2021 EDITION

STANDARD TREATMENT GUIDELINES AND ESSENTIAL MEDICINES LIST

Of Common Medical Conditions in the Kingdom of Eswatini

PAEDIATRIC

MINISTRY OF HEALTH

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FOREWORD

The Ministry of Health is pleased to present the first edition of the paediatric standard treatment guidelines (STGs) and essential medicines list (EML) for common medical conditions in the Kingdom of Eswatini. The purpose of the guidelines is to standardise and improve cost-effective management of common diseases in children to enhance quality and efficiency in service delivery. Development of these guidelines were based on principles of scientific evidence, cost-effectiveness, and prioritisation of conditions to maximise health benefits with limited resources and is in line with the World Health Organisation (WHO) model list of Essential Medicines 21st edition of 2019..

The health system still faces multiple challenges that include a high burden of infectious diseases, that remain major causes of morbidity and mortality, such as; HIV, tuberculosis, Pneumonia and malnutrition. Furthermore, non-communicable disease conditions such as diabetes, hypertension, heart disease, and mental disorders exert more pressure on the already constrained health resources. These standard treatment guidelines will facilitate effective diagnosis and management of these conditions across all levels of care by presenting updated, practical, and useful information on the diagnosis and management of these common conditions. The essential medicines list also provides a rational basis for efficient procurement and supply of medicines as per the Essential Health Care package (EHCP) for specified levels. This is to ensure continuous availability of safe, efficacious, quality medicines and health supplies to emaSwati and also ensure the rational use of these medicines.

These guidelines were developed collaboratively involving wide consultations with relevant stakeholders and interested parties in the public, private not for profit, private for profit health sectors and academia. Lessons learnt from the development of the maiden editions of the Eswatini treatment guidelines were taken into consideration. These include enhancing content for secondary care, providing linkages to other programme guidelines, involvement of all health professional and development of an electronic application. These guidelines are therefore recommended for use at all heath facilities and at pre-service training institutions and will be distributed widely to all health care workers.

To promote continued appropriate use of medicines, health products and technologies in line with the Extended National Health Sector Strategic Plan II 2019-2023, these guidelines will be reviewed on a regular basis.

Finally, I would like to express my gratitude to the Directorate in the Ministry of Health; the STG/EML technical working group and the efforts of all those who worked on these guidelines. Special mention and gratitude go to the World Health Organisation and the Global Health Supply Chain- Procurement and Supply Management Project funded by the USAID, for providing sustained technical and financial support for the development of these important documents.

Honourable Senator Lizzy Nkosi
Minister of Health

Standard treatment guidelines provide evidence-based, practical, and implementable guidance to heath care workers to ensure cost-effective and affordable treatment of priority health conditions to optimise use of limited resources and provide a basis for formulation of an essential medicines list.

These guidelines have been reviewed and updated from August 2019 to December 2020 involving extensive consultations with public health programmes staff, medical experts, academics and health workers of all cadres. The treatments described in this standard treatment guidelines are therefore nationally recognised standard treatments, and in many cases, are derived from the appropriate Public Health programmes updated guidelines, World Health Organisation, and other international diseases guidelines.

As per the previous version, Section A of the document contains the STG, and efforts have been made to have the conditions commonly encountered in Eswatini classified according to systems and written in simple, clear language. Each section consists of a short definition, common symptoms and signs of the disease or condition and then management (pharmacological and non-pharmacological).

Section B is the EML derived from recommendations from the STG. The medicines are clearly listed according to the Anatomical Therapeutic Chemical (ATC) classification system recommended by WHO. These guidelines are intended to be used as a guide and cannot replace clinical judgement in individual cases given the dynamic developments in clinical medicine. The Ministry of Health and all stakeholders involved in the development of the second edition (STG/EML) in the Kingdom of Eswatini believe that these guidelines will provide much needed guidance for improving quality of care at health facilities.

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ACROYNMYS

ABCD	-	Airway, Breathing, Circulation, Disability, Exposure
AEFI	-	Adverse Events Following Immunisation
AIDS	-	Acquired Immuno-Deficiency Syndrome
ALT	-	Alanine Aminotransferase
AMI	-	Acute Myocardial Infarction
ANA	-	Antinuclear antibodies
ANC	-	Antenatal Care
ARF	-	Acute renal failure
ASO	-	Antistreptolysin O
AST	-	Aspartate aminotransferase
BCG	-	Bacillus Calmette Guerin [TB Vaccine]
BD	-	“bis in die” - Two times a day
BP	-	Blood Pressure
CBC	-	Complete Blood Count
CNS	-	Central Nervous System
COPD	-	Chronic Obstructive Pulmonary Disease
CPAP	-	Continuous Positive Airway Pressure
CPR	-	Cardiopulmonary Resuscitation
CSF	-	Cerebrospinal Fluid
CT or CAT	-	Computerised Axial Tomography
CXR	-	Chest Xray
DBS	-	Dried Blood Spot
DKA	-	Diabetic ketoacidosis
DMARD	-	Disease-modifying antirheumatic drugs
DPT	-	Diphtheria Tetanus Pertussis
DT	-	Diphtheria, Tetanus
ECG	-	Electrocardiogram
ENT	-	Ear, Nose, and Throat
EPI	-	Expanded Programme on Immunisation
EVF	-	Extravascular Fluid
FBC	-	Full Blood Count
FSGS	-	Focal segmental glomerulosclerosis
HB	-	Haemoglobin
HCT	-	Hematocrit
HIV	-	Human Immuno-Deficiency Virus
HPV	-	Human papilloma virus

ICP	-	Intracranial pressure
ICU	-	Intensive Care Unit
IDM	-	Infant of Diabetic Mother
IM	-	Intramuscular
IPV	-	Inactivated polio vaccine
IV	-	Intravenous
JIA	-	Juvenile idiopathic arthritis
LBW	-	Low birth weight
LFT	-	Liver function tests
LIP	-	Lymphoid Interstitial Pneumonitis
LR	-	Lactated Ringer's solution
MAS	-	Macrophage activation syndrome
MCNS	-	Minimal Change Nephrotic Syndrome
MUAC	-	Mid-Upper Arm Circumference
NICU	-	Neonatal Intensive Care Unit
NPO	-	Nothing by mouth
NS	-	Normal saline
NSAID	-	Nonsteroidal anti-inflammatory drugs
OPV	-	Oral poliovirus vaccines
ORS	-	Oral rehydration solutions
PE	-	Physical exam, pulmonary embolism
PEP	-	Post-exposure prophylaxis
PH	-	Past history
po	-	By mouth
PRBC	-	Packed red blood cells
PRN	-	As needed, whenever necessary
PT	-	Physical therapy; Prothombin Time.
PTT	-	Partial prothrombaplastin time
RBC	-	Red blood cell/count
RDT	-	Rapid diagnostic test
RFT	-	Renal function test
ROTA	-	Rotavirus Vaccine
RPR	-	Rapid Plasma Reagin
RSP	-	Right sacroposterior position
Td	-	Tetanus and Diptheria
TTCV	-	Tetanus Toxoid Containing Vaccine
UTI	-	Urinary Tract Infection
VAS	-	Vitamin A Supplementation
VVM	-	Vaccine Vial Monitor

CHAPTER 1

IMMUNISATION

CHAPTER 1. IMMUNISATION

General Notes

The terms immunisation and vaccination will be used interchangeably in this chapter. Further information on immunisation, the cold chain, etc. may be found in the Expanded Practical Immunisation (EPI) Guideline.

