
- Sinus pain or pressure
- Headache
- Toothache
- Loss of smell
- Halitosis (bad breath)
- Cough (more common in children)



Treatment

Supportive

- Nasal saline irrigation to reduce congestion and flush out mucus.

Pharmacological

Pain Management: Acute Rhinosinusitis

- *Paracetamol (Acetaminophen):*
 - *Adults:* 500 mg to 1 g every 4-6 hours as needed (maximum 4 g per day).
 - *Children 6-12 years:* 250-500 mg every 4-6 hours as needed (maximum 2 g per day).
 - *Children 1-5 years:* 120-250 mg every 4-6 hours as needed (maximum 1 g per day).
- *Ibuprofen:*
 - *Adults:* 200-400 mg every 4-6 hours as needed (maximum 1.2 g per day).
 - *Children 4-7 years:* 150 mg every 8 hours (maximum 7.5-10 mg/kg daily).
 - *Children 7-12 years:* 200 mg every 8 hours (maximum 7.5-10 mg/kg daily).

Nasal Decongestants:

- *Pseudoephedrine:*
 - o *Adults:* 60 mg every 4-6 hours (maximum 240 mg per day).
 - o *Children over 6 years:* 30 mg every 4-6 hours (maximum 120 mg per day).
- *Xylometazoline hydrochloride*
 - o *Child 6–11 years:* 1–2 drops 1–2 times a day as required for maximum duration of 5 days, 0.05% solution to be administered into each nostril
 - o *Child 12–17 years:* 2–3 drops 2–3 times a day as required for maximum duration of 7 days, 0.1% solution to be administered into each nostril
 - o *Adult:* 2–3 drops 2–3 times a day as required for maximum duration of 7 days, 0.1% solution to be administered into each nostril

Nasal Corticosteroids:

- *Fluticasone:*
 - o *Adults:* 100 mcg once daily into each nostril, can be increased to 100 mcg twice daily if necessary.
 - o *Children:* 50 mcg once daily into each nostril, can be increased to 50 mcg twice daily if necessary.
- *Mometasone:*
 - o *Adults:* 100 mcg once daily into each nostril, can be increased to 200 mcg daily if necessary.
 - o *Children:* 50 mcg once daily into each nostril, can be increased to 100 mcg daily if necessary.

Antibiotics: Acute Rhinosinusitis (If bacterial infection is suspected)

- *Amoxicillin:*
 - o *Adults:* 500 mg every 8 hours or 1 g every 12 hours for 7-10 days.
 - o *Children:* 50 mg/kg/day in divided doses every 8 hours (not to exceed 1 g per dose) for 7-10 days.
- *Doxycycline:*
 - o *Adults:* 100 mg every 12 hours for 7-10 days.

5.16.2.3. Nasal Polyposis



Description

Nasal polyposis involves the growth of polyps in the nasal passages or sinuses, often associated with chronic rhinosinusitis.



Signs and Symptoms

- Nasal obstruction
- Reduced sense of smell
- Postnasal drip

- Nasal congestion
- Sinus pressure



Treatment

Nasal Corticosteroids:

- *Fluticasone:*
 - o *Adults:* 100 mcg once daily into each nostril, can be increased to 100 mcg twice daily if necessary.
 - o *Children:* 50 mcg once daily into each nostril, can be increased to 50 mcg twice daily if necessary.
- *Mometasone:*
 - o *Adults:* 100 mcg once daily into each nostril, can be increased to 200 mcg daily if necessary.
 - o *Children:* 50 mcg once daily into each nostril, can be increased to 100 mcg daily if necessary.

5.15.3. Disease Conditions of the Throat

5.15.3.1. Pharyngitis



Description

Pharyngitis is the inflammation of the pharynx, often leading to a sore throat. It can be caused by viral or bacterial infections.



Signs and Symptoms

- Sore throat
- Difficulty swallowing
- Red and swollen tonsils
- Fever
- Swollen lymph nodes



Treatment

Supportive

- Warm saline gargles
- Hydration
- Rest

Pharmacological

Pain Management:

- *Paracetamol (Acetaminophen):*
 - *Adults:* 500 mg to 1 g every 4-6 hours as needed (maximum 4 g per day).
 - *Children 6-12 years:* 250-500 mg every 4-6 hours as needed (maximum 2 g per day).
 - *Children 1-5 years:* 120-250 mg every 4-6 hours as needed (maximum 1 g per day).
- *Ibuprofen:*
 - *Adults:* 200-400 mg every 4-6 hours as needed (maximum 1.2 g per day).
 - *Children 4-7 years:* 150 mg every 8 hours (maximum 7.5-10 mg/kg daily).
 - *Children 7-12 years:* 200 mg every 8 hours (maximum 7.5-10 mg/kg daily).

Antibiotics: For bacterial pharyngitis (e.g., streptococcal infection).

- *Phenoxymethylpenicillin (Penicillin V):*
 - *Adults and children over 12 years:* 500 mg every 6 hours for 10 days.
 - *Children 6-12 years:* 250 mg every 6 hours for 10 days.
- *Amoxicillin:*
 - *Adults:* 500 mg every 8 hours or 1 g every 12 hours for 10 days.
 - *Children:* 50 mg/kg/day in divided doses every 8 hours for 10 days (not to exceed 1 g per dose).
- *Clarithromycin (if penicillin-allergic):*
 - *Adults:* 250-500 mg every 12 hours for 5-7 days.
 - *Children:* 7.5 mg/kg every 12 hours for 5-7 days (maximum 500 mg per dose).
- *Cefuroxime:*
 - *Adult:* 250 to 500 milligrams (mg) two times a day for 7 days.
 - *Children:* 20 to 30 milligrams (mg) per kilogram (kg) of body weight per day divided into two doses, taken for 7 days

5.15.3.2. Tonsillitis



Description

Tonsillitis is the inflammation of the tonsils, which are two oval-shaped lymph nodes located at the back of your throat. It can be caused by viral or bacterial infections.



Signs and Symptoms

- Sore throat
- Difficulty swallowing
- Red and swollen tonsils
- White or yellow patches on the tonsils

- Fever
- Swollen lymph nodes in the neck
- Bad breath
- Headache
- Ear pain



Treatment

Supportive

- Rest and hydration
- Warm saltwater gargles
- Lozenges for throat pain
- Humidifying the air
- Avoiding irritants like smoke and harsh cleaning products

Pharmacological

Pain Management:

- *Paracetamol (Acetaminophen):*
 - *Adults:* 500 mg to 1 g every 4-6 hours as needed (maximum 4 g per day).
 - *Children 6-12 years:* 250-500 mg every 4-6 hours as needed (maximum 2 g per day).
 - *Children 1-5 years:* 120-250 mg every 4-6 hours as needed (maximum 1 g per day).
- *Ibuprofen:*
 - *Adults:* 200-400 mg every 4-6 hours as needed (maximum 1.2 g per day).
 - *Children 4-7 years:* 150 mg every 8 hours (maximum 7.5-10 mg/kg daily).
 - *Children 7-12 years:* 200 mg every 8 hours (maximum 7.5-10 mg/kg daily).

Antibiotics: For bacterial tonsillitis (e.g., streptococcal infection).

- *Amoxicillin:*
 - *Adults:* 500 mg every 8 hours or 1 g every 12 hours for 10 days.
 - *Children:* 50 mg/kg/day in divided doses every 8 hours for 10 days (not to exceed 1 g per dose).
- Clarithromycin (if penicillin-allergic):
 - *Adults:* 250-500 mg every 12 hours for 5-7 days.
 - *Children:* 7.5 mg/kg every 12 hours for 5-7 days (maximum 500 mg per dose).
- *Cefuroxime:*
 - *Adult:* 250 to 500 milligrams (mg) two times a day for 7 days.
 - *Children:* 20 to 30 milligrams (mg) per kilogram (kg) of body weight per day divided into two doses, taken for 7 days

5.15.3.3. Laryngitis



Description

Laryngitis is the inflammation of the larynx (voice box), often leading to hoarseness or loss of voice. It can be acute (lasting less than three weeks) or chronic (lasting more than three weeks).

Causes

- *Acute Laryngitis:*
 - Viral infections (most common)
 - Bacterial infections
 - Fungal infections (e.g., Candida)
 - Vocal strain (yelling, singing, or speaking loudly for long periods)
- *Chronic Laryngitis:*
 - Persistent overuse of the voice
 - GERD (chronic acid reflux)
 - Smoking
 - Allergies (e.g., hay fever, allergic rhinitis)
 - Exposure to irritants (e.g., cigarette smoke, alcohol)



Signs and Symptoms

- Hoarseness
- Loss of voice
- Sore throat
- Tickling or rawness in the throat
- Dry cough
- Dry throat



Treatment

Supportive

- Resting the voice as much as possible
- Drinking plenty of fluids to stay hydrated
- Using a humidifier to keep the air moist
- Inhaling steam from a bowl of hot water or a hot shower
- Avoiding whispering, which strains the voice more than normal speech

- Avoiding irritants such as smoke, alcohol, and caffeine
- Sucking on lozenges, gargling with salt water, or chewing gum to moisten the throat
- Self-Care Tips
 - Avoid decongestants as they can dry out the throat.
 - Maintain good hand hygiene to prevent infections.
 - Avoid clearing the throat, which can irritate the vocal cords.
 - Eat a well-balanced diet to support overall health.

Pharmacological

Pain Management:

- *Paracetamol (Acetaminophen):*
 - *Adults:* 500 mg to 1 g every 4-6 hours as needed (maximum 4 g per day).
 - *Children 6-12 years:* 250-500 mg every 4-6 hours as needed (maximum 2 g per day).
 - *Children 1-5 years:* 120-250 mg every 4-6 hours as needed (maximum 1 g per day).
- *Ibuprofen:*
 - *Adults:* 200-400 mg every 4-6 hours as needed (maximum 1.2 g per day).
 - *Children 4-7 years:* 150 mg every 8 hours (maximum 7.5-10 mg/kg daily).
 - *Children 7-12 years:* 200 mg every 8 hours (maximum 7.5-10 mg/kg daily).

Antibiotics: Only if bacterial infection is confirmed.

- *Penicillin V:*
 - *Adults and children over 12 years:* 500 mg every 6-8 hours for 10 days.
- *Erythromycin:*
 - *Adults:* 250-500 mg every 6-8 hours for 10 days.
 - *Children:* 7.5 mg/kg every 6-8 hours for 10 days.

Corticosteroids: Sometimes used to reduce vocal cord inflammation, particularly in urgent cases.

- *Prednisolone:*
 - *Adults:* 30 mg daily for 5-7 days.
 - *Children:* Dose based on weight, typically 1-2 mg/kg/day.

5.15.3.4. Laryngopharyngeal Reflux (LPR)



Description

Laryngopharyngeal reflux (LPR) is a condition in which stomach acid flows back into the throat (pharynx) and larynx (voice box), causing irritation and inflammation.

The causes include:

- Dysfunction of the lower esophageal sphincter (LES) allowing acid to escape from the stomach
- Dietary factors (e.g., spicy foods, caffeine, alcohol)

- Obesity
- Smoking



Signs and Symptoms

- Hoarseness
- Chronic cough
- Throat clearing
- Sensation of a lump in the throat
- Sore throat
- Postnasal drip
- Difficulty swallowing



Treatment

Supportive

- Avoid foods and beverages that trigger reflux (e.g., spicy foods, caffeine, alcohol)
- Eat smaller, more frequent meals
- Avoid lying down immediately after eating
- Elevate the head of the bed
- Maintain a healthy weight
- Stop smoking
- **Self-Care Tips**
 - o Avoid eating late at night
 - o Wear loose-fitting clothes to avoid pressure on the stomach
 - o Stay upright for at least 3 hours after meals
 - o Use at least 2 pillows when lying in bed

Pharmacological

Proton Pump Inhibitors (PPIs): Reduce stomach acid production.

- *Omeprazole*: Adults: 20-40 mg once daily before a meal for 4-8 weeks.

5.16 DENTAL AND ORAL CONDITIONS

5.16.1. Dental Caries



Description

Dental caries is a tooth surface cavity caused by acid demineralization of tooth hard tissue. It occurs as a result bacterial conversion of refined carbohydrates to acids, which in prolonged contact with tooth surface leads to the demineralization. This process is entirely preventable but can progress to severe decay and tooth loss or complicated by infection



Signs and Symptoms

- Usually asymptomatic.
- A hole or black spot may be visible on any surface of a tooth.
- Tenderness on percussion of the affected tooth.



Treatment

Supportive

- Regular mouth rinse after refined carbohydrate intake
- Brushing of teeth at least twice a day with fluoridated tooth paste.
- Filling
- Tooth extraction

Pharmacological

- Paracetamol, oral,
Adults 500 mg-1 g 6-8 hourly
Children 6-12 years: 250-500 mg 6-8 hourly; 1-5 years: 120-250 mg 6-8 hourly
OR
- Ibuprofen, oral ,Adults 200-400 mg 8 hourly
Children 4-7 years: 150 mg 8 hourly (max. 7.5-10 mg/kg daily 6-8 hourly)
7-12 year: 200 mg 8 hourly (max. 7.5-10 mg/kg daily)
OR
- Diclofenac, oral , adult 50-100mg 12 hourly, IV 75mg Stat

5.16.2. Teething



Description

The eruption of the primary teeth (around 6 months old) is usually accompanied by inflamed and sore gingiva. Teething does not cause high fever or convulsion.



Signs and Symptoms

There may be irritability, disturbed sleep and drooling.



Treatment

- Analgesic/anti-inflammatory such as elixir paracetamol
- “Teething ring” or something hard to chew on, like hard toy

Trauma to soft Tissue and Primary (milk) Teeth

- Small superficial oral lacerations heal spontaneously and no antibiotic is indicated.
- Dirty lacerations need surgical debridement and antibiotic with:
 - o penicillin 12.5mg/kg qid for 5-7 days
OR
 - o Amoxicillin 25mg/kg tid for 5-7 days
OR
 - o Benzyl penicillin, 15-30mg/kg IV every six hours
 - o If hypersensitive to penicillin, use:
 - o Erythromycin 10-20mg/kg orally bd
OR
 - o Cephalexin 6.25mg/kg orally every 6 hours
OR
 - o Clindamycin (child: 5mg/kg up to) 300mg orally, bd for 5 days
- **Protocol for Painful Tooth/Teeth-** where possible, refer case to the dental department for identification and treatment of cause of pain. Variation in an individual's response to pain is affected by fatigue, anxiety and sometimes depression. While one is waiting for definitive dental treatment, the following analgesics could be given:
 - o **Mild Pain**
 - Paracetamol 500mg-1g orally 4 to 6-hourly
OR

- Other NSAIDS such as
- Ibuprofen 200-400mg- orally 8 hourly
- Diclofenac, oral , adult 50-100mg 12 hourly, iv 75mg stat
- o **Moderate Pain**
 - Tramadol 50-100 orally 12 hourly
- o **Severe Pain**
 - Pethidine 25mg-100mg SC/IMI 2 to 3-hourly PRN
OR
 - Morphine 2.5mg-10mg SC/IMI 2 to 3-hourly PRN

Trauma to Secondary / Permanent Teeth

- Permanent teeth start to erupt into the oral cavity at 5-6 years and continue up to the age of 21. After the initial eruption, root formation/development continues for a period of 18-30 months. Injuries during this phase have the potential to interrupt root development. Injuries involved are mostly fractures of the root or crown and displacement (luxation, intrusion, extrusion or avulsion).
- Treatment includes
 - o Oral paracetamol 500mg -1g TDS
OR
 - o Diclofenac, oral, adult 50-100mg 12 hourly, IV 75mg stat
OR
 - o Ibuprofen 200-400mg - orally 8 hourly for pain and immediate dental referral. Successful outcome depends on timely re-establishment of a normal periodontium (supporting structures around tooth).

5.16.3. Alveolar Osteitis

Dry Socket



Description

Severe dull pain post dental extraction, two-three days later. Tooth socket appears 'dry' with exposed bone and no blood clots, gingiva is inflamed.



Treatment

- Paracetamol 500mg-1g orally 8-hourly for 3 days
OR
- Ibuprofen 200-400mg orally 8 hourly for 3 days
Or
- Diclofenac, oral , adult 50-100mg 12 hourly
Dental referral for LA debridement and curettage to initiate socket healing

Infected Socket



Description

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



Signs and Symptoms

- 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)



Treatment

- Amoxicillin 500mg (PO) 8 hourly for 5–7 days
OR
- Azithromycin 500mg (PO) once a day for 3 - 5 days
OR
- Erythromycin 500mg (PO) 6 hourly for 5- 7 days
AND
- Metronidazole 400mg (PO) 8 hourly for 5 days.