Adverse events following Immunisation

All adverse events following immunisation should be notified through the normative immediate notification system and reported using the *'Adverse Events Following Immunisation'* (AEFI) form. Health workers should refer to the National AEFI Surveillance Guideline.

Diseases Preventable by Immunisation

- Diphtheria
- Measles
- Rubella
- Hepatitis B
- Pertussis (whooping cough)
- Poliomyelitis
- Rabies
- Tetanus
- Tuberculosis
- Pneumococcal diseases such as septicaemia and meningitis (caused by Haemophilus Influenza type B and Streptococcus pneumoniae) and milder ones, such as otitis media (middle ear infection) and sinusitis.
- Diarrhea, vomiting and systematic upset due to Rotavirus infection.

Multi Dose Vial Policy

- The policy allows opening a vial of multi-dose vaccine even if there is one eligible client to avoid missed opportunities.
- Open vials of DPT, DPT-HepB-Hib (Pentavalent), DT, TT, OPV, IPV, Rota, HPV and Hepatitis B vaccines may be used in subsequent sessions for a maximum of 28 days (EPI Policy) provided the vaccine:
  - Has not expired,
  - Has not been contaminated (aseptic rule observed when withdrawing doses)
  - Has not been exposed to excessive cold and heat
  - Has not been immersed in water
- An open vial of Measles Rubella, BCG and yellow fever vaccines must be discarded at the end of a session or after six hours of reconstitution, whichever comes first.
- For all the vaccines act according to the Vaccine Vial Monitor (VVM) staging (1 and 2 use vaccine or 3 and 4 don't use vaccine – discard).

Effectiveness of Vaccines in HIV Infected Individuals

- EPI recommended vaccines have shown satisfactory seroconversion rates in early stages of HIV infection.
- However, the proportion of responders decreases with progression from HIV infection to AIDS.
- Children with known or asymptomatic HIV infection should receive all EPI vaccines according to the schedule.
- BCG vaccine should not be given to children with clinical symptoms of HIV infection.

1.1 Immunisation Schedule for Children

See Table.1. This schedule is the *only one* to be used in Eswatini. Ages given are minimum ages for each vaccination. Children should receive doses at these stated ages or at the first contact after reaching that age (maximum age limits are: BCG 11 months, Rotavirus 32 weeks, and Pentavalent 23 months).

- For all vaccines dosing *always* follow the Eswatini Immunisation Procedure as stated in Table 1 below.
- Always remember to record the batch number of the vaccine on the child's health card when entering the date of immunisation.
- Always ensure that the emergency box or kit is available and is stocked with appropriate emergency medicines.

Table1. Eswatini Immunisation Schedule

Vaccine	Age		Dosage	Interval between doses	Total Number of Doses	Mode of administration	Site	Side Effects
	Minimum	Maximum						
BCG	Birth	12 months	0.05 ml	-	1	Intradermal	Left fore-arm	Small swelling blister
BCG	12 months	15 Years	0.1ml	-	1	Intradermal	Left fore-arm	Small swelling blister
Hepatitis B (Birth dose)	Birth	2 weeks	0.5 ml	-	1	Intramuscular	Left lateral thigh	
Hepatitis B (Adult dose)	-	-	1ml	4 weeks	3	Intramuscular	Left upper arm	Pain and redness on stie of injection
bOPV 0	Birth	2 weeks	2 drops	4 weeks	5	Orally	Mouth	None
1	6 weeks	15 years	2 drops	4 weeks				
2	10 weeks	15 years	2 drops	4 weeks				
3	14 weeks	15 years	2 drops	4 weeks				
Booster	18 months	-	2 drops	-				
Booster	5 years	-	2 drops	-				
IPV	14 weeks	23 months	0.5 ml	-	1	Intramuscular	Right lateral thigh	• Pain and redness on site of injection • Fever
DPT-Hep B-Hib 1	6 weeks	23 months	0.5 ml	-	3	Intramuscular	Left lateral thigh	• Pain and redness on site of injection • Fever
2	10 weeks	23 months	0.5 ml	4 weeks				
3	14 weeks	23 months	0.5 ml	4 weeks				
PCV 1	6 weeks	23 months	0.5 ml	-	3	Intramuscular	Left lateral thigh	• Pain and redness on site of injection • Fever
PCV 2	10 weeks	23 months	0.5 ml	4 weeks				
PCV 3	14 weeks	23 months	0.5 ml	4 weeks				
Rotarix 1	6 weeks	23 months	1 mono-tube	-	2	Orally	Mouth	None
Rotarix 2	10 weeks	23 months	1 mono-tube	4 weeks				

Vaccine	Age		Dosage	Interval between doses	Total Number of Doses	Mode of administration	Site	Side Effects
	Minimum	Maximum						
MR 1	9 months	15 years	2	-	2	Subcutaneous	Right upper arm	• Fever (1 – 3 days) • Redness • Rash between 5 – 12 days
MR 2	18 months	-						
DT Booster	5 years	10 years	0.5 ml	-	1	Intramuscular	Upper outer aspect of the buttock	• Pain and redness on site of injection • Fever
DT 1	2 years	10 years	0.5 ml	-	1	Intramuscular	Upper outer aspect of the buttock	• Pain and redness on site of injection • Fever
DT 2				4 weeks				
DT 3				-				
Td (adolescent)	9 years	> 10 years	0.5 ml	-	1	Intramuscular	Right Upper Arm	• Pain and redness on site of injection

NB:

- All vaccines at all delivery points should be kept at +2°C-+ 8°C.
- EPI shall update all service providers on new developments regarding new vaccines and technologies.
- All vaccines are vital and should be availed at all levels of care.

1.1.1 Integrating Routine Immunisation with other Interventions

A strategy commonly known as EPI plus provides a platform for delivery of other health interventions such as Vitamin A supplementation, deworming and early infant diagnosis (DBS) of HIV infection. Eswatini has integrated Vitamin A supplementation (VAS) into the routine immunisation system. Any immunisation contact is an opportunity to screen mothers and infants for eligibility to receive VAS and any other interventions.

Table.2: Vitamin A Supplementation Schedule

Target for Vit. A	Immunisation contact	Vitamin A dose
Infants 6–11 months	Measles Rubella Supplemental Immunisation Activities (SIAs)	100 000 IU
Children 12 months and older	Other EPI campaigns Boosters	200 000 IU
Children 12–69 months	Booster doses Delayed primary immunisation School health programme Supplemental Immunisation Activities (SIAs)	200 000 IU

NB: Give Vitamin A supplementation every six months to eligible children

1.2 Tetanus Immunisations for Adults

- For life long immunity, serological studies suggest that a primary series of 3 Tetanus Toxoid Containing Vaccine (TTCV) doses in infancy plus a booster during the second year of life (12–23 months) will

provide 3–5 years of protection. A further booster dose (e.g. in early childhood, or at school entry, 4–7 years) will provide protection into adolescence, and another booster during adolescence (9–15 years) will induce immunity that lasts throughout the life course and which protects women through their childbearing years.

- Pregnant women with unknown vaccination status and those who have not been previously vaccinated should receive at least 2 TTCV doses as early as possible, with an interval of 4 weeks between the doses. Administer the 2nd dose at least 2 weeks before birth to allow for adequate immune response.
- Further doses of TTCV should be administered as shown in Table below.

Table.3: TTCV vaccination schedule for Women of Reproductive Age (WRA) and pregnant women with unknown vaccination status or without previous exposure to TTCV

Dose of TTCV	When to give	Expected duration of protection
TTCV 1	At first contact or as early in pregnancy as possible.	None
TTCV 2	At least 4 weeks after TTCV1 (at the latest 2 weeks prior to birth)	1 -3 years
TTCV 3	At least 6 months after TTCV2, or during subsequent pregnancy	At least 5 years
TTCV 4	At least 1 year after TTCV3, or during subsequent pregnancy	At least 10 years
TTCV 5	At least 1 year after TTCV4, or during subsequent pregnancy	For all child-bearing age and much of adulthood

- For partially vaccinated individuals follow the schedule below in Table 4.

Table.4: TTCV Vaccination Schedule For Partially Vaccinated Pregnant Women

Age of last vaccination	Previous vaccinations (from vaccination record)	Recommended TTCV doses	
		At present ANC contact/ pregnancy	Later (with interval of at least one year)
Infancy	3 TTCV primary doses	2 doses of TTCV (minimum 4 week interval between doses)	1 dose of TTCV
Early childhood/ school age	3 TTCV primary doses + 1 booster (total of 4 TTCV doses)	1 dose of TTCV	1 dose of TTCV
School age	3 TTCV primary doses + 2 boosters (total of 5 TTCV doses)	1 dose of TTCV	None (fully protected)
Adolescence	3 TTCV primary doses+ 3 boosters (total of 6 TTCV doses)	None (fully protected)	None (fully protected)

NB: The country has replaced TT with Td vaccine

Immunisation details for available vaccines

- Always check the dosage instructions in the manufacturer's information supplied with the vaccine as strengths may vary.
- In the event of a measles epidemic, children between 6 and 9 months can be vaccinated. However, the measles vaccination must be repeated again after 9 months and another dose at 18 months.
- The minimum interval for HB2 and HB3 is 5 months, if given as a mono dose.

Contraindications to vaccinations

There are very few absolute contraindications to vaccines. Fever, diarrhea, mild respiratory infection and malnutrition are not contraindications to vaccines.

- BCG vaccine should not be given to a child with symptomatic HIV infection but polio and measles/ rubella vaccines should be given to children with HIV and AIDS together with other vaccines.
- A second or third dose of Pentavalent and DTP at 18 months should not be given to a child who severely reacted to a previous dose of Pentavalent (Note DTP because of the whole cell Pertussis may cause severe anaphylaxis, collapse, or convulsions). DT should be given instead.
- A child with an evolving neurological disease such as uncontrolled epilepsy or progressive encephalopathy should not be given Pentavalent or DTP. Give DT instead.
- **NB**: The current DPT contains whole cell pertussis.

Interval between multi-doses of the same antigen

- The minimum interval between doses is 28 days.
- If any dose of an antigen for subsequent doses is delayed, vaccinations on the next attendance should be continued as if the usual interval had elapsed (i.e. 4 weeks have elapsed). All the EPI antigens are safe and effective when administered simultaneously i.e. during the same vaccination session but on different sites. Pentavalent, Pneumococcal, Rotavirus, IPV and OPV are given simultaneously.
- If a vaccine dose is given at less than the recommended 28 days' interval, it should not be counted as a valid dose and therefore should be repeated at the appropriate interval of 28 days from the previous dose. This applies to vaccines given during campaigns such as child health days, national immunisation days or in reaction to outbreaks of vaccine preventable diseases.

Hospital admission policy on immunisation

- To reduce nosocomial transmission, Measles vaccine should be given on admission to all children six months to 15 years. This admission dose must be recorded on the notes, sheets of the child health card with the age at which it was given and written. If the child is 9 months and receives the first dose on admission this is charted on the appropriate section of the card.
- Health workers should ascertain the vaccination status for all admitted children, including those without a child health card and give the appropriate antigens.
- Children who are very ill on admission should be vaccinated as soon as their condition has improved.

CHAPTER 2

NEONATAL CONDITIONS

2.1 Sick Newborn

At birth all well newborns are active with strong cry. Any baby born ill will show signs of inactivity and may be described as being "flat."

Causes

- Birth asphyxia
- Neonatal infections
- Congenital malformations (e.g., of heart and central nervous system)
- Prematurity
- Maternal sedation or analgesia during labour
- Metabolic (e.g., hypoglycaemia, hypocalcaemia)

Symptoms and signs

- Inability to cry or weak cry
- Difficulty in breathing or recurrent cessation of breathing
- Inactivity with reduced spontaneous movements or very floppy
- Refusal of feedings or vomiting
- Abdominal distension
- Pallor
- Respiratory distress
- Cyanosis
- Jaundice
- Bradycardia <100 beats/minute or tachycardia >160 beats/minute

2.2 Neonatal Jaundice (*Refer* Neonatal Guidelines)

Neonatal jaundice is important because of the consequences of excess hyperbilirubinemia on the brain of the newborn infant. This condition is called kernicterus and may cause death. Infants who survive may be handicapped with cerebral palsy and associated deafness, mental retardation, and lack of motor coordination.

Treatment

In mild cases of neonatal jaundice appearing after the second day (i.e., physiologic jaundice), phototherapy can be used. Its eyes must be covered while under the lights to avoid retinal damage. The baby must be placed in phototherapy as much as possible. Continue breastfeeding during this time.