Post extraction bleeding



Description

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. Bleeding socket can be primary (occurring within first 24 hours post extraction) or secondary occurring beyond 24 hours post extraction



Signs and Symptoms

- 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



Treatment

Supportive

- Ensure the patient airway, breathing and circulation are restored if required
- Check blood pressure and pulse rate and take quick history
- 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

- Analgesics may be needed:
 - Paracetamol (PO) 1gm 8 hourly for 3 days
OR
 - Diclofenac (PO) 50mg-100mg 8 hourly for 3 days
OR
 - Ibuprofen (PO) 400mg 8 hourly for 3 days
- Give local anesthesia (lignocaine 2% with adrenaline 1 in 80,000 IU)
- Tranexamic acid 500 mg (PO/IV) 8 hourly for first 24 hours.
- Administer Intravenous fluid especially Normal Saline 0.9% or Ringer's lactate in case of dehydration then followed by blood transfusion in case of haemoglobin below 7 g/dl in a patient who was otherwise healthy before tooth extract.

5.16.4. Tooth Sensitivities



Description

Usually due to attrition of teeth, abrasion or gingival recession



Treatment

Supportive

- Recommend brushing teeth with desensitizing toothpaste for sensitive teeth.
- Topical Fluoride gel, apply 12 hourly

5.16.5. Periodontal Disease

Bacterial Infections



Description

Causative organisms are usually a mixture of aerobic and anaerobic oral flora. All cases should ideally be referred to a dentist or dental therapist for appropriate treatment.

Gingivitis



Signs and Symptoms

- Presents as swollen gums that easily bleed on brushing teeth.
- Gingival redness
- Bad breath from the mouth



Treatment

- Local dental care such as regular tooth brushing to control bacterial plaque is usually sufficient
- Other adjuvant means of oral hygiene (dental flossing, tongue cleaning on the dorsal part, use of mouth washes including saline mouth wash)
- 0.2% chlorhexidine gluconate mouthwashes (if available), adjunct to tooth brushing
- Ascorbic acid (Vitamin C) 500mg od for 5 days

5.16.6. Acute Necrotising Ulcerative Gingivitis (ANUG)



Description

This is a painful yellowish-white ulcer of the interdental papillae and gingival margins which bleeds easily. Causative bacteria are a mixture of the anaerobes: *Borrelia vincentii*, *Fusobacterium fusiform*, *Bacteroidis* and *Treponema* species. The appearance of ANUG in an otherwise healthy individual may be the presenting sign of HIV infection.



Treatment

- Advise adequate oral hygiene
- 0.2% chlorhexidine gluconate mouthwashes (if available), adjunct to tooth brushing
- Metronidazole (10mg/kg) 400mg 8 hourly for 5 days

5.16.7. Periodontal Abscess



Description

Localised collection of pus in a periodontal pocket of a tooth



Signs and Symptoms

There is pain on lateral movement of the tooth and it may be quite mobile



Treatment

- Oral Amoxicillin 500mg PO 8 hourly
OR
- Azithromycin 500mg (PO) once a day for 3 - 5days
OR
- Erythromycin 500mg (PO) 6 hourly for 5- 7 days
AND
- Metronidazole 400mg orally 8 hourly for 5 days

5.16.8. Periodontitis



Description

This is usually caused by gram negative anaerobes which are also prominent in active disease.



Signs and Symptoms

Teeth involved are usually mobile and painful.



Treatment

- 0.2 % chlorhexidine gluconate mouthwash (if available) bd
- Doxycycline 100mg orally bd for 5 days
OR
- Oral Amoxicillin 500mg PO 8 hourly for 5 days
OR
- Phenoxy methyl penicillin (child 12.5mg/kg) up to 500mg orally 6-hourly for 5 days
PLUS
- Metronidazole 400mg orally TDS for 5 days (in moderately severe cases).
- Use Erythromycin (Child: 10 mg/kg up to) 500 mg orally, qid for 5 days in place of penicillin in penicillin allergy
- Pocket dental treatment for localised pus formation

ADULTS CONDITIONS

5.16.9. Pericoronitis



Description

This is an inflammation / infection of a gum flap (operculum) overlying a partially erupted tooth, usually a lower wisdom tooth (or lower third molars) - often traumatised by an over erupted upper wisdom tooth (or upper third molars).



Treatment

- Chlorhexidine gluconate 0.2% mouth wash
- Irrigation with 3% hydrogen peroxide
- Phenoxy methyl penicillin 12.5mg/kg four times daily for 5-7 days
OR
- Amoxicillin 25mg/kg three times daily for 5-7days
- If penicillin hypersensitive-
 - o Erythromycin 10-20mg/kg orally twice daily
OR
 - o Cephalexin 6.25 mg/kg orally 6-hourly

5.16.10. Facial Swelling and Infection



Description

Facial swelling can either be due to odontogenic causes (e.g. caries, retained roots, periodontitis) or non-odontogenic causes (e.g. soft tissue infection, fractures, osteomyelitis, sialoadenitis, foreign body). Infections can spread to the soft tissue around jaws, neck and cause cellulitis and suppuration. This can easily be life-threatening. In the absence of systemic signs and symptoms, odontogenic causes can be usually treated by local dental care, such as removal of the infected pulp tissue.



Signs and Symptoms

- Fever
- Lymphadenopathy
- Pain
- Suppuration
- Redness



Treatment

- Oral amoxicillin 500mg tds and metronidazole 400 tds for 5 days
- Patients hypersensitive to penicillin should be given either erythromycin or cephalexin.

- If progressive trismus arises and airway is compromised, admit case and give:
 - o Benzyl Penicillin 1 MIU-2MIU (600mg – 1200mg) IV 6 hourly
OR
 - o Cloxacillin 500mg Po 6 hourly
PLUS
 - o Metronidazole 500mg IV 8 hourly
PLUS
 - o Gentamicin 3-5mg/kg/day IV (ideally not exceeding 48 hours; in patients with poor renal function serious damage to the vestibular apparatus may result from gentamicin. Get an estimate of renal function before prescribing)
- Pus must be drained surgically by the dentist

5.16.11. Acute Dento-alveolar Abscess (Dental abscess)



Description

A dento-alveolar abscess is an acute lesion characterized by localization of pus in the structures that surround the teeth.

Usually the origin is a bacterial infection that has accumulated in the soft, often dead, pulp of the tooth. This can be caused by tooth decay, broken teeth or extensive periodontal disease (or combinations of these factors) or a failed root canal treatment.



Signs and Symptoms

- The pain is continuous and may be described as extreme, growing, sharp, shooting, or throbbing
- Sensitive to touch
- Swelling on the affected side
- Redness
- Partial trismus
- Pus discharge



Investigations

Pus for Grams stain, culture and sensitivity if the patient doesn't respond to initial antibiotic treatment.



Treatment

Supportive

- 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

- Amoxicillin 500mg (PO) 8 hourly for 5 days
OR
- Azithromycin 500mg (PO) once a day for 3 - 5 days
OR
- Erythromycin 500mg (PO) 6 hourly for 5- 7 days
AND
- Metronidazole 400 mg (PO) 8 hourly for 5 days.
- Severe cases
 - Amoxicillin Clavulanic acid 625mg (PO) 8 hourly for 5 days
AND
 - Metronidazole 400 mg (PO) 8 hourly for 5 days.
- If patients are allergic to penicillins:
 - 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
 - Ampicillin 500mg IM/IV 6 hourly for 5 days
OR
 - Ceftriaxone 1 gm IV once daily for 5 days
AND
Metronidazole 500 mg IV 8 hourly for 5 days

Criteria for Referral to Dental/Maxillofacial Surgeon

- Rapidly progressive infection
- Difficulty in breathing
- Difficulty swallowing
- Fascia space involvement
- Elevated body temperature (greater than 39°C)
- Severe jaw trismus/failure to open the mouth (less than 1cm)
- Toxic appearance
- Compromised host defences

5.16.12. Ludwig's Angina



Description

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.



Signs and Symptoms

- Brawny induration
- Tissues are swollen, board like, not pitted and no fluctuance
- Respiratory distress
- Dysphagia



Treatment

Supportive

- 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

- Benzylpenicillin 1 to 2 MIU (600mg to 1200 mg) by IV injection 6 hourly for 5 days
OR
- Amoxicillin + clavulanic acid 625mg (PO) 8 hourly for 5 days
AND
- Metronidazole 500mg IV 8 hourly for 5 days
- If allergic to penicillin use A: Erythromycin (PO) 500mg 6 hourly for 5 days
OR
- Ceftriaxone 1g-2g 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

5.16.13. Osteomyelitis of the Jaw



Description

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.



Signs and Symptoms

- 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 radiolucency.
- Perform culture and sensitivity of the pus to detect the specific bacteria



Treatment

Supportive

- 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

- Amoxicillin 500mg 8 hourly for 10 days
OR

- Azithromycin 500mg (PO) once a day for 3 - 5 days
OR
- Erythromycin 500mg (PO) 6 hourly for 5- 7 days
AND
- Metronidazole 400mg (PO) 8 hourly for 10 days.
- If culture is available, treat according to result.

5.16.14. Viral Infections

Primary Herpetic Stomatitis



Description

Causative agent is Herpes Simplex Virus 1 (HSV 1).



Signs and Symptoms

- Multiple oral ulcers
- Fever
- Malaise
- Anorexia and irritability
- In children, they may have drooling of saliva



Treatment

- For symptomatic relief; soft diet and adequate fluid intake, since this is a self-limiting illness
- Antipyretic such as paracetamol 125mg to 500mg 8 hourly for 3-5 days
- Local antiseptic mouthwashes such as chlorhexidine 0.2% solution
- Acyclovir, 10mg/kg 8 hourly orally for 7-10 days

Herpes simplex labialis (cold sore)



Description

Causative agent is HSV 1. The virus is latent in the trigeminal ganglia and is reactivated as herpes labialis. It is precipitated by sunlight, trauma, systemic disease or stress.



Signs and Symptoms

Papules are followed by blisters then pustules crusting.



Treatment

- Acyclovir cream (5%) applied 6 hourly early, before blisters appear.

Herpes zoster (shingles)



Description

Causative agent is Varicella Zoster Virus (VZV) (causative organism for chicken pox).



Signs and Symptoms

It presents as an acute painful, vesicular rash along the dermatomal distribution of the sensory nerves; commonly of the trigeminal branches (mandibular and maxillary).



Treatment

- Acyclovir 800mg oral 5 times daily
OR
- Valaciclovir 1g oral, 8 hourly for 7 days; beneficial only if started within 72 hours from the onset of the vesicles.
AND
- Paracetamol 1g 8 hourly for 5 days
OR
- Diclofenac (PO) 50mg- 100mg 8 hourly for 5 days
OR
- Ibuprofen (PO) 400mg 8 hourly for 5 days

5.16.15. Fungal Infection

Oral candidiasis



Description

A white creamy plaque which leaves a red base when wiped off. Causative agent is usually *Candida albicans*, when triggered off by the use of antibiotics, steroids, unhygienic dentures, smoking and in immunocompromised hosts. It can be seen in neonates too.



Signs and Symptoms

- White creamy plaque
- Erythema on the mucosa
-



Treatment

- Eliminate predisposing factors
- Nystatin 100,000 U/ml suspension 1ml oral, 6 hourly for 7-14 days.
- For severe cases in immunocompromised hosts, give itraconazole 100-200 mg oral, daily for 14 days
OR
- Nystatin suspension 2ml orally 6 hourly for 7-14 days

ADULTS CONDITIONS

5.16.16. Trigeminal Neuralgia



Description

Characterised by an unilateral, sharp, stabbing and intermittent pain in division of the trigeminal nerve but no sensory loss. Diagnosed by relief following nerve block using bupivacaine 0.5% or 2% Lignocaine



Signs and Symptoms

Unilateral, sharp, stabbing and intermittent pain in division of the trigeminal nerve but no sensory loss



Treatment

- Carbamazepine 100-200mg oral once or 12 hourly, Dose can be increased to 400-600mg and even up to 1.2g/day.
OR
- Gabapentin 300mg on day 1, then day 2, 300mg 12 hourly, day 3, 300mg 8 hourly
OR
- Pregabalin 150 mg daily in 2 to 3 divided doses , increased to 300mg daily in 2 to 3 divided doses (to be increased after 3 to 7 days. 600mg daily in 2 to 3 divided doses after 7 days)
AND
- Diclofenac (PO) 50mg 8 hourly for 5 days
OR
- Ibuprofen (PO) 400mg 8 hourly for 5 days

5.16.17. Bell's Palsy



Description

Acute unilateral, lower motor neuron type of facial palsy of unknown aetiology (maybe viral). Most recover spontaneously.

It is advisable to protect the eye with pad or artificial tears to prevent corneal damage when eyelids cannot close properly.



Treatment

Steroids are of unproven value but still, certain authorities advise giving oral prednisolone 5-10mg bd for 5 days early during the disease to aid recovery.

5.16.18. Oral Ulcers

(Major, minor and herpetiform)



Description

Oral ulceration is probably the most common oral mucosal disease seen. It can potentially be the most serious too. There are many causes and one must make careful history and examination to help diagnosis.



Treatment

- Hydrogen peroxide solution 3% 6 hourly for at least 5 days
- Chlorhexidine 0.2% topical oral gel 12 hourly
- Antibiotic use is rarely indicated
- Oral prednisolone 5-10mg bd for 5 days
- A corticosteroid cream application may help but if the ulcer does not heal in 2-3 weeks' time, refer immediately for dental assessment.

Sedatives for Dental Procedures

To be used in anxious patients such as those who are phobic to needles, or in children. Use:

- Diazepam 5-30mg 0.5-1 hour before procedure. This can also be given in divided doses such as 5mg nocte, 5mg in the morning and 5mg at 0.5-1 hour before dental procedure.
- In children, Diazepam 2mg (or according to age), is given either orally, IM or PR at 0.5-1 hour before the procedure
- OR
- Midazolam 0.1mg/kg orally, SC, IM or IV.

Anti-Emetic Medications

Important especially for post-operative Oral and Maxillofacial Surgery (OMFS) patients on inter-maxillary fixation (wired jaws).



Treatment

- Metoclopramide 10mg 6 hourly PRN IV or IM
- OR
- Prochlorperazine 12.5mg 6 hourly PRN IM; or 5-10 mg orally or 25mg PR
- OR
- Promethazine 25-50mg 12 hourly IM

5.16.19. Temporo-mandibular Joint dysfunction and masticatory muscle dysfunction



Description

Temporo-mandibular Joint (TMJ) dysfunction and or masticatory muscle dysfunction is a complex of derangements affecting only the joint, the muscles of mastication or both. The pathological process may be

due to joint arthropathy, disc disease or tension in tendons and masticatory muscles from abnormal movement behaviour or occlusal disharmony.

Causes

- Behavioural induced bruxism
- Arthropathy
- Trauma (physical)
- Occlusal disharmony



Signs and Symptoms

- Pre-auricular pain associated with opening and closing the mouth
- Clicking noise on opening and closing
- Dull, persistent pain in masticatory muscles
- Tenderness in the TMJ associated with mouth opening
- Clicking in TMJ on mouth opening and closing
- Tenderness in muscles of mastication on contraction
- Occlusal abnormalities



Investigations

- X-ray-TMJ and OPG views
- ESR



Treatment

Supportive

- Occlusal splints
- On-lays
- Reduce stress and encourage relaxation in masticatory apparatus

Pharmacological

- For muscle relaxation Diazepam, oral,
 - o Adults: 5 mg 12 hourly
 - o Children 12-18 years: 5 mg 12 hourly; 5-12 years: 2.5 mg 12 hourly
- For pain relief- Ibuprofen, oral,
 - o Adults: 400 mg 12 hourly as required

- o Children 6-12 years: 200-400 mg 6-8 hourly as required; 1-5 years: 100-200 mg 6-8 hourly as required; 3 months-1 year: NOT recommended.

5.17 NOTIFIABLE DISEASES

5.17.1. Anthrax



Description

This is a highly infectious disease of animals caused by *Bacillus anthracis*, transmitted to man by contact with the animal or animal products (carcasses) or faeces. It is a notifiable disease. It is classified as cutaneous, pulmonary or inhalational or gastrointestinal. Farmers, animal product industry, laboratory personnel are at high risk of infection.