Refer

- All babies who develop jaundice within 48 hours of life
- All babies who have severe jaundice, if exchange transfusion cannot be done at the facilities
- All babies whose jaundice worsens despite treatment

2.3 Birth Injuries

Birth injuries may result from any difficult delivery, including instrumental delivery and may cause:

- Extensive caput succedaneum
- Cephalohaematoma
- Subgaleal haemorrhage
- Nerve palsies
- Fractures
- Lacerations

2.3.1 Extensive Caput Succedaneum

Diffuse swelling of the presenting part of the scalp that may extend beyond suture lines.

Management

- Leave alone and reassure parents.
- It resolves spontaneously over 3–4 days.

2.3.2 Cephalohaematoma

A hemorrhage involving the skull bones, confined by suture lines. Usually unilateral but occasionally bilateral.

Management

- No specific treatment is required. Leave alone.
- **Caution:** Do not perform incision and drainage. It resolves with time.

Prevention

Medicine	Dose	Frequency	Duration	Codes
Vitamin K (Phytomenadione)	1mg (0.5mg to neonates under 1kg) at birth	Ginen once	At birth	A V

2.3.3 Subdural Haemorrhage

A swelling resulting from bleeding under the scalp. It may be extensive enough to distort shape of head and also cause severe pallor. Jaundice follows later.

Nonpharmacological management

- Give phototherapy if jaundice is severe.
- Transfuse with blood if Hb <12 g/L.

Pharmacological management

Medicine	Dose	Frequency	Duration	Codes
Vitamin K (Phytomenadione)	1mg (0.5mg to neonates under 1kg) at once			A V

Refer to the hospital in severe cases.

2.3.4 Nerve Palsies

Excessive traction may result in injuries to the brachial plexus of nerves. The types of nerve injuries are:

- *Erb's palsy* - Whole upper limb does not move. There is movement only in the fingers.
- *Klumpke's palsy* - Fingers of the affected arm do not move, but there is spontaneous movement in the arm and forearm.

Treatment

- Patients need early and regular physiotherapy; ***refer*** to hospital.

2.3.5 Fractures

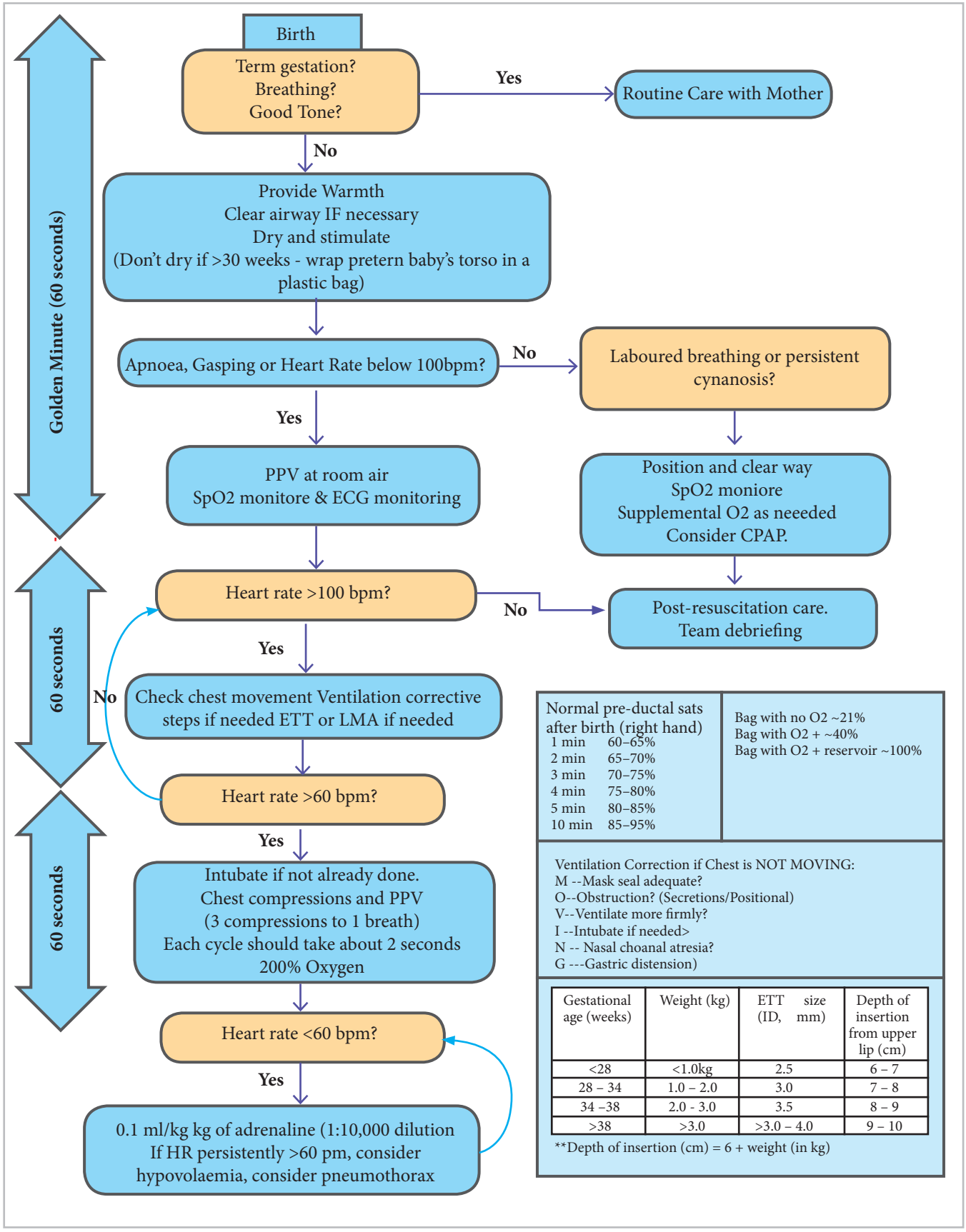
Fractures can involve any bone in the body. If a fracture is suspected, ***refer urgently.***

2.4 Neonatal Resuscitation

High-risk deliveries that may require resuscitation include:

- ≤36 weeks gestation.
- Meconium staining.
- Fetal distress.
- Known congenital malformations.
- Multiple births.
- Malpresentation.
- Maternal complications such as diabetes, haemorrhage, hypertension.

Figure 2: Neonatal resusciatation algorithm



2.5 Indications for Admission of Sick Newborn

- Prematurity <34 weeks' gestation
- LBW < 1800g
- Cardiopulmonary problems:
  - Central cyanosis
  - Respiratory distress
  - Apnoea/bradycardia
  - Tachycardia >200 beats per minute (bpm)
- Neonates that required resuscitation
- Neurological problems:
  - Seizures
  - Impaired consciousness
  - Abnormal neonatal reflexes
  - Severe hypotonia
- Low 5-minute Apgar score <7
- Gastrointestinal and genitourinary problems:
  - Delayed passage of meconium beyond 48 hrs.
  - Bile stained vomiting or other signs suggesting bowel obstruction
  - Feeding problems severe enough to cause clinical concern
  - Abdominal masses
  - Delayed passage of urine beyond 24 hrs.
- Haematological problems:
  - Pallor
  - Polycythaemia with venous haematocrit > 65%, or 60-64% with clinical symptoms
  - Petechiae and purpura
  - Bleeding
- Neonatal jaundice requiring treatment
- Neonatal infection
- Metabolic problems:
  - Infant of diabetes mother (IDM)
  - Hypothermia or hyperthermia
  - Hypoglycaemia or hyperglycaemia
- Dehydration
- Electrolyte disturbances
- Congenital malformations
- Birth injuries
- Surgical conditions.

2.6 Respiratory Conditions of the Newborn

2.6.1 Respiratory Distress of the Newborn

Diagnostic criteria

Pulmonary and/or extra pulmonary disorders presenting with two or more of the following signs in a Newborn baby:

- Tachypnoea (≥60 breaths/minute).
- Expiratory grunting.
- Intercostal and sternal retractions (recession).
- Central cyanosis while breathing room air.

Clinical presentation may include any of the following:
- Apnoea (no spontaneous breathing for over 15 seconds).
- Inspiratory stridor.
- Nasal flaring.
- Poor feeding.
- Tachypnoea (>60 breaths per minute) or bradypnoea (<30 breaths per minute).
- Dyspnoea.

Signs include:
- Tachypnoea.
- Apnoea (no breathing over 20 seconds) or bradypnoea
- Increased, decreased or no respiratory effort.
- Poor to absent distal air movement in the lungs.
- Tachycardia (in early stage respiratory failure) or bradycardia (late stage respiratory failure).
- Cyanosis.
- Altered mental status (late sign of respiratory failure).

Table 5: Causes of Respiratory Distress of the Newborn

Pulmonary causes	Extrapulmonary causes
RDS or hyaline membarane disease (HMD)	Sepsis
Meconium Aspiration Syndrome (MAS)	Cardiac failure
Pulmonary haemorrhage	Pulmonary hypertension
Hypoplastic lungs	Hypothermia/hyperthermia
Diaphragmatic hernia	Hypoglycaemia
Transient tachynoea of thee newborn (TTN)	Anaemia
Pneumonia	Polycythaemia
Pneumothorax	Hypovolaemic shock
	Perinatal hypoxia

Management:

General measures
- Determine if resuscitation is needed:
  - o Is the baby unresponsive?
  - o Is there apnoea or gasping/ineffective breathing?
  - o Are there less than 20 breaths per minute?
- If the answer is yes, initiate neonatal resuscitation and stabilse the baby first.
- Place on cardiorespiratory monitor for respiratory rate, oxygen saturation, heart rate and blood pressure.
- Establish intravenous access (peripheral, central or intraosseous).
- If there is hypoxia, provide enough oxygen support to keep oxygen saturation between 90% to 94% (85% to 90% if there is congenital cyanotic heart lesion).
- Treat any identifiable causes or problems (e.g. hypoglycaemia, infection, anaemia, etc.).
- Insert gastric tube to empty stomach of air and secretions.
- Commence IV fluids.
- Evaluate to see if criteria are met for continuous positive airway pressure (CPAP)
- Monitor vital signs and condition until 24 hours after the baby is stable.
- NPO until stable.
- If breathing condition worsens or has central cyanosis, then increase oxygen administered.
- If still cyanotic despite 100% oxygen, transfer to hospital or ICU capable of assisted ventilation immediately.

2.6.1.1 Respiratory distress syndrome (RDS)

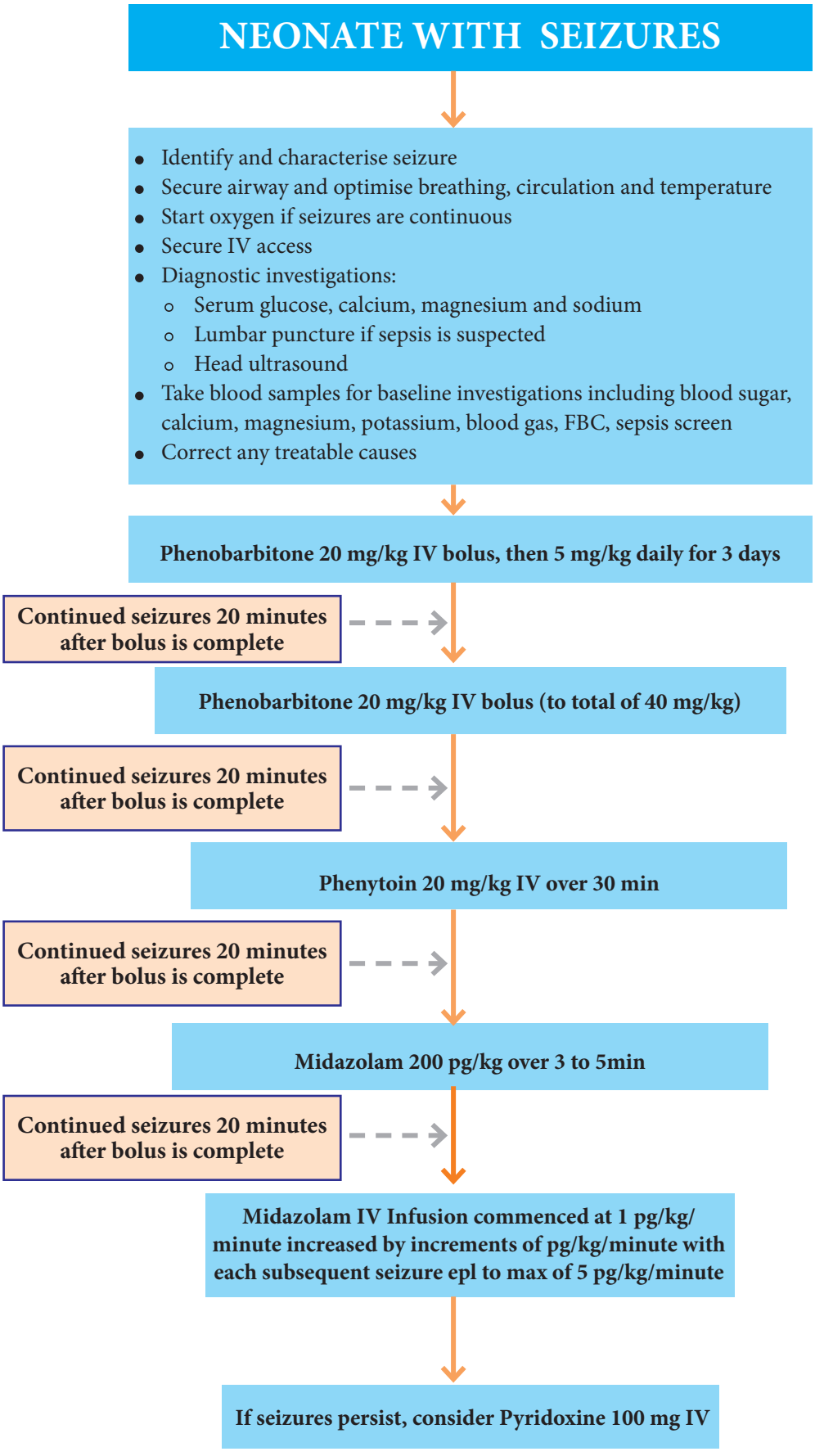
RDS, formerly known as hyaline membrane disease remains a significant problem for babies born prematurely. It is caused by surfactant deficiency and is the most common cause of respiratory failure in preterm infants.