Signs and Symptoms

- The incubation period varies from 12 hours to 5 days
- **The cutaneous form:**
 - o painless (but may be pruritic) red-brown papule that enlarges with considerable peripheral erythema, vesiculation, and induration. Central ulceration follows, with serosanguineous exudation and formation of a black eschar.
 - o Local lymphadenopathy
 - o Fever
 - o Malaise
 - o Nausea and vomiting
 - o Myalgia
 - o Headache
- **Pulmonary (Inhalation) Anthrax:**
 - o Progresses rapidly after non-productive cough and low-grade fever
 - o Pulmonary oedema
 - o Pleural effusion
 - o Severe shortness of breath
 - o Cyanosis
 - o Chest pain
 - o Septic shock



Investigations

- Microscopy and culture of swabs from cutaneous lesions or sputum
- Blood culture
- Lumbar puncture if anthrax meningitis is suspected
- Serological tests (ELISA)
- PCR
- Chest x-ray/CT scan of chest may show diffuse patchy infiltration; the mediastinum is widened because of enlarged haemorrhagic lymph nodes.



Treatment

Table 140: Treatment of Anthrax

Non-pregnant adult	Pregnant/lactating woman	Children
Ciprofloxacin 500mg 12 hourly	Ciprofloxacin 500mg 12 hourly	Ciprofloxacin 30 mg/kg/day divided 12 hourly (max 500mg /dose)
Doxycycline 100mg every 12 hrs		Amoxicillin 75mg/kg/day every 8 hours (max 1 g/dose)
Levofloxacin 750 mg every 12 hours		
Moxifloxacin 400 mg every 24 hours		
ALTERNATIVE		
Clindamycin 600 mg every 8 hours	Levofloxacin 750 mg every 12 hours	Clindamycin 30mg/kg/day divided every 8 hrs (max 600mg/dose)
		Levofloxacin <50kg: 16 mg/kg/day divided 12 hrs (max dose, 250mg/dose)

- **Prevention**
 - o Vaccination for those at high risk (veterinarians, laboratory technicians, butchers and employees of textile mills processing goat hair)
 - o Use of personal protective equipment, gloves, overalls, and boots.
- **Post exposure prophylaxis**
 - o Given to those with risk of inhalation of anthrax spores during the burning of infected carcasses.
 - o The evaluation of these cases should be in consultant with the Public health specialist and infectious disease physicians.

- o The Regimens for the prophylaxis should be:

Table 141: Anthrax Post-Exposure Prophylaxis

Drug name and dosage	Duration
Doxycycline 100 mg twice daily	4 weeks post exposure
Ciprofloxacin 500 mg twice daily	

For cutaneous exposure, the prophylaxis can be administered for a period of 7 days.



Referral Criteria

Disseminated or meningitis anthrax should be referred for specialist treatment

5.17.2. The Plague



Description

This is an acute, severe infection appearing in, bubonic, septicemic or pneumonic form, but pharyngeal and meningeal could also be found. This is caused by a bacterium called *Yersinia pestis*; a short bacillus that often shows bipolar staining (especially with Giemsa stain). Plague often occurs primarily in rodents e.g. rats. Plague is transmitted from rodent to man by the bite of an infected flea vector. Man to man infection occurs through inhalation of droplets in pneumonic plague. Septicaemia and meningeal plague are due to haematological spread.



Signs and Symptoms

- Headache, Severe malaise, Vomiting, Chills, Muscle pain, Cough, Abdominal pain, Chest pains
- **Bubonic Plague**
 - o This is the commonest form. The incubation period varies from a few hours to 12 days but is usually 2 to 5 days. Onset is abrupt often associated with chills, fever, rapid pulse with low blood pressure (hypotension) may occur. Enlarged lymph nodes (buboes) appear very shortly before the fever. The femoral and inguinal lymph nodes are most commonly involved; followed by axillary cervical or multiple nodes. Typically, the nodes are extremely tender and firm, surrounded by considerable oedema. The liver and the spleen may be palpable. The mortality rate of the untreated patient is about 60%.
- **Primary Pneumonic Plague**
 - o This has 2 to 3 days incubation period, followed by abrupt onset of high fever, chills, tachycardia and headache, often severe. Cough is not prominent initially. Cough develops within 20 to 24 hours with the sputum, mucoid at first, and rapidly becomes bloody.



Investigations

- Chest X-ray shows progressive pneumonia. Most untreated patients die within 48 hours of the onset of symptoms.
- Diagnosis is based on the recovery of the organisms which may be isolated from blood, sputum or lymph node aspirate.
- Needle aspiration of bubo is preferable since surgical drainage may disseminate infection. Inject sterile Phosphate buffered saline in the bubo and aspirate the pus.



Treatment

- Uncomplicated plague
- Treatment in Adults
 - Streptomycin 15mg/kg 12 hourly for 10 days or Gentamicin 5mg/kg IM or IV qid or Doxycycline 100mg po bid or Chloramphenicol 25mg/kg IV qid
 - Tetracycline 250mg -1g orally 6 hourly for 7 to 10 days or
 - Chloramphenicol 25mg/kg I.V or orally 6 hourly for 7 to 19 days.
- Treatment in pregnancy
 - Gentamycin 5mg/kg IM
 - Doxycycline 100mg PO bid
- Treatment in children
 - Streptomycin 15mg/kg IM BID
 - Gentamycin 2.5mg/kg IM
 - Doxycycline 2.2mg/kg IV BID
 - Chloramphenicol 25mg/kg IV QID
- Prevention
 - This is based on rodent control and the use of repellent to minimize fleabites. Through immunization with standard killed plague vaccine gives protection to at-risk individuals e.g. veterinary doctors.

5.18 SURGICAL CONDITIONS

5.18.1. Injuries



Description

Injuries refer to harm that occurs to the body. They may be intentional or due to accidents. The cause may be physical, chemical, burns, or traffic accidents.

Injuries may cause temporary or permanent disability. Injuries may be divided into minor and major injuries.

5.18.1.1. Minor injuries



Description

These include cuts and blunt injuries. Cuts are usually from sharp objects, especially household implements. Blunt injuries may be as a result of impact with an object.



Signs and Symptoms

Cuts may bleed and if seen more than 8 hours, may develop an infection and pus may form. Blunt injuries will cause bruises or haematomas or more serious deeper injuries, such as bone fractures.



Treatment

Supportive

- Clean open wounds thoroughly with normal saline or a disinfectant such as chlorhexidine gluconate.
- Remove foreign matter and dead tissue
- Suture fresh wounds
- Do not suture open wounds after 8 hours of injury except those that are on the face.
- Cover the wound with a dressing

Pharmacological

- Tetanus toxoid, 0.5ml intramuscularly as a single dose

- Anti-tetanus serum, 250 IU as a single dose (for non-immunised patients)
- Paracetamol, adults; 500mg-1g orally 3 times daily, children; 10-20mg/kg orally 3 times daily
OR
- Ibuprofen; Adult 400mg orally 3 times daily, children 5mg/kg 3 times daily
- Haematomas usually resolve on their own.

5.18.1.2. Major injuries



Description

These are multiple injuries or serious injuries to specific body parts.

Multiple injuries

These may be characterised by fractures, bruises, internal injuries, head injuries, spinal injuries, chest trauma, and eye injuries. The patient will present with two or more of such injuries. They may be due to accidental injuries at home, road traffic accidents, or assault.



Treatment

- Initially, a quick history and examination should be carried out to establish the severity of the injuries.
- Establish a clear airway and assess if patient is breathing
- Remove any debris in the mouth
- Assess circulation and set up an intravenous line with a large bore cannula.
- Control overt bleeding and watch closely for concealed bleeding
- Resuscitate for shock if present
- Group and cross match blood
- Clean and debride wounds before suturing
- Immobilize fractures immediately
- Drugs
- Tetanus toxoid, 0.5ml intramuscularly as a single dose



Referral Criteria

- Head injuries
- Chest injuries
- Suspected internal haemorrhage
- Loss of consciousness

- Need of additional care.

Specific injuries

Head injuries



Description

Injuries to the scalp, skull and brain. The patient may present with a laceration, fracture, a history of altered consciousness or amnesia. Head injuries may be associated with a fracture or dislocation of the cervical spine.



Signs and Symptoms

- Bleeding from the mouth, nose and ears
- Headache
- Light headedness
- Loss of consciousness
- Confusion
- Vomiting
- Raised intracranial pressure – hypertension, bradycardia, irregular breathing



Investigations

- X-ray of the cervical spine (lateral view)
- X-ray of the skull (anteroposterior, lateral and Townes' views)
- CT-Scan of the brain and cervical spine



Treatment

General Management

- An accurate history and thorough physical examination is required ,.
- Assess the conscious level using the Glasgow Coma Scale (GCS). The face and head should be examined carefully for blood or cerebrospinal fluid draining from the nose or ears, suggesting a fractured base of the skull
- Examination of the eyes is needed as a unilateral fixed and dilated pupil may indicate a haematoma on the same side
- The patient should be admitted to hospital for observation for at least 24 hours, , if there is:

- History of loss of consciousness
- Loss of consciousness on arrival in hospital
- Focal neurological signs
- Post-traumatic amnesia
- Significant drowsiness
- Severe headache or vomiting
- Blurred vision
- Skull fracture
- During Admission ensure airway is patent and maintainable,
- monitor hourly GCS, breathing pattern, vital signs, and pupil reaction
- patient should be nursed with the head propped up at 30°
- Severe injuries need specialised management by a neurological centre
- Restrict intravenous fluids to minimise cerebral oedema (give 100ml/hr). and maintain a urine output of 0.5 – 1ml/kg/hour.



Referral Criteria

- GCS of 8 and below
- Suspected intracranial bleeding
- Absence of CT-brain services

Facial injuries



Treatment

- Maintain the airway as swelling may be severe
- Intubation or tracheostomy may be performed, if necessary
- Prophylactic antibiotics should be given for facial fractures
- Suture wounds after thorough irrigation with saline and debridement

Spinal injuries



Description

Injury to the vertebral bodies with/without spinal cord involvement. This should always be suspected in patients with head injury or multiple trauma(s).



Signs and Symptoms

- Numbness
- Paresthesia
- Weakness of the limbs
- Pain radiating down a limb
- Urine or fecal incontinence.



Investigations

- Lateral view X-ray of the whole spine,



Treatment

- Stabilize cervical spine with a collar
- The patient should be moved very carefully if required, maintaining the neck in the midline and using log-roll technique
- Refer for specialised management, which will be needed for specific injuries.

Eye injuries

For penetrating or blunt trauma refer the patient for specialised treatment at a higher level of care. (Section 5.15)

Chest injuries



Description

Physical injuries to the ribs, pleura, heart and lungs.



Signs and Symptoms

- Chest Pain, Dyspnea, Unequal movement of the chest wall
- Surgical emphysema of neck and chest, Palpable rib fractures
- Bruising, Tracheal deviation , Restlessness and Central cyanosis
- Tachycardia and Hypotension



Investigations

- Chest X-ray (anteroposterior view)
- Lung Ultra-sound
- ECHO
- CT-scan if diagnosis is equivocal

NB: Look for signs of tension pneumothorax and intervene promptly.

Bruising over the lower left ribs may indicate a ruptured spleen

Bruising over the right lower ribs may indicate a ruptured liver



Treatment

- Rib fractures - adequate analgesia and chest physiotherapy
 - Flail chest
 - The patient may need oxygen or mechanical ventilation
 - Ribs may need to be fixed.
 - Refer to a higher level or specialist care
- Open Pneumothorax:
 - Conservative management
 - Apply a rectangular sterile dressing taped securely on 3 sides, 1 side untapped, allowing intrapleural air to escape
 - May require an intercostal drainage (ICD)
 - Refer for appropriate treatment if patient's condition deteriorates
- Tension Pneumothorax
 - This is an emergency
 - Convert to open pneumothorax by pushing a large-bore needle into the 2nd intercostal space along the midclavicular line
 - Insert an intercostal underwater seal drainage
 - Symptomatic Haemothorax
 - Insert an intercostal underwater seal drainage
 - The patient should be referred to a higher level or specialist care if there is concern of on-going bleeding (more than 1500ml/24hrs)

Abdominal injuries



Description

Abdominal injuries can be penetrating or blunt. Penetrating injuries are usually due to stab and bullet wounds. The patient may present with a metal protrusion or disembowelment. Blunt injuries are usually due to a fall, blows or kick to the abdomen



Signs and Symptoms

- Abdominal pain
- Abdominal distension
- Rigidity
- Tenderness
- Protruding viscus



Investigations

- Diagnostic peritoneal lavage
- Ultra-sound
- CT-abdomen when diagnosis is equivocal



Treatment

- All abdominal bullet or stab wounds should be explored by laparotomy
- If there is peritonism in blunt abdominal injuries, explore by laparotomy
- Analgesia and antibiotics if indicated

Renal injuries



Description

There is usually microscopic or macroscopic hematuria.



Signs and Symptoms

- Swelling in the loin area
- Bruising and tenderness in the loin area



Investigations

- Abdominal ultrasound
- Intravenous urogram



Treatment

- Catheterise patient
- Refer the patient to a specialist for specific treatment

5.18.1.3. Burns



Description

A burn is an injury occurring after exposure of the body surface to friction, chemicals, electricity or extreme temperature. Burns may be partial or full-thickness.



Signs and Symptoms

- Partial-thickness burns
- Appears red
- Blisters may be present
- Pain
- Full-thickness burns
- Appears white or charred
- Painless
- Loss of sensation
- Visible deep structures like bone and muscle



Treatment

- Assessment
 - Airway patent and maintainable
 - Breathing – spontaneous, regular, provide oxygen if required
 - Circulation – examine for shock and loss of fluids
 - Disability – level of consciousness, adequate analgesia
 - Exposure - Assess the extent and depth of the burn and look for signs of infection
 - Drugs
 - Paracetamol, adults; 500mg-1g PO/IV 3-4 times daily, children; 10-20mg/kg PO/IV 3 times daily
- WITH/

- o Ibuprofen 400mg 3 times daily OR Diclofenac 50-100mg 2-3 times daily
OR
- o Morphine adult; 10mg orally 4-6 times daily; children 0.15mg/kg 4-6 times daily
OR
- o Ketamine 0.1-0.3mg/kg orally 2 times daily
OR
- o Pethidine, 0.5-1mg/kg intramuscularly 4-6 hourly for severe burns especially in the first 24 hours.

Pain management should be based on severity of pain using the W.H.O pain ladder approach.

- Tetanus toxoid 0.5ml intramuscularly as a single dose
- Topical antibacterial agents – silver nitrate, and silver sulphadiazine cream
- Supportive
 - o High calorie, high proteins diet
 - o Nurse patient in a warm room/ward. Active heating using a heater or air-conditioning system.
 - o Physiotherapy for burns affecting joints as soon as the patient is resuscitated and pain has been controlled
- Specific Care
 - o Fluid replacement (refer to table xxx below).
 - o Dress burns with topical antibiotics such as silver sulfadiazine and cover the wounds

Avoid routine use of systemic antibiotics except when there is evidence of infection

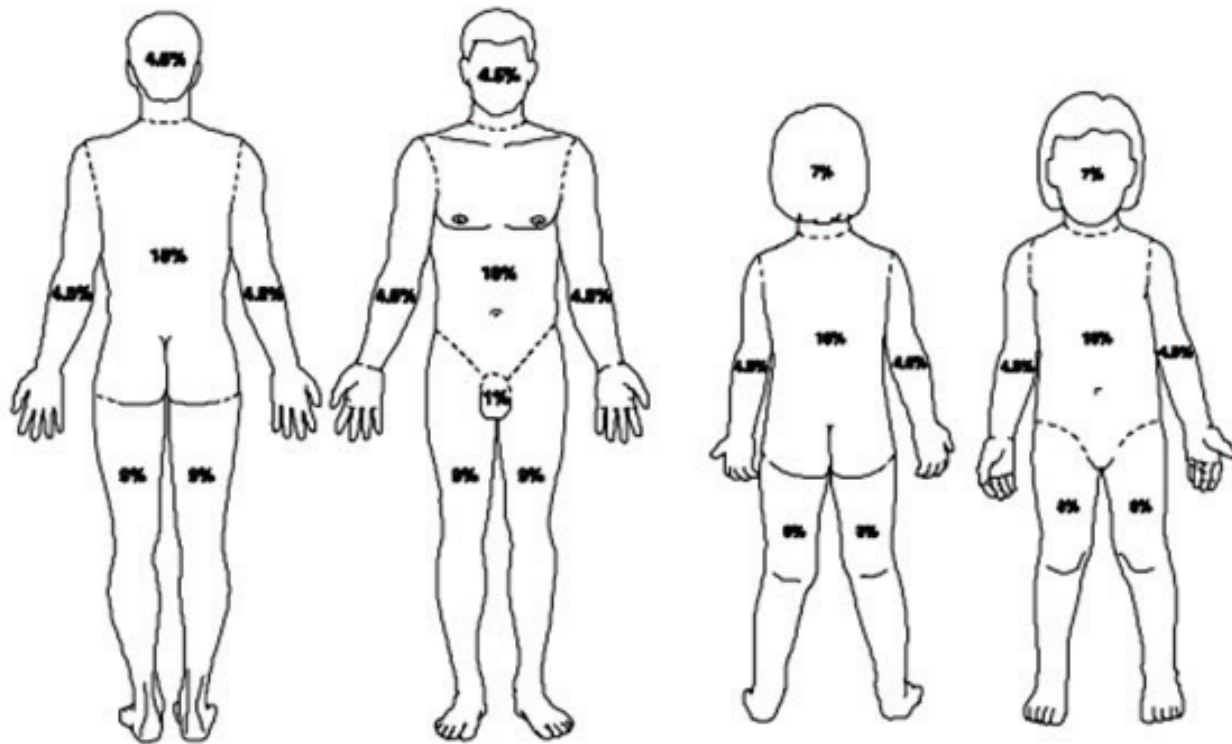
- o Wash burns twice a day with normal saline
- o Avoid shared bath tubs in hospitals to prevent cross infection
- o Specific areas such as the eyes, eyelids, ears, perineum and hands need specific care
- o Transfusion in patients with burns should be done after 72 hours after injury in stable patients. Subsequently, haemoglobin should be monitored weekly and follow up transfusion if necessary.
- o Monitor urine output. It should be at least 0.5-1ml/kg/hour
- o All patients with deep and extensive burns should be referred to a specialist.
- Determination of burn size
 - o The burn size in adults is determined using the rule of nines in which the following body areas are taken to represent 9% or 18%:

Table 142: Rule of Nines

Whole of each upper limb	Whole of each lower limb	Front of trunk	= 9%
Back of trunk			= 18%
Whole of head and neck			=18%
			=9%
Perineum			=1%

In children, the burn size can be determined using Lund and Browder chart.

Figure 16: Lund and Browder chart



Lund and Browder Chart

Age	0	1	5	10	15	Adult
A=Half of Head	9.5	8.5	6.5	5.5	4.5	3.5
B=Half of Thigh	2.75	3.25	4.0	4.25	4.25	4.75
C=Half of Leg	2.5	2.5	2.75	3.0	3.25	3.5

- **Fluid therapy in burns**
 - o Total Fluid requirements/day are calculated by adding fluid replacement and maintenance in 24 hrs.
- **Fluid replacement**
 - o Use Parklands Formula for Ringers Lactate:
 - $4\text{ml} \times \text{body weight(kg)} \times \text{total burns surface area}$
 - Give half in the first 8 hours from injury, the remaining half to be given in the remaining 16 hours.

Maintenance requirements for children can be calculated using Holliday-Segar method as indicated in table below:

Table 143: Holliday-Segar method

	Volume/day	Rate/hr
First 10kg	100ml/kg/day	4ml/kg/hr
Next 10kg	50ml/kg/day	2ml/kg/hr
Every additional kg after	20ml/kg/day	1ml/kg/hr

Examples:

5kg infant; maintenance fluids: $5 \times 100\text{ml} = 500\text{ml/day}$ **OR** $[(5 \times 4\text{ml}) = 20\text{ml/hr}]$

30kg child; maintenance fluids:

$[(10 \times 100\text{ml}) + (10 \times 50\text{ml}) + (10 \times 20\text{ml})] = 1700\text{ml/day}$ **OR**

$[(4\text{ml} \times 10) + (2\text{ml} \times 10) + (1\text{ml} \times 10)] = 70\text{ml/hr}$

Maintenance fluids in adults is calculated as: 35-40ml/kg. Maximum 3L in 24 hours.



Complications

- Hypovolemic or septic shock
- Hypothermia
- Electrolyte abnormalities
- Pulmonary oedema may occur after inhalation of smoke
- Infection
- Anaemia
- Contractures
- Acute peptic ulcers
- Acute kidney injury

ADULTS CONDITIONS

5.18.1.4. Bites



Description

These are injuries which are inflicted by animal or human teeth. Common animal bites are due to dogs, snakes, crocodiles, and hippo attacks.



Signs and Symptoms

- Open wounds
- Bleeding
- Swelling which can lead to compartment syndrome
- Associated fractures or amputations if inflicted by large animals



Treatment

Supportive

- Generously irrigate the wound with normal saline
- Adequate debridement of the wound
- DO NOT SUTURE WOUNDS. Leave the wound open for delayed primary or secondary suture except for facial bites and actively bleeding vessels
- Limb elevation to reduce swelling
- If there is compartment syndrome, fasciotomy must be done
- Partial-traumatic amputation requires surgical completion, aggressive debridement and wound care.

Pharmacological

- Tetanus toxoid, 0.5ml intramuscularly as a single dose.
- If the bite is from a suspected rabid animal, administer post-exposure rabies treatment.
- For snake bites, refer to section on medical emergencies (refer to Chapter 1.2.3)
- **Major Bites**
- Ceftriaxone Adult: 2g IV once daily. Children 50mg/kg once daily, maximum 2g daily.
- Metronidazole Adult: 500mg IV 3 times daily. Children 7.5mg/kg 3 times daily.
- Tramadol Adult: 50mg IV/PO 1-3 times daily
- WITH
- Paracetamol Adult 500mg-1g IV/PO 3 times daily. Children 10-15mg/kg 3 times daily.
- **Minor Bites**
- Amoxicillin/Clavulanic Acid Adult: 625mg PO 2-3 times daily. Children 15-30mg/kg (based on Amoxicillin component) 2-3 times daily.
- Metronidazole, adults; 200-400mg orally 3 times daily, children; 7.5mg/kg orally 3 times daily for 5 days
- Paracetamol Adult 500mg-1g IV/PO 3 times daily. Children 10-15mg/kg 3 times daily.
- AND/OR
- Ibuprofen Adult: 400mg 3 times daily. Children: 10mg/kg 3 times daily.



Complications

- Infection with both aerobic and anaerobic bacteria and viruses.
- Compartment syndrome
- Gangrene
- Loss of limb/disability

5.18.2. Intestinal obstruction



Description

Inability to propel intestinal contents distally. It can either be small or large bowel obstruction



Signs and Symptoms

- Abdominal pain
- Abdominal distension
- Vomiting
- Constipation
- Difficulties in breathing
- Abdomen tympanic to percussion
- Increased bowel sounds
- Empty rectum on digital rectal examination



Investigations

- Plain abdominal xrays in erect and supine views
- Full blood count
- Urea, creatinine and electrolytes



Investigations

Supportive

- Insert nasal gastric tube for decompression
- Urethral catheterisation
- Insert two wide bore canulae for fluid resuscitation
- Pharmacological
- Prophylactic antibiotics (cover for aerobic and anaerobic bacteria)
- Analgesia (WHO pain ladder guideline)

Definitive

- Laparotomy

NB: refer patient early if surgery can not be done immediately

5.18.3. Appendicitis



Description

Inflammation of the appendix. It can occur in children 5 years old and above.



Signs and Symptoms

- Migratory pain from the umbilicus to right iliac fossa
- Nausea and vomiting
- Abdominal pain
- Fever
- Tenderness in right iliac fossa
- Rebound tenderness
- Special signs: Psoas sign, Rovsing sign, Obturator sign etc



Investigations

- Full blood count- look for leucocytosis
- Abdominal ultrasound
- CT scan if diagnosis is equivocal



Treatment

- Antibiotics (cover for aerobic and anaerobic infections)
- Analgesia (as per WHO pain management guideline)
- Appendicectomy



Complications

- Appendicular mass
- Appendicular abscess

5.18.4. Inguinal hernia



Description

Protrusion of a viscus or part of a viscus beyond its normal confines. Inguinal hernia is the commonest type of a hernia



Signs and Symptoms

- Swelling in groin and scrotum
- Might be painful if irreducible
- Vomiting if obstructed



Investigations

- Abdominal Xrays if obstruction is suspected



Treatment

- Herniotomy in children
- Herniorrhaphy/hernioplasty in adults

- Antibiotics (cover for aerobic and anaerobic infections)
- Analgesia (as per WHO pain management guideline)



Complications

- Obstruction
- Strangulation

5.18.5. Abscess



Description

Confined pocket of pus that collects in tissues, organs or spaces inside the body. Commonly affected areas include submandibular, axilla, cervical, perianal, gluteal, scalp and breast.



Signs and Symptoms

- Painful swelling which is fluctuant
- Fever



Treatment

- Antibiotics (cover for aerobic and anaerobic infections)
- Analgesia (as per WHO pain management guideline)
- Surgical drainage

5.19.6. Testicular Torsion



Description

This is the twisting of the testis along its vertical axis, resulting in compromised blood supply to the testis and the adjoining spermatic cord. It may be spontaneous or following trauma.. It may also result from anomalies in the development of the tunica vaginalis and the spermatic cord.



Signs and Symptoms

- Severe local pain
- Nausea
- Vomiting
- Scrotal swelling
- Dark discolouration of the scrotum
- Fever



Investigations

This is clinical and confirmed on surgical exploration



Treatment

- Immediate surgical intervention within a few hours of suspected torsion and fixation of the contralateral testis
- Antibiotics cover
- Analgesia (as per WHO pain management guideline)

5.18.7. Hydrocele



Description

This is a condition characterised by the accumulation of fluid in the tunica vaginalis and it presents as a cystic scrotal mass.



Signs and Symptoms

- Painless scrotal swelling
- May be painful when severely distended and infected
- Mass is usually unilateral

- Translumination test is positive
- Spermatic cord is palpable above the cystic mass



Investigations

- Scrotal ultra-sound



Treatment

- Hydrocelectomy
- Appropriate antibiotic cover is required

5.18.8. Orchitis



Description

This is an inflammatory condition of the testis caused by bacteria and mumps virus. About 20 % of post-pubertal male patients have testicular inflammation, usually unilateral. Testicular atrophy may ensue.



Signs and Symptoms

- Painful testicular swelling
- Fever
- Signs of STI (urethral discharge, dysuria, tender inguinal lymphadenopathy)
- If due to Mumps, there might be associated parotid swelling



Treatment

- Analgesics
- Antibiotics for STIs

5.18.9. Anal Fissure



Description

A tear in the lining of the anus following constipation/holding on to stool for a long time



Signs and Symptoms

- Severe anal pain worse on passing stool
- Occasional bleeding



Treatment

- Stool softeners
- Lactulose Adult: Initially 15 mL twice daily, adjusted according to response. Children: 2.5-10ml twice daily, adjusted according to response.
- Enema (Sodium Phosphate compounds) if fecal impaction occurs
- High fibre diet
- Encourage increased water intake (2-3L/day)
- Diltiazem cream Apply twice daily until pain stops. Max. duration of use 8 weeks, apply to the anal canal, using 2% topical preparation.

5.18.10. Haemorrhoids



Description

Swollen and inflamed veins in the anal area usually due to increased intra-abdominal pressure



Signs and Symptoms

- Discomfort when passing stool
- Associated bleeding
- Itching



Investigations

- Proctoscopy



Treatment

- High fibre diet
- Encourage increased water intake (2-3L/day)
- Antihaemorrhoids
- Creams/ointments: Apply twice daily for no longer than 7 days, to be applied morning and night, an additional dose should be applied after a bowel movement
- Suppositories: 1 suppository twice daily for no longer than 7 days, to be inserted night and morning, additional dose after a bowel movement
- Surgical - haemorrhoidectomy

NB: Haemorrhoids in pregnancy are managed conservatively in consultation with consultant surgeons.



Complications

Thrombosed haemorrhoids



REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH

6.0

OBSTETRIC AND GYNAECOLOGICAL CONDITIONS

6.1 ANTENATAL CARE



Description

The goal of antenatal care is to promote maternal and newborn health and survival through:

- Early detection and treatment of problems/complications in the mother and foetus e.g. proteinuria, hypertension, syphilis, foetal abnormality, mal-presentation, intrauterine growth retardation, etc.
- Prevention of complications and diseases such as malaria, anaemia and neonatal tetanus;
- Birth preparedness and complication readiness - provide a Birth Plan which indicates the place of delivery and transport to the delivery site among other key decisions;
- Health promotion e.g., health education, counselling and provide supplementation of iron, folic acid, iodine, calcium, multiple micronutrient supplement (MMS) and provision of ITNs.

Schedule and conduct of Antenatal visits

A minimum of 8 antenatal contacts are recommended.

Contact schedule:

- 1st trimester (up to 12 weeks' gestation)
- 2nd trimester (at 20 and 26 weeks' gestation) 3rd trimester (at 30, 34, 36, 38 and 40 weeks' gestation). The client should return for delivery if not delivered at 40 weeks.

During **the first** visit, the following should be done:

- **General, obstetric and gynaecological history**
- Full physical examination, vitals, presence of oedema, breast exam etc;
- Obstetric examination HOF, lie, presentation, descent, foetal heart rate, urinalysis.



Investigations

Pregnancy test, FBC (Hb), Group and Rhesus, HIV, RPR, Hepatitis B surface antigen, RBS and early dating ultrasound where available (viability, number of fetuses, placentation, location).

Note

Special investigations for BOH

Transvaginal ultrasound for cervical length, antiphospholipid screen (lupus anti-coagulant, anti-cardiolipin antibody and beta-2 glycoprotein), Factor V Leiden, protein C & S levels and full TORCH screen (IgG and IgM)



Treatment

Haematinics (Iron 30 - 60 mg elemental iron daily, folic acid 400mcg or 0.4mg daily, vitamin C 100mg daily from booking; or MMS (multiple micronutrient supplement) combination;

Mebendazole 500mg stat (2nd trimester)

Malaria (IPT-SP up to 6 doses can be given at least one month apart between doses – 3tabs of 500mg/25mg SP) from 13 weeks gestation, however, patients on Co-trimoxazole should not receive SP

SP to be given from 13 weeks gestation

Tetanus prophylaxis should be given (ATT 0.5mls IM stat) at booking

Note

Special medications: For BOH

Low dose Aspirin 75-150 mg daily from 12 weeks to 36 weeks

Calcium 500mg-1g daily

Micronised progesterone 200 mg daily up to 20 weeks

Consider cervical Cerclage placement between 13 to 16 weeks if indicated

Other medications to consider where necessary: maternal corticosteroids, anti-emetics, anti-acids, antibiotics, antifungals, anti-hypertensives, anti-coagulants, , vitamin B complex, analgesics, insulin etc.

Anti-D

Early pregnancy < 12 weeks gestation (miscarriage, ectopic pregnancy, or medical termination of pregnancy) a minimum dose of 250 IU (50mcg) is administered

>12 weeks gestation a single dose of 1500 IU (300mcg) is given at 28 weeks gestation OR smaller doses of 500 IU (100mcg) are administered at 28 weeks and 34 weeks respectively

Post delivery within 72 hours a single standard dose of 1500 IU (300mcg) to prevent sensitization. If large fetomaternal haemorrhage a Kleihauer-Betke test may be done and additional doses given with the guidance of a consultant obstetrician.

During the second and subsequent visits:

- Detailed history and presenting complaints;
- Examine for growth of the foetus;
- Assessment of maternal wellbeing;
- Check on medications given previously;
- Check presentation of the foetus;
- Repeat obstetric scan (evaluate the anomaly scan between 18-21weeks), HIV test and FBC;
- Discuss the place of delivery and mode of delivery and draw up a birth preparedness plan;
- Discuss warning signs/danger signs;
- Malaria prophylaxis (IPT-SP);
- Iron and folic acid supplementation or MMS;

- ART/PrEP where appropriate;
- Viral load at 36 weeks (a month before delivery) where appropriate.

6.2 NORMAL LABOUR



Description

Physiological process defined by regular and painful uterine contractions that lead to progressive dilatation and effacement of the cervix.

Management of each stage of labour

First stage: From diagnosis (initiation) of true labour to full cervical dilatation.

Admit patient to either lay in ward or labour suite if in latent or active phase, respectively

Allow for presence of spouse or relative in early labour where feasible

Patient may choose to pace around or lie in left lateral position

Review antenatal records and establish risk factors if any .e.g previous caesarean section etc.

Encourage regular emptying of bladder

IVF fluids and dextrose to be given whenever indicated

Obtain consent for underage patients for possible caesarean delivery

Allow for liquid and semi solid diet only

In rare circumstances, soap enema or laxatives can be used

Adequate analgesia with pethidine 100mg IM or fentanyl 100 mcg provided cervical dilatation is less than 6 cm

Promethazine 25 mg stat may also be given to counter the nausea and vomiting associated with the pethidine injection

Naloxone 10 mcg/kg may be given to a neonate to reverse pethidine induced respiratory depression if given late in labour (less than 4 hours before delivery)

Monitor foetal maternal wellbeing closely

Once active phase of labour is established, open partograph and monitor labour by it

Birth preparedness i.e. delivery pack (s), resuscitaire and call to NICU if need be

Second stage: From full cervical dilatation to delivery of the baby.