The goal of management of RDS is to provide interventions that improve survival and minimise potential adverse effects. Where possible, babies with RDS should be initiated on CPAP as soon as possible.

Surfactant therapy plays a major role in management of babies with RDS. The overall aim is to avoid mechanical ventilation where possible or reduce its duration by administering surfactant therapy to babies with moderate to severe RDS as early as possible.

Surfactant administration:
Can be given as a bolus via an endotracheal tube with short periods of manual ventilation, followed by either mechanical ventilation or extubate the baby to CPAP if baby has a good respiratory drive.
DOSE: Surfactant 4MLS/ KG.

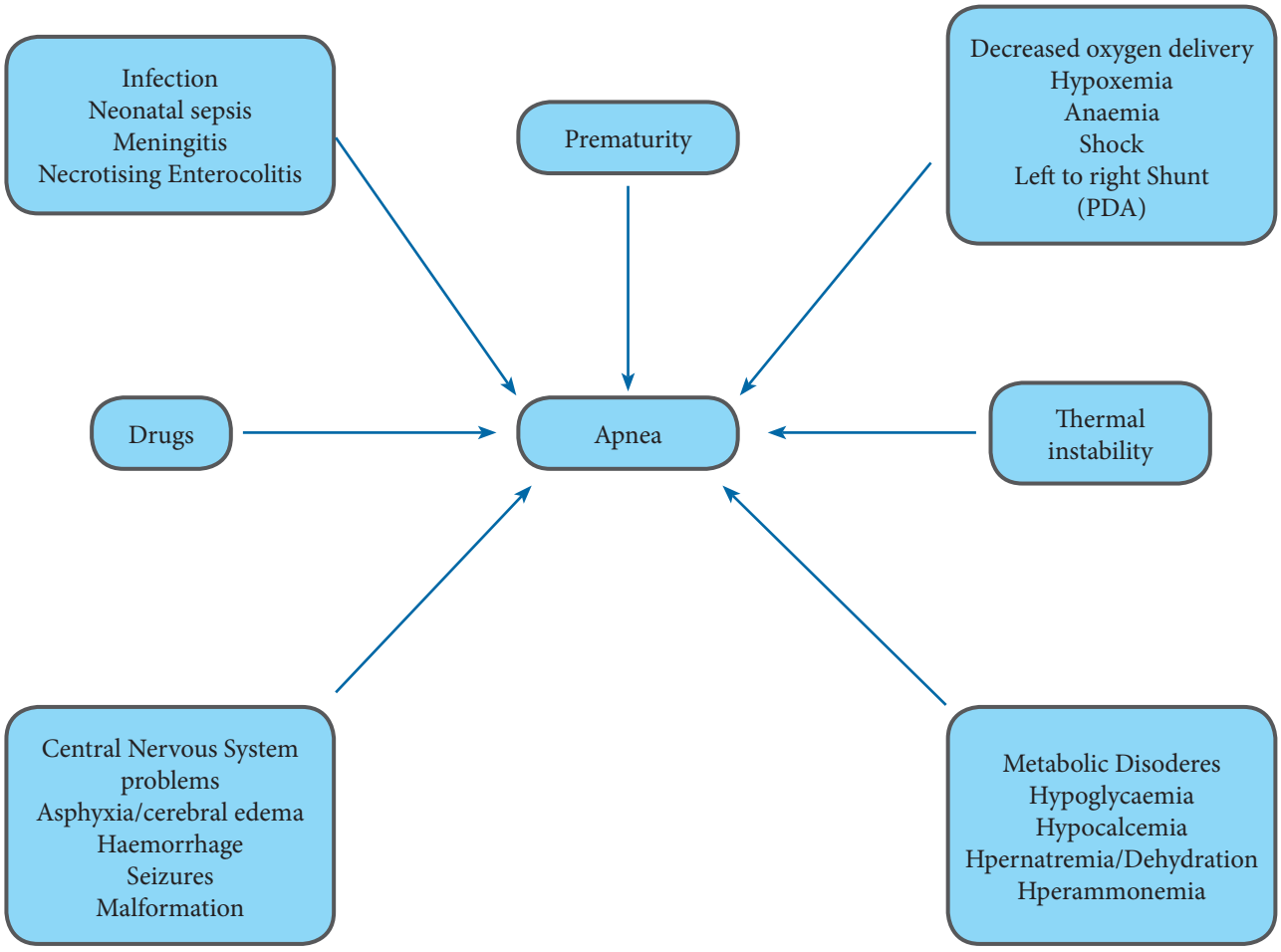
Figure 2: Neonatal Seizures



2.6.2 Apnea in neonates

- Apnea is pause in breathing of longer than 15 to 20 seconds, often associated with bradycardia<100 beats/minute, cyanosis, or both. It is a developmental disorder in preterm infants, which occurs as a direct consequence of immature respiratory control.
- In an infant less than 37 weeks gestational age (GA), apneic spells are considered clinically significant if the episodes are greater than 20-second duration or when shorter episodes are accompanied by hypoxemia and/or bradycardia.
- Almost all extremely low birth weight (ELBW) infants (BW below 1000 g) are affected by apnea.

Causes of Apnea



Adapted from Klaus MH, Fanaroff AA. Care of the High-Risk neonate. 5th Edition. Philadelphia. WB Saunders, 2001:268

Types of Apnea

- Central apnea is due to impaired signal from the Central Nervous System to the respiratory muscles. This may be due to brainstem immaturity or excessive vagal stimulation (e.g. suctioning)
- Obstructive apnea is due to obstructed airflow within the upper airway
- Mixed apnea is a combination of both and is the most common.

Management

- If child is apneic and does not respond to tactile stimulation, then positive pressure ventilation may be needed.
- Correct any underlying causes
- For chronic apnea, consider
  - Caffeine citrate
    - Loading dose 20 mg/kg/dose IV/PO
    - Maintenance: 5 mg/kg/day OD
    - Therapeutic level: 8 – 20 ug/mL
  - Aminophylline
    - Loading dose: 5 - 6 mg/kg/dose IV
    - Maintenance: 1 – 2 mg//kg/dose q 6 to 8 hourly IV
    - Therapeutic level 6 – 12 ug/mL
    - Infuse slowly over minimum of 20 minutes to avoid cardiac arrhythmias
  - Theophylline
    - Loading dose: 5 mg/kg/dose PO x 1
    - Maintenance: 3 – 6 mg/kg/24 hour divided every 6 to 8 hourly
    - Therapeutic level 6 – 12 ug/mL

NB: ORAL CAFFEINE IS PREFERRED DUE TO LESS SIDE EFFECTS.

Babies <32 GA and ELBW require prophylactic caffeine to prevent apnea of prematurity.
Prophylactic Dose:
Oral Caffeine 3mg/kg/ day

- CPAP for obstructive or mixed apnea
- Synchronised Intermittent Mandatory Ventilation using minimum pressures

2.6.3 Blood transfusion

Indications for red blood cell transfusion

- Hb ≤12g/dl or HCT <35% and any of:
  - Hypovolemic shock.
  - Severe respiratory distress and mechanical ventilation with Fi02>50%.
  - Severe congenital heart condition; cyanosis, heart failure.
- Hb ≤10 or HCT <30% and any of:
  - Moderate respiratory distress with Fi02 >35%.
- Hb ≤8 or HCT <25% and any of:
  - Mild respiratory distress.
  - Repeated apnoea.
  - Sustained tachycardia.
  - Inadequate weight gain.
- Severe anaemia; Hb <7g/dl or HCT <20.

Table 6: Hemoglobin Cut Off Levels

WEEK	HAEMOGLOBIN LEVEL		
	TERM BABIES	PREMATURE BABIES (1200-2500G)	SMALL PREMATURE BABIES (<1200G)
0	17.0	16.4	16.0
1	18.8	16.0	14.8
3	15.9	13.5	13.4
6	12.7	10.7	9.7
10	11.4	9.8	8.5

Source: Glander B, Naiman JL. Erythrocyte disorders in infancy. In Cloherty JC, Stark AR, editions. Manual of Neonatal Care. 7th edition. Philadelphia, PA: Lippincott-Raven; 2011

- Volume of transfusion of Packed Red Blood Cells (PRBC) is **15-20ml/kg**.
- To calculate volume based on observed and desired haematocrit with an estimated blood volume of 80ml/kg:
- Calculation
- (Desired haematocrit - observed haematocrit) x (weight x 80 ml) Haematocrit of blood to be given(typically 60-80%)
- Whole blood should be given to correct the anaemia of rapid blood loss. If haematocrit is not available: give 10ml/kg, monitor.
- For mild anaemia, nutritional supplementation of iron, folate and Vitamin D may be prescribed for a period of time.

Prevention

- Infants at risk of iron deficiency should receive supplemental oral iron (2-4mg of elemental iron/kg/day) once they are tolerating full enteral feeds.
- At risk infants include preterms and those with substantial blood loss via bleeding or phlebotomy.

2.7 Neonatal Hypoglycaemia

Defined as a blood sugar less than 2.5 mmol/L.