Discuss and chose preferred position for delivery i.e. lithotomy

Hand washing, double glove, swab the vulva and perineum and then drape the patient

Ask patient to push in tandem with the uterine contractions

Once the baby crowns at the vulva, stabilize the perineum with the right hand with pad while the left hand

flexes the oncoming foetal head

When head emerges out of the vulva, wipe the face or suction with penguin sucker (if meconium present) and the check for the cord around the neck

If the cord is too tight and cannot be loosened, then double clamp and cut the cord at that point

After restitution and external rotation of the head, apply gentle downward traction to deliver the foetal anterior shoulder, then deliver the posterior shoulder sweeping the baby and delivering it unto the mother's abdomen and place a clean nappy to keep baby warm, whilst on mother's abdomen

Allow for sufficient flow of blood to the baby before clamping the cord close to the maternal perineum (delayed cord clamping- golden minute)

Third stage: From delivery of the baby to delivery of the placenta and membranes.

Adopt active management of third stage of labour (AMTSL)

Place a kidney dish close to the maternal perineum

Palpate the abdomen to rule out any undiagnosed baby(s) and to await a contraction

Give oxytocin 10 IU IM(on the thigh) stat within a minute of delivery (alternatively ergometrine 0.5 mg IM stat, but contraindicated in **hypertension and cardiac disease**)

Place gentle downward traction on the cord following the direction of the pelvic curve while the radial aspect of the left hand provides counter traction suprapubically

Once the placenta and membranes reach the vulva, twist them in order to ensure complete removal

Place the placenta and membranes in the kidney dish and estimate the blood loss

Inspect the vulva, vagina and perineum for any tears or lacerations;

Inspect the placenta and membranes for any missing cotyledons or other abnormalities

Immediately following birth:

Check the mother's vitals (Bp, pulse rate, respiratory rate); every 15 min for the first two hours then every 30 min for the next one hour, then every hour for the next three hours

Initiate bonding of the mother and baby within an hour of delivery by keeping baby in skin to skin on the mother's chest/abdomen

Promote early and exclusive breastfeeding within an hour of birth;

In the event of the mother being HIV positive, ensure mother is on cART and that the baby receives ART prophylaxis according to prevailing ART guidelines

6.3 NORMAL LABOUR



Description

Bleeding from or within the genital tract between the age of viability i.e. 24 weeks GA (WHO guidelines) 28 weeks (Zambian guidelines) to delivery of the baby.

NB: Such a patient should be managed by the next level of care

Causes of APH

- **Placental causes:** Placental praevia, placental abruption and vasa praevia.
- **Non-placental causes:**
- **Local:** uterine rupture/dehiscence, cervical cancer, cervical polyps, cervicitis or vaginal trauma
Or
- **Systemic:** DIC, HELLP syndrome, idiopathic thrombocytopenic purpura (ITP), Thrombotic thrombocytopenic purpura (TTP), Von Willebrand disease etc.

6.3.1. Placental Praevia



Description

Occurrence of an abnormally sited placenta i.e. in the lower uterine segment.

Risk factors: Previous uterine operation, multiple pregnancy, macrosomia and increased maternal age;



Signs and Symptoms

- Per vaginal bleeding (bright red usually with no clots) +/- symptoms of anaemia e.g. headache, dizziness or palpitations.
- No associated lower abdominal pains
- Normal perception of foetal movements
- +/- signs of shock, pallor
- Uterus usually right for dates
- Abdomen soft and non-tender
- Foetal parts palpable
- Usually malpresentation e.g. breech or abnormal lie;
- Failure of engagement
- Normal foetal heart rate.



Investigations

FBC, Blood grouping and keep X- matched, obstetric ultrasound.



Treatment

Depends on the haemodynamic status of the patient i.e. the amount of bleeding, the type and the gestational age;

If bleeding is minimal i.e. patient is haemodynamically stable and gestational age is less than 38 weeks:

- Admit patient to Antenatal ward
- Have a delivery plan on the 1st page of patient records in capital letters and Red ink
- IV access at all times (large bore cannula 14-18 gauge)
- Bi-weekly FBC aiming to keep HB > 10 g/dl
- Monitor for PV bleeding by pad count and inspection
- Monitor vitals (Pulse, BP, RR, SPO2) 4 hourly
- Bi-weekly ultrasound examinations for foetal weight, fetal activity and possible placental migration
- Monitor foetal heart rate by pinnard auscultation and start kick chart monitoring;
- Group and keep at least 2 units X - matched RCCs/whole blood available in the ward fridge/blood bank at all times
- Administer corticosteroids e.g. Dexamethasone 6 mg 12 hourly IM x 4 doses or Bethamethasone 12mg IM once daily x 2 doses
- Continue with all other antenatal investigations and medications as per antenatal schedule, whilst admitted
- Avoid unnecessary abdominal palpations and encourage bed rest.
- Digital vaginal examination highly contraindicated;
- If bleeding occurs profusely or preterm labour is established, promptly inform team on call for emergency caesarean section;
- Aim to deliver at 38 completed weeks by caesarean section by an experienced practitioner;
- Anticipate for PPH due to uterine atony and prepare accordingly.
- If bleeding is profuse or patient is already at term or foetus is dead or has major anomalies then prepare for immediate delivery by caesarean section.

6.3.2. Placental abruptio



Description

Premature separation of a normally sited placenta.

Risk factors: Abdominal trauma, hypertensive disorders, PROM with sudden decompression of the uterus, anaemia, thrombophilias, iatrogenic procedures such as ECV.



Signs and Symptoms

- Per vaginal bleeding usually dark red and with clots (but may be concealed bleeding); +/- symptoms of anaemia;
- Associated lower abdominal pains;
- Changes in perception of fetal –movements as either increased or decreased.
- +/- Signs of shock, pallor;
- Abdomen is tense and tender (woody hard on palpation);
- Presentation and lie can be normal at term;
- Fetal heart rate absent or if present will be suggestive of fetal distress.



Investigations

- FBC, Group and X-match for RCCs/whole blood, FFPs and PLTs, bedside clotting time, RFTs and clotting profile. Note: obstetric ultrasound not always necessary.



Treatment

Depends on haemodynamic status, gestational age and fetal viability;

If foetus is viable and pregnancy is at or near term, regardless of haemodynamic status, prepare patient for emergency caesarean section;

If the foetus is demised and patient is haemodynamically stable, then:

- Admit to high dependency unit;
- 2 IV access (large bore cannulae 14- 18 gauge size);
- X- match for RCCs/whole blood, FFPs, PLTs and cryoprecipitate (with aim to transfuse the 6 units of blood products before delivery);
- Catheterise bladder for strict input-output monitoring;
- Digital vaginal examination to assess the Bishop score prior to induction of labour;
- If patient is already in established labour, then expedite the process by amniotomy and further augmentation with oxytocin 2.5 to 5.0 IU in 500 mls of normal saline/ringer's lactate;
- IVF 1L ringer's lactate to run fast in 30 min;
- Tranexamic acid 1g IV stat (within 3 hours of bleeding);
- Adequate analgesia with pethidine 100mg or fentanyl 100mcg or morphine 15mg IM
- Monitor vitals, SP0 2, intake & output of fluids and urine closely;
- Medical officer to be present at 2nd and 3rd stages of labour in anticipation for PPH due to both uterine

atony and coagulopathy;

- AMTSL
- Estimate the total blood loss inclusive of the retro placental clot.
- If patient is haemodynamically unstable and bleeding actively, prepare for caesarean section regardless of the fetal condition.

6.3.3. Vasa Praevia



Description

Bleeding from rupture of foetal vessels that are covered only by amnion and traverse the lower uterine segment.

Risk factors may include; previous uterine operation, abnormal placental types such as succenturiate lobe and velamentous cord insertion.



Signs and Symptoms

- Usually occurs at rupture of membranes (spontaneously or artificially);
- Per vaginal bleeding bright red at rupture of membranes;
- Usually associated features of foetal distress.



Investigations

- Kleihauer Betke test to isolate foetal blood cells in maternal blood;
- CTG shows sinusoidal foetal heart decelerations;
- Ultrasound check the placental cord connection for velamentous cord insertion.



Treatment

Prepare patient for urgent caesarean section.

- **Supportive Treatment: when not in labour**
 - o Use of tocolytics to stop all uterine activity;
 - o Bedrest;
 - o No sexual intercourse;

- o No vaginal examinations;
- o No lifting of heavy items;
- o No heavy straining during bowel movements (use of stool softeners).
- **Hospitalization (if suspected antenatally)**
 - o Foetal monitoring;
 - o Regular ultrasounds to monitor the progression of vasa praevia;
 - o Steroid treatment to develop fetal lung maturity;
 - o Elective delivery most important;
 - o When diagnosed antenatally, aggressive resuscitation with blood transfusion for the neonate if necessary must be planned for and/or expected.

6.3.4. Cervical Lesions



Description

Cervical lesions can either be polyps, ectropion, cancerous lesions or inflammatory conditions that can cause bleeding in pregnancy and should therefore be checked. Remember that a speculum should only be passed after a scan has been done to locate the placenta to avoid precipitating bleeding in a placenta praevia.

NB: Refer to next level of care after initial management

6.4 POST-PARTUM HAEMORRHAGE (PPH)



Description

Excessive per vaginal bleeding after delivery of greater than 500mls following vaginal delivery or greater than 1000mls following cesarean section; Or any excessive vaginal bleeding following delivery that causes (or has potential to cause) haemodynamic instability; It is called primary PPH when it occurs within the first 24 hours and secondary PPH from 24 hours to 6 weeks.

Causes of PPH: Denoted by the four (4) Ts namely; tone, trauma (tears), tissue and thrombin.

- **Uterine atony:** High parity, multiple pregnancy, macrosomia, polyhydramnios, APH, full urinary bladder, uterine fibroids;
- **Trauma:** Use of oxytocin, misoprostol or dinoprost, previous uterine operation e.g. caesarean section or myomectomy, transverse lie in labour, instrumental delivery and poor management of second stage of labour;

- **Tissue:** Preterm labour, previous uterine operation, abnormal placental types eg succenturiate lobe and poor management of third stage of labour;
- Thrombin: DIC, HELLP syndrome, ITP, TTP etc.



Signs and Symptoms

- Excessive vaginal bleeding;
- May be in shock with:
- High pulse rate equal to or more than 100/min;
- Low BP < 90/60 mmHg;
- Air hunger;
- Thirst –patient requesting fluids
- Restlessness and disorientation (uncooperative patient)
- Cold sweat.



Treatment

- **CALL FOR HELP**, constitute team and identify team leader
- Ensure sterile field;
- Secure 2 IV access (large bore cannulae 14G-18G);
- Collect blood for: FBC, Group & X match, bedside clotting time, serum fibrinogen and clotting profile, LFTs, U&E's, KFTs
- Check vitals and level of pallor;
- Repeat oxytocin 10 IU IM stat, start Oxytocin 20 IU in 500mls normal saline at 20 drops per minute
- IVF 1L ringers lactate fast;
- Concurrent uterine massage;
- Catheterise the bladder;
- Inspect vulva, vagina and perineum +/- repair;
- Manual exploration of the uterus for RPOCs and any obvious uterine wall defects;
- Misoprostol 800mcg per sublingual/rectum and Tranexamic acid 1g IV stat **within 3 hours** of the PPH
- Bimanual uterine or aortic compression
- Prepare for cervical assessment +/- repair
- Repeat bimanual or aortic compression, repeat vitals
- Prepare for uterine balloon tamponade
- If haemostasis achieved at this point, then administer broad spectrum antibiotic (according to level of care) IV stat and pethidine 100 mg IM stat
- If bleeding persists beyond this point, then obtain consent and inform OT for urgent laparotomy
- Consider anti shock garment (if in shock) and continue with bimanual or aortic compression
- Procedures in theater under GA include:

- Uterine compression sutures such as B lynch or Haymann sutures
- Uterine vessel ligation (stepwise devascularisation);
- Pelvic arterial embolization or intra-aortic balloon occlusion
- Hysterectomy
- Thank the teams and acknowledge their contribution in the documentation
- Post event team debrief and evaluation

6.5

THE OBSTETRIC UNCONSCIOUS PATIENT



Description

A pregnant woman may be brought into a health facility unconscious without much history. Management therefore will mainly depend on clinical examination and investigations. The obstetrician should work in collaboration with the physician.

Presentation of an unconscious patient - differential diagnosis

Figure 17: Presentation of an unconscious patient

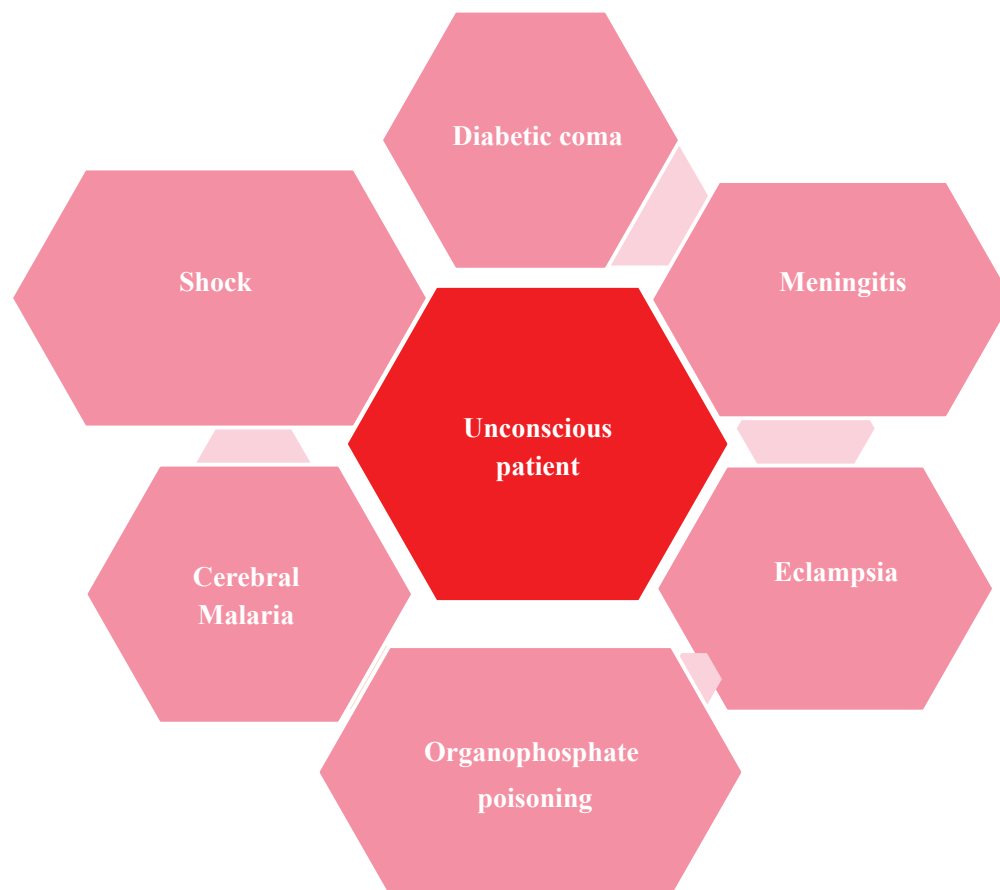


Table 144: Principles of General Management

	Diabetic coma	Cerebral malaria	Eclampsia	Meningitis	Organophosphate poisoning	Hypovolemic shock
Clinical Details Check corresponding section in manual	(pg)	(pg)	(pg)	(pg)	(pg)	(pg)
Investigations	RBS, Urinalysis, FBC, U&E's, CR, LFTS, HBA1C, ABGS, CXR, ECG, MPS. Blood culture, Urine MCS.	MPS, RDT, FBC, LFTs, RFT, RBS, CT/ MRI.	RBS, Urinalysis, FBC, Clotting studies, RFT, LFT, U&E'S, U/S, CXR, CT/ MRI brain, 12 LEAD ECG, ECHO.	CSF Studies: -MCS: ZN stain, Indian ink stain and Gram stain Biochemistry; CSF Protein and CSF Glucose. CAT & TAT. RBS, FBC/DC, U&E, Creatine, MPS, RDT FOR Malaria, LFTS, Blood culture, CRP, ESR, Urine LAM, RVD/ RPR CT/ MRI Brain, CXR.	FBC, U&ES, CR, LFTS, Toxicology-urine and blood, Arterial blood gases (ABGs).	FBC, U&E's, CR, LFTS, Arterial blood gases (ABGs).

Principles of general management

CALL FOR HELP

- Check airway, breathing and circulation (ABC) of resuscitation;
- Take a quick history from carer and note the patient's previous notes-last meal taken, history of seizures;
- A quick examination should include and take note of blood pressure (BP), pulse, temperature, jaundice, cyanosis, hydration, sweating, cold clammy extremities, respiration, heart sounds, PV bleeding, fundal height, foetal viability and neck stiffness;
- IV access with 2 large bore cannulae (14-18 gauge) and collect bloods accordingly
- Catheterize and monitor input and output judiciously
- Nurse in a left lateral position and maintain airway
- Keep patient in a high dependency ward (Special Observation Unit) with quarter hourly, half hourly to hourly observations.

6.5.1. Pre-Eclampsia



Description

Pre-eclampsia is a pregnancy-specific disorder involving widespread endothelial dysfunction and vasospasm that usually occurs after 20 weeks of gestation and can present as late as 4-6 weeks postpartum.

There are 2 types; mild pre-eclampsia and severe pre-eclampsia. When convulsions appear in this syndrome it is then called Eclampsia. This is an obstetric emergency requiring immediate referral to a hospital.



Investigations

Table 145: Diagnostic Criteria

Parameter	Mild Preeclampsia	Severe Preeclampsia	Eclampsia
Systolic Bp	≥140 mmHg	≥160	
Diastolic Bp	≥90 mmHg	≥110	
Proteinuria	≥30 mg/mol/≥300 mg/24 hour	≥3+	
Platelets	<100,000/μL	< 100,000/μL).	
Renal function	Serum creatinine level above 1.1 mg/dL or doubling of serum creatinine in the absence of other renal disease.	Serum creatinine concentration >1.1 mg/dL or a doubling of the serum creatinine	
Liver function		Impaired hepatic function as indicated by abnormally elevated blood concentrations of liver enzymes (to double the normal concentration)	
clinical features		New-onset cerebral or visual disturbances; Severe persistent upper quadrant or epigastric pain that does not respond to pharmacotherapy; Pulmonary oedema; Increased tendon reflexes.	Presence of convulsions - generalised tonic clonic seizures
Management			The four principles of management: Prevention and control of convulsions; Control of hypertension; Maintenance of fluid balance; Prevention of Respiratory Distress Syndrome (RDS) and delivery of the baby.
	Management of hypertension in pregnancy If diastolic BP >110mmHg reduce by giving Hydralazine IV 5mg bolus over 15 minutes and repeated every 20 to 30 minutes if Diastolic BP >110mmHg Labetalol 20-40mg IV infusion every 10-15 minutes (maximum dose 300mg, avoid Labetalol in asthma and congestive cardiac failure);	Prevention of convulsions Magnesium sulphate 4g (20mls of 20%) IV over 20min followed by 5g (10mls of 50%) IM in each buttock; Add 1ml of 2% lignocaine to IM injection; Give MgSO4 every 4 hours up to 6 doses,	Management of convulsions Call for help; Check airway, breathing and circulation (ABC); Protect patient from injury (place on left lateral position, place in bed with side rails or on the floor);

Parameter	Mild Preeclampsia	Severe Preeclampsia	Eclampsia
	Give Methyldopa 250 -500mg every 6-8 hours orally for maintenance or Labetalol 100mg oral 12 hourly (maximum dose 2400mg/day); Fluid input and output must be monitored and fluid replaced as required. Fluid management Fluid overload should be avoided and not more than 2.5 litres of fluids should be given in 24 hours. No matter how oedematous a woman is, if the urine production goes below 30ml/hour, the patient should be given a fluid challenge of 1 litre 0.9% Normal Saline given over 30 minutes; If the response is an increase in urine more fluid should be given; If there is no response the patient may be developing renal failure and should be referred to a specialist physician.		Nurse in high dependency ward or ICU; Control BP (goal SBP<160, DBP <110) give: Hydralazine IV or Nifedipine PO or Labetalol. Prevent more seizures: give MgSO₄ 4g (20mls of 20%) IV slowly over 20 minutes loading dose; Follow promptly with MgSO₄ 5g (10mls of 50%) in each buttock deep IM add 1ml of 2% lignocaine in the same syringe; If convulsions re-occur give 2g, 20% MgSO₄ IV over 5 minutes; Maintenance dose: give 5g (10mls of 50%) MgSO₄ IM with 1 ml of 2% lignocaine every 4 hours in alternate buttocks until 24 hours after birth or after last convulsion (whichever is later); Once fits are controlled assess for mode of delivery (assisted vaginal delivery or caesarean delivery).
			Before repeating MgSO₄ administration, ensure that: Respiratory rate is at least 16 per minute; Patellar reflexes are present; Urine output is at least 30ml per hour over 4 hrs. Withhold or delay MgSO₄ if: Respiration rate falls below 16 per minute; Patellar reflexes are absent; Urinary output falls below 30ml per hour over preceding 4 hrs; Keep antidote (calcium gluconate) ready

Pre-eclampsia and Eclampsia in labour

- The patient should be monitored as a high-risk one with BP checked every 30 minutes or less if necessary listen for the foetal heart every 15 minutes and/or during and immediately after a contraction;
- The patient must be catheterised and fluid input and output monitored;
- The patient should be given adequate pain relief;
- The second stage of labour should be kept short and an elective vacuum extraction or forceps delivery done as soon as the patient is fully dilated;
- Fresh meconium in the liquor and heart rate abnormality signifies foetal distress and the baby should be delivered by caesarean section;
- Ergometrine should be avoided and instead, Oxytocin 10 IU IM should be given with delivery of the anterior shoulder.

Post-partum care

The patient must be closely monitored for at least 48 hours in a place where maximum care can be given. This usually means in the labour ward or a special observation unit (SOU) which is a high dependency unit. Monitor BP's in the postnatal period and keep them under control.

Care for the Neonate

- The baby is likely to be in a poor condition and may require resuscitation such as:
- Keeping baby warm;
- Give oxygen or ambu bag as required;
- Suctioning as required.

6.5.2. Eclampsia



Description

Is characterised by one or more new onset generalised tonic-clonic seizures in the presence of pre-eclampsia.



Signs and Symptoms

- Generalised tonic-clonic seizures, confusion, loss of consciousness, severe headache (usually frontal);
- Visual disturbances e.g. flashing lights, blurred vision or double vision;
- Nausea and vomiting, right upper abdominal pain;
- Swelling of the hands and face, excessive weight gain, weakness.
- BP > 140/90mmHg or increase in Systolic BP by 30mmHg or and Diastolic BP by 20mmHg from baseline, measured at two different times, at least 4 hours apart;
- Hyper-reflexia, positive ankle clonus, low GCS, papilledema;

- Tender right abdominal upper quadrant +/-jaundice;
- Swollen face and hands;
- Poor urine output.



Investigations

RBS, urine test for protein, FBC, clotting studies, KFTs, LFTs, uric acid, electrolytes;
Obstetric ultrasound, CXR, CT/MRI brain, 12 lead ECG, ECHO.



Treatment

- **Resuscitation**
 - o A, B, C, D, E assessment and intervention as appropriate and protect patient from injury;
 - o Left lateral position, with secured airway and give oxygen.
- **Stop or prevent convulsions**
 - o Magnesium sulphate -Loading dose: total of 14g given as follows 4g IV (20% solution) slowly, 5g in each buttock;
 - o Maintenance dose: 5g IM (50% solution) 4 hourly;
 - o Magnesium sulphate should be continued for 24 hours after delivery/ last seizure, whichever is later.

Alternatively,

- o Diazepam 5-10mg IV;

OR

- o Phenobarbitone loading dose 15- 20mg/kg IV over 10-15 minutes. Maintenance 12- 24 hours later at 1-3mg/kg in 1-2 divided doses;

Patient may need respiratory support.

- **Blood pressure control**
If DBP $\geq$ 110mmHg
- Labetalol 20mg IV over 2minutes initially, then 40- 80mg IV every 10minutes total dose not more than 300mg. Alternative regime for labetalol 1-2mg/minute by continuous IV infusion, total dose of 300mg;
OR
- Hydralazine 5mg- 10mg IV/IM initially, then 5-10mg every 20-30 minutes PRN or 0.5-10mg/hour IV infusion provided DBP $\geq$ 110 mmHg;
- **Maintenance Doses**
 - o Oral labetalol-100mg every 12 hours initially, increased by 100mg every 2-3 days. Usual dose range 200-400mg po every 12 hours, not to exceed 2400mg/day;
- OR**
- o Nifedipine 10-30mg 6-8 hourly PO (Extended release Nifedipine 30-60mg is given once daily maximum 120mg/day, Immediate release Nifedipine is thrice a day 20-40mg maximum 180mg/day
PLUS

- o Methyldopa 250mg-1000mg initially po every 8-12hours for 2days, increase every 2days PRN maintenance 250-1000mg/day divided every 6-12 hourly po, usually not more than 3g/day;
- o Target MAP<120mmHg;
- Continuous CTG monitoring;
Dexamethasone 6mg IM every 12 hours x 4 doses
OR
Betamethasone 12mg IM once daily x 2 doses.

Prompt Delivery of baby and placenta

- Mother must be stable before delivery with any seizure controlled, severe hypertension treated and hypoxia corrected this is the case regardless of any foetal compromise;
- Caesarean section is the ideal mode of delivery, however, intrapartum seizures in established labour may be managed by vaginal delivery;
- Nurse in HDU/ ICU for close monitoring until patient is stable- meaning well controlled blood pressure, adequate urine output and discontinuation of MgSO4. This usually takes a minimum of 24 hours.

6.5.3. Cerebral Malaria



Description

Severe malaria caused by Plasmodium Falciparum. Patient may present with altered mental state, convulsions, confusion and coma. It may also present with other complications of severe malaria such as acute renal failure, DIC, Pulmonary oedema, severe anaemia, hyperparasitaemia and hypoglycaemia.



Signs and Symptoms

- Fever, Chills, headache, nausea and vomiting, joint pains, backache, loss of appetite, abdominal pains and diarrhea.
- Fever/ hypothermia, low GCS, convulsions, confusion.



Investigations

- Malaria parasite slide, RDT, FBC, RFTs, LFTs, RBS, CT/ MRI Brain.



Treatment

- Artesunate 2.4mg/kg IV or IM at the time of admission (time = 0), then at 12 hour, and 24 hour, then once per day until the patient is able to take oral medication.

Alternative treatment:

Quinine to be given in cases of suspected treatment failure to artesunate or when hypersensitivity reactions exist to artesunate;

- Quinine dihydrochloride 20mg/ kg (loading dose) in 10% dextrose on admission, then 10mg/kg every 8 hours. Dilute Quinine in 5% dextrose and infused over 4 hours. If patient able to tolerate orally, switch to per oral quinine;

NB: Complete treatment with Artemeter /Lumefantrine as soon as patient is able to take oral medication but not before the minimum 24 hours of parenteral treatment;

- Paracetamol 10- 20mg/kg IV if patient is pyrexical.

6.5.4. Meningitis



Description

Inflammation of the brain coverings called meninges.



Signs and Symptoms

- Headache
- Malaise
- Stiff neck and rigidity
- Photophobia
- Nausea and vomiting
- Fever, chills
- Confusion, disorientation
- Convulsions
- Lethargy
- Decreased appetite
- Altered mental state
- Irritability,
- Kerning sign, Brudzinski sign
- Low GCS
- Papilloedema.



Investigations

- CSF studies: -MCS: Ziehl-Nelson stain, Indian ink stain and Gram stain;

- Biochemistry-CSF protein and CSF glucose;
- Cryptococcal Antigen Test (CAT) and Toxoplasma Antigen Test (TAT).
- RBS, FBC and DC, KFTs, MPS, RDT for malaria, LFTs, blood culture, CRP, ESR, Urine LAM, HIV test, RPR
- CT/ MRI brain
- CXR



Treatment

Refer to Meningitis under CNS Conditions in Adult Patient – 5.5.2

6.5.5. Shock



Description

Low circulatory volume due to loss of blood or due to loss of fluids due to diarrhoea or vomiting.



Signs and Symptoms

- Thirsty, weakness, loss of consciousness, bleeding, diarrhoea and vomiting.
- High pulse rate of low volume or thready, capillary refill Time > 3 seconds, low blood pressure, cold peripheries, oliguria or anuria, confusion, sweating, low GCS, high respiratory rate, restlessness.



Investigations

- FBC, U&Es, Cr, LFTs, stool MCS.



Treatment

- ABC approach;
- Fluid resuscitation, crystalloids, blood and blood products, colloids, trendelenburg position;
- Monitoring and re-assessment; vitals, intake-output, GCS, temperature gradient, CRT;
- Treat the underlying cause of the hypovolaemic shock.

6.5.6. Organophosphate Poisoning



Description

Ingestion of organophosphates deliberately after social disputes (parasuicide) or accidentally (farmers) or as homicide.



Signs and Symptoms

- Diarrhoea, vomiting, urination, salivation, difficulty breathing.
- Miosis (constricted pupils), bradycardia, bronchoconstriction, bronchorrhea, lacrimation, altered mental state, hypoglycaemia, hypotension, sweating, confusion, agitation, coma, muscle weakness, paralysis, fasciculations, type 2 respiratory failure or intermediate syndrome.



Investigations

- FBC, U&Es, Cr, LFTs
- Toxicology-urine and blood, arterial blood gases.



Treatment

Refer to adult emergencies section

6.5.7. Diabetic Coma



Description

Can result from non-ketosis Hyperglycaemic Hyperosmolar State (HHS) or Diabetic Ketoacidosis or from hypoglycaemia.



Signs and Symptoms

- Polydipsia, polyuria, weight loss, lethargy, nausea and vomiting, abdominal pains, deep rapid breathing, tremor, palpitations, sweating, altered behaviour, intense hunger, confusion or coma.
- Signs of dehydration, low GCS, acetone smell in the breath, sweating, Kussmaul's breathing, convulsions.



Investigations

Random blood sugar (RBS), urinalysis, FBC, U&Es, Cr, LFTs, glycosylated Hb (HbA1C), ABGs, CXR, ECG, MPS, Blood culture, urine MCS.



Treatment

- ABC approach;
- Intubation and ventilation if airway protection if required;
- Oxygen as required;
- Urinary catheter.

6.5.8. DKA/Hyposmolar/Hypoglycaemia Management

Refer to Medical Emergencies (1.1.6 and 1.1.7) and Endocrine Conditions (5.8.1)

6.6 MEDICAL DISORDERS IN PREGNANCY

6.6.1. Malaria in Pregnancy



Description

Pregnant women are particularly at risk of malaria due to the lowered acquired partial immunity prevailing in pregnancy. Adverse pregnancy outcomes include spontaneous abortion, stillbirth, severe maternal anaemia and low birth weight (weight <2500g).



Treatment

Treatment for uncomplicated Malaria in pregnancy (MIP)

- First-line treatment
- Artemether-Lumefantrine or Dihydroartemisinin-Piperaquine (to be used across all trimesters).
- Second-line treatment

- Quinine should be used in all cases of failure to 1st line treatment.

Severe Malaria in pregnancy

- Pregnant women, particularly in the second and third trimesters, are more likely to develop severe malaria than other adults. Parenteral antimalarials should be given to pregnant women with severe malaria in full doses without delay and must be started with:
- Quinine in the first trimester and Injectable artesunate in the second and third trimesters.

Intermittent Presumptive treatment (IPT)

- Sulphadoxine-Pyrimethamine (SP) is the medicine of choice for IPT;
- One adult treatment dose of 3 tablets should be given monthly (at least 4 weeks apart) during the second trimester from 13-weeks gestation onwards;
- The total number of doses recommended for the entire duration of pregnancy is up to 6 doses, under direct observation (DOT) when possible.

6.6.2. Cardiac Conditions in Pregnancy

Cardiac diseases



Description

The most common cardiac disease encountered in pregnancy is Rheumatic Heart Disease (RHD). The most prevalent of RHD is Mitral Stenosis (MS) and Mitral Incompetence



Treatment

- Pre-pregnancy counseling and patient should be referred for an obstetric opinion before conception occurs;
- Pregnant patient should be co-managed by an Obstetrician and a Physician/Cardiologist.
- Give Digoxin 0.25mg daily where there are arrhythmias as in atrial fibrillation;
- Frusemide should only be used in case of pulmonary oedema;
- Admit to hospital in the 3rd trimester in case of pulmonary oedema;
- Avoid the use of Angiotensin-converting enzyme inhibitors (ACEIs) and Angiotensin receptor blockers (ARBs) in pregnancy;
- Consider Labetalol when a beta blocker is indicated (avoid in congestive cardiac failure) in labour;
- Keep in high dependency ward in propped up position;
- The patient should be monitored as a high-risk one with Bp checked every 30 minutes or less, if necessary.
- Delivery must be assisted in second stage of labour

NB: For further cardiac information, check under Cardiac Conditions in chapter xxx

6.6.3. Elimination of Mother-to-Child Transmission of HIV (EMTCT)

The four prongs of EMTCT

Prong 1 – Primary prevention of HIV among women of childbearing age;

Prong 2 – Prevention of unintended pregnancies among women living with HIV;

Prong 3 – Prevention of HIV from mother to her infant;

Prong 4 – Provision of appropriate treatment, care and support to women and children living with HIV and their families.

Prevention of Mother-to-Child Transmission

- There are better clinical and laboratory outcomes if HIV treatment is initiated early;
- Initiate cART immediately among all pregnant or breastfeeding women who test positive within Maternal Newborn Child Health (MNCH) services.;
- Treatment preparation and adherence counselling should be accelerated so that it is completed on the same day where feasible;
- Initiation may be done by ART trained nurses/midwives within MNCH;
- Where there is no capacity within MNCH to initiate cART the pregnant woman should be fast-tracked through the ART clinic;
- Start Cotrimoxazole among all HIV infected pregnant women regardless of gestational age, CD4 count or WHO clinical staging;
- Viral load should be performed within 4 weeks before labour and delivery to estimate the risk of transmission for all pregnant women on cART;
- At 6 weeks postnatal, check CD4 count and if >350cells/ul on two results, Cotrimoxazole may be discontinued.

Combination antiretroviral therapy (cART) for eMTCT

First-line cART

- For ARV naïve or sure of tail coverage 1st line cART is **TDF + XTC + DTG** - alternative regimen is TDF + XTC + or EFV400 or TDF + XTC + ATV-r (or LPV-r) or ABC +3TC +ATV-r (or LPV-r) or ABC + 3TC + DTG;
- For previous single dose Niverapine (sdNVP) exposure; or Niverapine (NVP) monotherapy exposure, or unsure of tail coverage 1st line cART is **TDF + XTC + DTG**;
- Alternative regimen is TDF + XTC + ATV-r (or LPV-r) or ABC + 3TC + ATV-r (or LPV-r).

Second- line cART

- DTG and NNRTI –based first-line regimens can be substituted by **AZT +3TC + LPV-r (or ATV-r)**.

Table 146:Combination antiretroviral therapy (cART) for eMTCT

Specific Population	Description	Child-bearing Female with Negative HIV Test Result	Child-bearing Female with Positive HIV Test Result
Pre-Pregnancy/ Adolescents	Family Planning/Contraception	Counsel on family planning and offer dual method of contraception with either of the following: progestogen-only contraceptive methods without restriction copper-bearing intrauterine devices (Cu-IUDs) and LNG-IUDs without restriction combined hormonal contraceptive methods without restriction	Counsel on family planning and offer dual method of contraception with either of the following: progestogen-only contraceptive methods without restriction copper-bearing intrauterine devices (Cu-IUDs) and LNG-IUDs without restriction combined hormonal contraceptive methods without restriction
	Co-morbidity	Screen for Hep B and Syphilis: If positive treat client plus partner	Screen for Hep B, Syphilis and OIs, if positive treat client plus partner
	HIV Prevention	Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention Retest for HIV every 3 months	Counsel and continue/Initiate ART Positive health dignity and prevention (PHDP)
		Counsel and Initiate PrEP if eligible	Provide condoms or information on where to access condoms, including female condoms

Elimination of Mother-to-Child Transmission of HIV (EMTCT)

Specific Population	Description	Child-bearing Female with Negative HIV Test Result*	Child-bearing Female with Positive HIV Test Result*
Pregnancy	1st Trimester	Screen for Hep B and Syphilis. If positive treat client plus partner	Counsel and continue/Initiate ART
		Counsel and Initiate PrEP if eligible	Screen for Hep B, Syphilis and OIs If positive treat client plus partner At ANC1, for known positives on ART, check if VL was done: if >3 months retest, and thereafter every 3 months For those who initiate ART in ANC do VL at 3 months, thereafter retest every 3 months
		Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention Retest for HIV every 3 months	Provide condoms or information on where to access condoms, including female condoms

Specific Population	Description	Child-bearing Female with Negative HIV Test Result*	Child-bearing Female with Positive HIV Test Result*
	2nd Trimester	Screen for Hep B and Syphilis. If positive treat client plus partner	Counsel and continue/Initiate ART
		Counsel and initiate PrEP if eligible	Screen for Hep B, Syphilis and OIs, if positive treat client plus partner
		Counsel client and partner on HIV combination prevention	At ANC1, for known positives on ART, check if VL was done: if >3 months retest, and thereafter every 3 months
		Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention Retest for HIV every 3 months	For those who initiate ART in ANC do VL at 3 months, thereafter, retest every 3 months Provide condoms or information on where to access condoms, including female condoms
	3rd Trimester	Screen for Hep B and Syphilis. If positive treat client plus partner	Counsel and continue/Initiate ART
		Counsel and Initiate PrEP if eligible	Screen for Hep B, Syphilis and OIs, if positive treat client plus partner
			Check if VL was done/do if not done and if >3 months repeat Repeat viral load 1 - 4 weeks before delivery
		Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention Retest for HIV every 3 months	Provide condoms or information on where to access condoms, including female condoms
	Labor and Delivery	Do HIV test if done >6 weeks	Counsel and continue/Initiate ART

Specific Population	Description	Child-bearing Female with Negative HIV Test Result	Child-bearing Female with Positive HIV Test Result		
Children	Birth	Do HIV test if done >6 weeks Counsel and Initiate PrEP if eligible Counsel client and partner on HIV combination prevention	HIV Exposed Infant/Child	Mother	
			Send DBS or fresh blood for NAT Send blood for syphilis (RPR) Scheduled immunization	Adherence Counselling and continue/Initiate ART Infant Feeding Counselling	

Specific Population	Description	Child-bearing Female with Negative HIV Test Result	Child-bearing Female with Positive HIV Test Result		
			Positive NAT	Negative NAT	
			Send fresh DBS or blood for confirmatory NAT Initiate treatment AZT+3TC+NVP for 14 days and thereafter change to the ABC+3TC+LPV-r If RPR is positive treat congenital syphilis	Initiate AZT+3TC+NVP prophylaxis for 12 weeks If RPR is positive treat for congenital syphilis	
	6 weeks	Do HIV test if done >6 weeks Counsel and Initiate PrEP if eligible Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention	Positive NAT Start Co-trimoxazole Continue ART Scheduled immunization Newly diagnosed initiate on ABC+3TC+LPV-r Continue adherence counselling	Negative NAT Start Co-trimoxazole Send DBS or fresh blood for NAT Continue AZT+3TC+NVP prophylaxis BUT if never breastfed, stop the AZT+3TC+NVP prophylaxis Scheduled immunization	Adherence Counselling and continue/Initiate ART Infant Feeding Counselling
	10 weeks	Do HIV test if done >6 weeks Counsel and Initiate PrEP if eligible Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention	Positive NAT Continue Co-trimoxazole. Continue ART Continue adherence counselling Scheduled immunization Initiate any newly diagnosed to ABC+3TC+LPV-r	Negative NAT Continue Co-trimoxazole Continue AZT+3TC+NVP Scheduled immunization	Viral Load Testing in the mother Adherence Counselling and continue/Initiate ART Infant Feeding Counselling
	14 weeks	Do HIV test if done >6 weeks Counsel and Initiate PrEP if eligible Counsel client and partner on HIV combination prevention Provide condoms or information on where to access condoms, including female condoms Refer to youth friendly services for more comprehensive sexual information, including HIV prevention	Positive NAT	Negative NAT	If mother virally suppressed continue same regimen Mother not virally take action to ensure mother is on more efficacious regimen

Specific Population	Description	Child-bearing Female with Negative HIV Test Result	Child-bearing Female with Positive HIV Test Result		
			Continue Co-trimoxazole. Continue ART Continue adherence counselling Scheduled immunization Initiate any newly diagnosed to ABC+3TC+LPV-r	If mother virally suppressed stop AZT+3TC+NVP Mother not virally suppressed continue AZT+3TC+NVP Scheduled immunization	

6.7 ABORTIONS



Description

This is the expulsion of products of conception, usually before 24(28) weeks gestation. The contents of conception may or may not be completely expelled. It may be spontaneous or induced.

6.7.1. Medical Abortion (Termination of Pregnancy)



Description

Under the Termination of Pregnancy Act, of 1972, Cap 304 of the Laws of Zambia, termination of pregnancy (TOP) relates to an induced abortion when a pregnancy is terminated by a registered medical practitioner if he/she and two other registered medical practitioners, one of whom has specialized in the branch of medicine in which the patient is specifically required to be examined before a conclusion could be reached that the abortion should be recommended.

The Act provides the general framework under which a pregnancy can be terminated.

According to the Act, an abortion in Zambia can be conducted under the following circumstances:

Risk to the life of the pregnant woman,

OR

Risk of injury to the physical or mental health of the pregnant woman,

OR

Risk of injury to the physical or mental health of any existing children of the pregnant woman greater than if the pregnancy were terminated, or

Substantial risk that if the child were born, it would suffer from such physical and mental abnormalities as to be seriously handicapped.

Women eligibility:

- If gestation ≤ 12 weeks; if the medical doctor, after consulting with a second doctor or registered midwife, is satisfied that;
 - o Pregnancy was from rape or incest,
OR
 - o There is a substantial risk that the foetus would suffer from a severe mental or physical abnormality,
OR
 - o The continued pregnancy would pose a risk to the mother's physical or mental health,
OR
 - o Continued pregnancy will significantly affect the social or economic circumstances of the woman.
- If gestation ≥ 12 weeks; if the medical doctor, after consulting with a second doctor or registered midwife, is satisfied that continuing the pregnancy would endanger the mothers' life, pose a risk of injury to the foetus, or result in a severe foetal malformation.
 - o Setting
 - o Public health facilities are legally obligated to provide abortion-related services.
 - o Private health facilities registered with HPCZ and offering other RH services can also offer abortion-related services.
 - o Procedure for TOP should be done in a hygienic environment by skilled staff (medical doctors, midwives) trained in performing medical TOP.

General Measures

- All women undergoing TOP must have certificate of opinion A or B completed not later than 24 hours after such termination in the case of certificate B
- Provide pre-and post-termination counselling as essential
- Obtain consent from the woman for TOP and related procedures (e.g. laparotomy, MVA, etc.).
- If the patient's age is below that of legal consent to a medical or surgical procedure (less than 18 years of age), the parents or legal guardian approval to terminate the pregnancy must be documented. The best interest of the minor will take precedence over that of the parents or guardian.
- In the case of conflict between the woman and the partner/spouse, the woman's decision takes precedence.
- For all patients, a pertinent medical history and physical examination including a bimanual examination must be obtained and documented.
- Anti-D where available should be offered to non-immunized RH negative women especially after expulsion..
- Offer contraception post-TOP

When a patient with a positive pregnancy test presents with vaginal bleeding and/or pelvic pain, ectopic pregnancy should be considered and ruled out urgently. Where necessary and available, the following tests could be done:

- Pregnancy test
- Hb if the patient is clinically anaemia

- Ultrasound scan to confirm gestation age, rule out abnormality where indicated, rule out ectopic pregnancy where there is suspicion and to confirm the completeness of uterine evacuation where necessary. Referral
- If service not available (e.g. facility not accredited), refer to the designated level of care as soon as possible (within 2 weeks)
- If gestation ≥ 20 weeks.

Uterine Evacuation Procedures

For pregnancies up to 12 completed weeks of gestation, methods used for evacuation include:

- Surgical (manual vacuum aspiration (MVA), electric vacuum aspiration)
- Medical (Mifepristone combined with Misoprostol or Misoprostol alone where mifepristone is not available).
- General Measures:
- Confirm pregnancy with a urine test.
- Determine the gestational age with ultrasound. If ultrasound is unavailable, use dates (LMP) and bimanual (pelvic) examination.
- If unsure of dates, or examination disagrees with dates, or uterus palpable abdominally, or the woman is obese or difficult to examine, arrange preprocedure ultrasound.
- Ultrasound is mandatory if suspected ectopic pregnancy – refer if uncertain.
- Counselling.
- Outpatient procedure by nursing staff with specific training.
- Screen for STIs (if treatment needed, do not delay TOP).
- Arrange Pap smear if needed.
- Check HIV status, Hb and blood group (Rh).
- Counsel and start contraception post-TOP, before leaving the facility.
- Arrange contraception follow-up.



Treatment

Mifepristone 200mg PO immediately as a single dose. Followed 24–48 hours later by:

Misoprostol 800mcg PV or SL

If expulsion does not occur within 4 hours of Misoprostol administration, a second dose of Misoprostol 400mcg PO or PV may be given

Mifepristone & Misoprostol Dosing Chart

Recommended Regimens 2023

Table 147: Mifepristone & Misoprostol Dosing Chart

≤12 weeks	13-17 weeks	18-24 weeks	25-27 weeks	≥28 weeks	Postpartum Use
Induced Abortion Mifepristone 200mg PO Wait 1-2 days then, Misoprostol 800µg BU/SL/PV x1 ≥10 weeks give misoprostol BU/SL/PV every 3 hours until expulsion ¹	Induced Abortion Mifepristone 200mg PO Wait 1-2 days then, Misoprostol 400 every 3 hours BU/SL/PV until expulsion ⁵	Induced Abortion Mifepristone 200mg PO Wait 1-2 days then, Misoprostol 400 every 3 hours BU/SL/PV until expulsion ⁵	Induced Abortion Mifepristone 200mg PO Wait 1-2 days then, Misoprostol 200 every 4 hours until expulsion BU/SL/PV ^{5,9}	Induced Abortion Mifepristone 200mg PO Wait 1-2 days then, Misoprostol 50-100µg every 4 hours PV OR Misoprostol 50-100µg every 2 hours PO ^{6,9}	Prophylaxis of Postpartum haemorrhage (PPH) Misoprostol 600µg SL x ¹
Missed Abortion/Anembryonic Pregnancy Mifepristone 200mg PO Wait 1-2 days then, Misoprostol 800µg BU/SL/PV x1 ≥10 weeks give misoprostol BU/SL/PV every 3 hours until expulsion ¹	Missed Abortion Mifepristone 200mg PO Wait 1-2 days then, Misoprostol 400 every 3 hours BU/SL/PV until expulsion ⁵	Fetal Demise Mifepristone 200mg PO Wait 1-2 days then, Misoprostol 400 every 3 hours BU/SL/PV until expulsion	Fetal Demise Mifepristone 200mg PO Wait 1-2 days then, Misoprostol 200 every 4 hours BU/SL/PV until expulsion ⁵	Fetal Demise Mifepristone 200mg PO Wait 1-2 days then, Misoprostol 25-50µg every 4 hours PV OR Misoprostol 50-100µg every 2 hours PO ⁶	Treatment of Postpartum haemorrhage (PPH) Misoprostol 800µg SL x ¹
Incomplete Abortion 400µg misoprostol SLx1 600µg misoprostol PO x1 800µg misoprostol BU x1 dose ⁴	Incomplete Abortion Misoprostol 400 every 3 hours BU/SL until expulsion	Incomplete Abortion Misoprostol 400 every 3 hours BU/SL until expulsion	Induction of Labour Misoprostol 25-50µg every 4 hours PV ^{7,8} OR Misoprostol 50-100µg every 2 hours PO ^{6,7,8}	Induction of Labour Misoprostol 25-50µg every 4 hours PV ⁷ OR Misoprostol 50-100µg every 2 hours PO ^{6,7}	
Cervical Preparation Before Aspiration Not required ²	Cervical Preparation Before Aspiration Misoprostol 400µg 1-3hrs BU/SL/PV before the procedure ³	Cervical Preparation Before D&E (Use of multiple modalities is recommended) Mifepristone 200µg PO & Osmotic Dilators 1-2 days before. ⁴	LEGEND: Buccal(BU) Sublingual (SL) Per Vagina (PV) Per Oral (PO)		
1. <12 weeks induced & missed abortion can be self-managed at home. 2. Consider using 400µg misoprostol 1-2 hours before procedure in patients ≤ 17 years of age. 3. Consider using Osmotic Dilators in patients ≤17 years old or in patients with a stenotic cervix. 3. Can use Misoprostol 400µg 1-2 hours before D&E if mifepristone is not available. 4. Dosing based on Society of Family Planning Guidelines (2011, 2013) A comprehensive systematic review and Meta-Analysis published 2020 5. Dosing based on Cochrane Database Syst Rev. (CD014484) published 2021 6. Buccal and Sublingual Misoprostol is not recommended for induction of labour with viable pregnancies, it is associated with more tachysystole and fetal distress. 7. There is a lack of strong evidence for misoprostol dosing for this indication at this gestational age. 8. Induced fetal cardioplegia should be considered for induced abortion after fetal viability			NOTES: - SL/PO route is associated with more side effects. - Avoid vaginal route if there is vaginal bleeding. - Misoprostol is SAFE below 28 weeks EVEN with history of Cesarean Delivery. - Misoprostol is not recommended in women ≥28 weeks gestational age with a prior Cesarean Delivery. - There is NO Maximum dose of misoprostol. If an abortion is not complete after 5 doses, you may continue additional doses or rest for 12 hours and start again - Misoprostol is not contraindicated in grand multipara. - Routine aspiration after medication abortion is not required or recommended		

Misoprostol ONLY Dosing Chart
(For use **ONLY** when mifepristone is not available)
Recommended Regimens 2023

Table 148: Misoprostol ONLY Dosing Chart

≤12 weeks	13-17 weeks	18-24 weeks	25-27 weeks	≥28 weeks	Postpartum Use
Induced Abortion Misoprostol 800µg BU/SL/PV every 3 hours until expulsion ¹	Induced Abortion Misoprostol 400 every 3 hours BU/SL/PV until expulsion ⁵	Induced Abortion Misoprostol 400 every 3 hours BU/ SL/PV until expulsion ⁵	Induced Abortion Misoprostol 200 every 4 hours until expulsion BU/SL/PV ^{5,9}	Induced Abortion Misoprostol 50- 100µg every 4 hours PV OR Misoprostol 50-100 µg every 2 hours PO ^{6,9}	Prophylaxis of Postpartum hemorrhage (PPH) Misoprostol 600µg SL x ¹
Missed Abortion/ Anembryonic Pregnancy Misoprostol 800µg BU/SL/PV every 3 hours until expulsion ¹	Missed Abortion Misoprostol 400 every 3 hours BU/ SL/PV until expulsion ⁵	Fetal Demise Misoprostol 400 every 3 hours BU/SL/PV until expulsion	Fetal Demise Misoprostol 200 every 4 hours BU/SL/PV until expulsion ⁵	Fetal Demise Misoprostol 25- 50µg every 4 hours PV OR Misoprostol 50-100 µg every 2 hours PO ⁶	Treatment of Postpartum hemorrhage (PPH) Misoprostol 800µg SL x ¹
Incomplete Abortion 400µg misoprostol SLx1 600µg misoprostol PO x1 800µg misoprostol BU x 1 dose ⁴	Incomplete Abortion Misoprostol 400 every 3 hours BU/ SL until expulsion	Incomplete Abortion Misoprostol 400 every 3 hours BU/ SL	Induction of Labour Misoprostol 25- 50µg every 4 hours PV ^{7,8} OR Misoprostol 50- 100µg every 2 hours PO ^{6,7,8}	Induction of Labour Misoprostol 25- 50µg every 4 hours PV ⁷ OR Misoprostol 50- 100µg every 2 hours PO ^{6,7}	
Cervical Preparation Before Aspiration Not required ²	Cervical Preparation Before Aspiration: Misoprostol 400µg 1-3hrs BU/SL/ PV before the procedure ³	Cervical Preparation Before D&E (Use of multiple modalities is recommended) Mifepristone 200µg PO & Osmotic Dilators 1-2 days before. 4 Misoprostol 400µg 1-3hrs BU/ SL/PV before the procedure ³	LEGEND: Buccal(BU) Sublingual (SL) Per Vagina (PV) Per Oral (PO)		
<12 weeks induced & missed abortion can be self-managed at home. - Consider using 400µg misoprostol 1-2 hours before procedure in patients ≤ 17 years of age. 3. Consider using Osmotic Dilators in patients ≤17 years old or in patients with a stenotic cervix. - Can use Misoprostol 400µg 1-2 hours before D&E if mifepristone is not available. - Dosing based on Society of Family Planning Guidelines (2011, 2013) A comprehensive systematic review and Meta-Analysis published 2020 - Dosing based on Cochrane Database Syst Rev. (CD014484) published 2021 - Buccal and Sublingual Misoprostol is not recommended for induction of labour with viable pregnancies, it is associated with more tachysystole and fetal distress. - There is a lack of strong evidence for misoprostol dosing for this indication at this gestational age. - Induced fetal cardioplegia should be considered for induced abortion after fetal viability			NOTES: - SL/PO route is associated with more side effects. - Avoid vaginal route if there is vaginal bleeding. - Misoprostol is SAFE below 28 weeks EVEN with history of Cesarean Delivery. - Misoprostol is not recommended in women ≥28 weeks gestational age with a prior Cesarean Delivery. - There is NO Maximum dose of misoprostol. If an abortion is not complete after 5 doses, you may continue additional doses or rest for 12 hours and start again - Misoprostol is not contraindicated in grand multipara. - Routine aspiration after medication abortion is not required or recommended		

Note:

- Allowing home use of Mifepristone and Misoprostol after counselling and clinical evaluation at a health care facility can improve the privacy, convenience and acceptability of services, without compromising on safety.
- Patient's instructions must include information about the use of medication at home and symptoms of abortion complications and what to do in such cases.
- Medical abortion and in particular, use of Misoprostol, for pregnancies over 12 weeks should be facility-based to facilitate the need for repeated.
- The patient must be informed that if the medical abortion fails, the surgical method may be needed.
- The facility must provide an emergency contact on a 24-hour basis and must assure referral for uterine aspiration if indicated for patients self-administering misoprostol and/or mifepristone at home following clinical evaluation and counselling at a health care facility.
- Healthcare providers should ensure that all victims of SGBV should be linked to other supportive services including prevention and management of STIs, HIV, unwanted pregnancy and need for Post Exposure Prophylaxis (PEP), psychosocial counselling and shelter. Establish effective referral systems through formalized agreements between stakeholders. For pain:
 - After administration of Mifepristone, start:
 - o Paracetamol 1g PO 4–6 hourly when required to a maximum of 4 doses per 24 hours (Maximum dose: 15mg/kg/dose or 4g in 24 hours).
 - **ADD** After expulsion is complete:
 - o Ibuprofen 400mg PO 8 hourly with or after a meal.
- TOP using manual vacuum aspiration (MVA) - if gestation >14 weeks:
- Medical abortion or Dilatation and Evacuation (D&E) are the preferred methods for evacuating the uterus in the second trimester after cervical preparation/priming/ ripening.
- Misoprostol 400mcg PV 3 hours before vacuum aspiration of the uterus. Note:
- Cervical preparation (ripening/priming) is recommended for
 - o Nulliparous women
 - o Women less than 18 years old
 - o All women at 12-14 weeks of gestation and above.
- Routine analgesia for vacuum aspiration:
- Consider para-cervical block if trained in the technique. All women undergoing MVA for induced abortion must be offered para-cervical block.
- Alternatively, Oral analgesia as required for 48 hours:
 - o Paracetamol 1g PO 4–6 hourly when required to a maximum of 4 doses per 24 hours, AND
 - o Ibuprofen 400mg PO 8 hourly with or after a meal. For both medical and surgical TOPs (MVA):
- In Rh-negative, non-sensitised women: Give Anti-D immunoglobulin
 - o < 12 weeks gestation 50mcg (250 IU) IM stat
 - o ≥ 12 weeks gestation 100mcg (500IU) IM stat in the deltoid muscle of the upper arm.
- Preferably within 72 hours but may be given up to 7 days following TOP.
- Clinical protocols for post-operative care must be followed.
- Review all patients after 7 days: if bleeding persists, arrange urgent ultrasound.



Referral Criteria

If gestation ≥ 12 weeks.

If gestation is uncertain.

If any signs or symptoms of ectopic pregnancy or other early pregnancy complications.

Co-morbid conditions (heart disease, asthma, diabetes, anaemia, clotting disorder, seizure disorder, substance abuse, hypertension).

Large fibroids (may interfere with determining gestation age and/or MVA).

Any signs of sepsis (tachycardia, hypotension, pyrexia, tachypnoea, offensive vaginal discharge).

- If MVA not available or declined.

Late 2 nd trimester terminations (Therapeutic)

TOP in the late 2 nd trimester is sometimes necessary. Termination done in late second trimester should be done in obstetrics and gynaecology sections of the hospital.

All facilities should have clear and evidence-based protocols for TOP in the late second trimester.

Hospitalisation is required for all patients having a termination of pregnancy in the late second-trimester abortion

Bereavement counselling should be offered to all women undergoing TOP in the late second trimester

Guideline:

Patient must be informed that should medical methods fail surgical methods such as D & E may be needed and with a possibility of hysterectomy.

Expulsion of a live foetus is a possibility which fact must be discussed with a patient.

6.7.2. Threatened Abortion

Abortion is said to be threatened when there is mild vaginal bleeding with or without lower abdominal pain, but the cervix is closed and all products of conception are in situ.



Signs and Symptoms

- Mild vaginal bleeding
- Mild/no lower abdominal pain or back ache



Investigations

- Ultrasound to confirm gestational age and foetal viability
- FBC
- Infection screening such as urinalysis, RPR, RVD



Treatment

- Excessive work is discouraged
- Avoid Coitus
- Admit the patient and manage appropriately if
- The foetus is dead
- Bleeding recurs
- Fever
- Foul smelling vaginal discharge
- Severe abdominal pain

6.7.3. Inevitable Abortion



Description

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.



Signs and Symptoms

- 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



Investigations

- FBC
- Group and X-match



Treatment

- Apply Airway, Breathing, Circulation and Dehydration (ABCD) principles of resuscitation
- Give IV Ringers Lactate (RL)/Normal Saline (NS) 2litres
- Augment the process if membranes have ruptured by administering oxytocin 20 IU in 500mls RL/NS at 40–60 drops/minute
- Manage as incomplete abortion if after expulsion some products of conception remain in the uterus
- Manage as complete abortion if all products of conception are expelled
- Refer to hospital if MVA/medical management is not possible and/or bleeding is persisting.

6.7.4. Incomplete Abortion



Description

Some of the products of conception have been retained in the uterine cavity and there is persistent lower abdominal pain, continuing per vaginal bleeding and open cervix.



Signs and Symptoms

- Cramping lower abdominal pain
- Slight to profuse per vaginal (PV) bleeding accompanied with clots/products of conception
- Fundus smaller than dates
- The cervix is dilated and products of conception may be felt in the cervix on digital examination



Investigations

- FBC
- Group and X-match



Treatment

Supportive

- Apply Airway, Breathing, Circulation and Dehydration principles of resuscitation
- Give IV RL/NS 2lts
- Give blood transfusion if indicated
- Perform MVA at the health centre if gestation age is below 12 weeks
- If above 12 weeks gestation, and patient has retained placenta – perform a manual evacuation

Pharmacological Treatment

- Oxytocin 10 IU IM

OR

- Misoprostol 600µg PO start
- After evacuation give:
- Amoxicillin PO 500mg 8 hourly for 5 days

PLUS

- Metronidazole PO 400mg 8hourly for 5 days
- PLUS
- Paracetamol 1g 8 hourly for 5 days
- Refer patient to hospital level with an escort of a nurse if bleeding continues
- Patient education, Counsel and provide appropriate contraception.

6.7.5. Complete Abortion



Description

Products of conception are completely expelled



Signs and Symptoms

- Minimal or no PV bleeding
- Uterus smaller than dates and often well contracted
- Cervix may or may not be closed



Investigations

- Ultrasound
- FBC



Treatment

- Amoxicillin PO 500 mg 8 hourly for 5 days
PLUS
- Metronidazole PO 400mg 8 hourly for 5 days
PLUS
- 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
 - Give blood transfusion if indicated
 - Insert an indwelling urethral catheter
 - Give IV Ceftriaxone 1g **Plus** metronidazole 500mg IV Stat
 - Obtain blood for HB, grouping and cross match.
 - Refer patient to hospital with an escort of a nurse
- Patient Education, Counsel and provide appropriate contraception.

6.7.6. Septic Abortion



Description

It is an abortion complicated with infections.



Signs and Symptoms

- 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



Investigations

- FBC/DC
- Endocervical and/or Blood culture
- Group and X-match
- Ultrasound
- Bedside clotting time



Treatment

Supportive

- Apply ABCD principles of resuscitation
- Give IV RL/NS 3liters or more in the first hour
- Give blood transfusion if indicated
- Insert an indwelling urethral catheter
- If an incomplete septic abortion perform necessary resuscitative measures and give IV antibiotics, allow atleast 6 hours post antibiotic treatment before evacuation

Pharmacological Treatment

- Cefriaxone 1g IV 12 hourly for at least 5 days
- PLUS
- Metronidazole IV 500mg 8 hourly for at least 5 days
- Refer patient to hospital accompanied by a nurse.
- Patient Education, Counsel and provide appropriate contraception.

6.7.7. Missed Abortion



Description

Foetus die in utero but it is not expelled out



Signs and Symptoms

- History of amenorrhea
- Regression of the pregnancy symptoms
- Uterine size smaller than dates
- Mild per vaginal bleeding



Investigations

- Abdominal pelvic ultrasound
- Clotting profile
- FBC



Treatment

- Induce abortion with misoprostol as follows:
- 1st trimester – 800mcg PV OR 600mcg SL every 3 hours for a maximum of 2 doses. Can be repeated after 24 hours.
- 13-17 weeks – 200mcg PV every 6 hours for a maximum of 4 doses
- 18-26 weeks – 100mcg PV every 6 hours for a maximum of 4 doses in 24 hours
- Evacuate if less than 12 weeks
- After evacuation give;
- Amoxicillin (PO) 500mg 8hly for 5 days
PLUS
- Metronidazole (PO) 400mg 8hly for 5 days
- Patient education, Counsel and provide appropriate contraception.

6.7.8. Post-abortion care (PAC)



Description

- PAC is safe when provided by a trained provider in an environment with adequate hygiene and suitable equipment. All institutions offering PAC services should be registered by appropriate regulatory authorities.

- PAC can be provided from health levels as low as the health post (depending on available skills and clients condition) up to tertiary level. All institutions providing PAC should be guided by local protocols.
- Emergency preparedness should be available in all facilities providing PAC. All facilities should be able to stabilize, treat or refer patients with post-abortion complications.
- Emergency treatment
- Assessment should include assessment of vital signs and indication of how clinically stable the patient is.
- Any patient discovered with a life-threatening condition such as shock, ectopic pregnancy, sepsis or haemorrhage should have resuscitative measures instituted immediately.
- Physical examination should include a pelvic examination noting any vaginal discharge, vaginal bleeding, uterine size and presence of retained products of conception (RPOCs). Signs of infection including fever, foul smelling discharge, and tender uterus should also be documented.
- If an infection is suspected, appropriate laboratory specimens should be taken but should not delay the initiation of treatment.
- Appropriate laboratory tests such as HB, blood grouping and cross matching and any other tests indicated by the medical condition of the patient should be done.
- For the management of complications, refer to local protocols or the National Standards & Guidelines for Comprehensive Abortion Care in Zambia.

6.8 MOLAR PREGNANCY



Description

It happens when tissue that normally develops into a foetus becomes an abnormal growth in the uterus. Once diagnosed, it should be treated immediately.



Signs and Symptoms

- Vaginal bleeding
- Uterus that is larger than gestational age (GA) and foetal parts not palpable.
- Severe nausea and vomiting
- Vaginal discharge of tissue that is grape like
- Very heavy vaginal bleeding when the mole abort spontaneously



Treatment

Resuscitate and refer the patient to higher level facility for appropriate management.

MEDICINE SAFETY MONITORING (PHARMACOVIGILANCE)

Monitoring the safety of medicines is a critical component of Zambia's national patient monitoring system as knowledge of adverse drug reactions and drug interactions helps to generate much-needed safety data to help improve care and treatment outcomes for patients and consumers of medicinal products.

All healthcare workers, recipients of care/consumers, manufacturers/distributors and the general public are encouraged to report safety issues such as adverse drug reactions, medication errors and quality problems. Everyone is encouraged to report as soon as possible even when not sure or does not have all the information. Reporting can be made using various tools which the Ministry of Health has put in place through the Zambia Medicines Regulatory Authority (ZAMRA). These reporting tools are:

1. Paper ADR report form which can be accessed from your pharmacy department
2. Mobile phone application Med Safety for android and IOS platforms found on Play Store and iStore respectively
3. Electronic reporting form on the ZAMRA website; <http://www.zamra.co.zm>
Note: Paper ADR reporting forms should be submitted/sent/mailed as soon as possible to:

The National Pharmacovigilance Unit (NPVU)
Zambia Medicines Regulatory Authority
P.O Box 31890, Lusaka, Zambia
Email: pharmacy@zamra.co.zm
Tel: +260211220429

In the event one is unable to submit directly to NPVU at ZAMRA, forms can be submitted through the following reporting centres:

1. ZAMRA regional offices
2. Regional Pharmacovigilance centers
3. District Health Office
4. Provincial Health Office
5. Responsible officer/In-charge of the dispensary or community pharmacy 6)
Posted at the nearest post office (Zambia Postal Services)

NOTES

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