Figure 3: Management of Hpoglycaemia

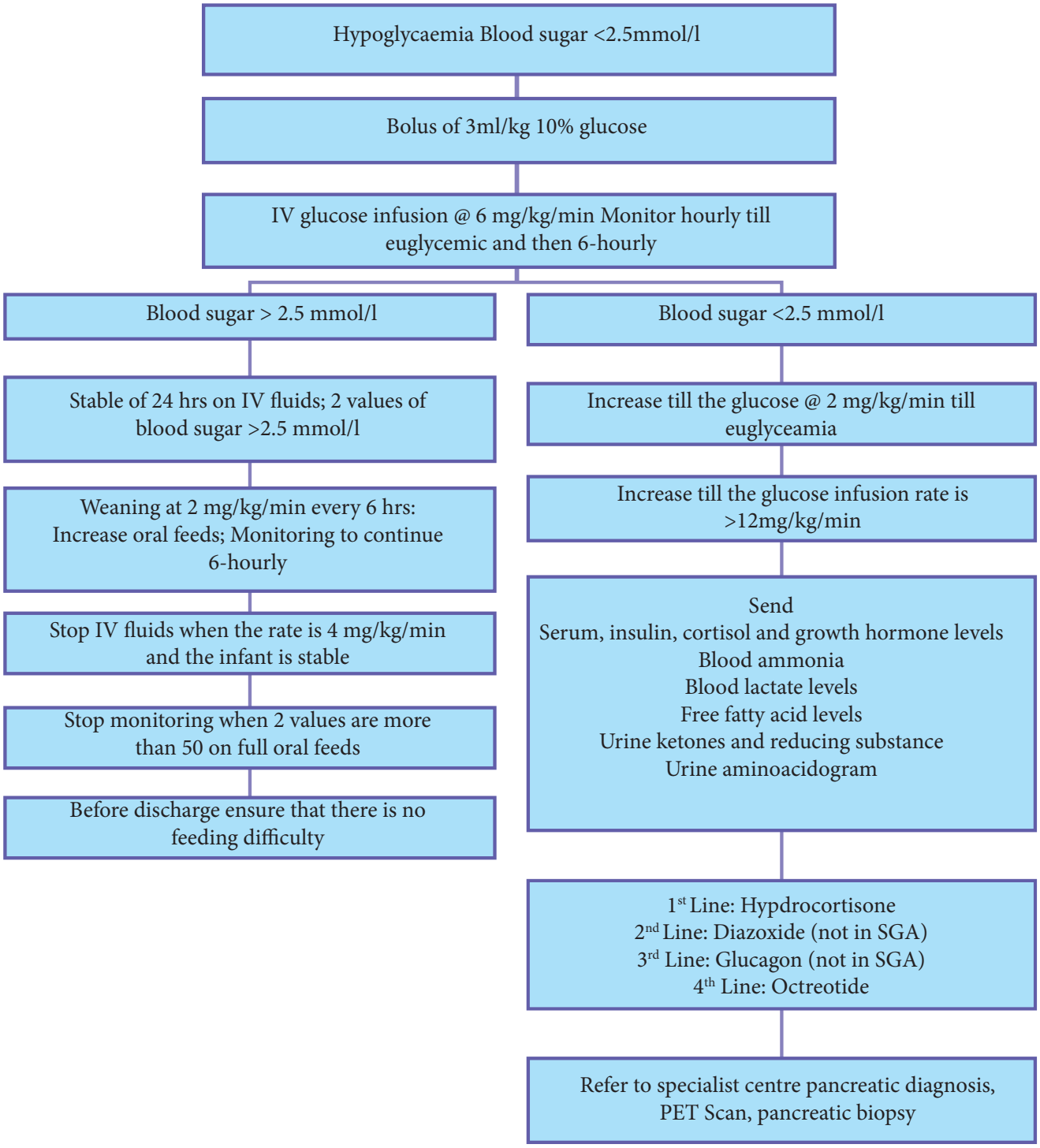
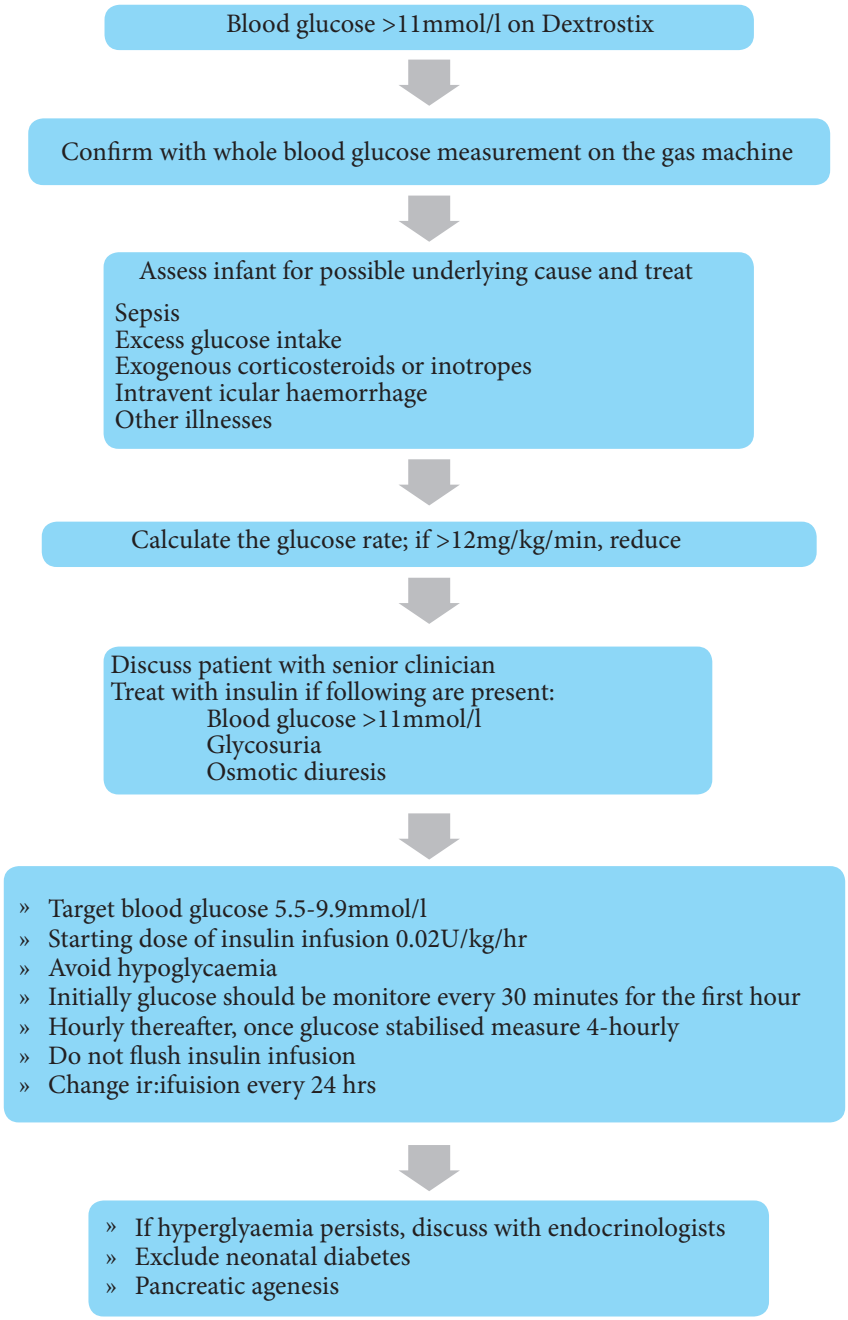


Figure 3: Management of Hperglycaemia



2.8 Neonatal Infections

2.8.1 Neonatal Sepsis

Neonatal sepsis is a clinical syndrome of systemic illness accompanied by bacteremia occurring in the first 28 days of life. Bacterial or fungal invasion of blood before or after birth may spread to involve other organs/ systems leading to meningitis, pneumonia, osteomyelitis and pyelonephritis.

Risk factors

- Maternal fever (temp >38°C) during labour or within 24 hours after delivery.
- Maternal UTI in current pregnancy or bacteriuria.

- Rupture of membranes >12 hours before delivery.
- Uterine tenderness or foul-smelling amniotic fluid.
- Obstetric diagnosis of chorioamnionitis.
- Meconium Aspitation Syndrome.
- Resuscitation at birth.
- Invasive procedures.
- Preterm delivery.
- Prolonged labour.
- Home delivery.

Signs and symptoms

- Tachycardia, bradycardia, tachypnoea, lethargy, hypotonic, irritability- (always look at trends in the observation chart over last 24 hours).
- Abdominal distension (+/- skin + colour changes, e.g. shiny, darkened skin).
- Feeding problems (e.g. poor feeding, stopped feeding, increasing residuals, vomiting).
- Organomegaly.
- Jaundice.
- Signs of respiratory distress.
- Petechiae, haemorrhage, anaemia.
- Diarrhea.
- Convulsions.
- Temperature instability - including hypothermia or hyperthermia.
- Apnoea, desaturations or cyanosis.
- Sclerema.
- Bulging fontanel.

Neonatal infection is a serious condition that needs to be investigated and treated vigorously.

Investigations

- Blood, urine and CSF cultures.
  - o Blood count and differential count (white blood cells (WBC) <5000 or >20000; neutrophils>70%).
- CRP.
- CXR (if signs of respiratory distress).
- Lumbar puncture (if there are no contraindications).

Non-pharmacological management

- Admit to the neonatal unit or NICU, if available.
- Ensure adequate nutrition.
- Insert naso/orogastric tube.
- Oxygen to maintain saturations 90-95%.
- CPAP if available and meets criteria.

Monitor infants for the following:

- Ensure a temperature of baby is 36.5-37.5°C.
- Blood glucose level greater than 2.6 mmol/l (45mg/dl).
- Antibiotic choice based on culture results
- Haematocrit of 40-45%, Hb 12-15g/dl (see blood transfusion guideline).
- Vital signs within their normal physiological ranges:

- o If sick/unstable - every hour.
- o If stable and improving - every 3 hours.

Pharmacological Management
If sepsis is suspected, give:

	Medicine	Dose	Frequency	Duration	Codes
First line	Ampicillin iv	50mg/kg	Every 12 hours	5-7 days	A V
plus	Gentamicin iv	5mg/kg per dose every 24 hours for neonates above 32 weeks and every 36 hours for neonates less than 32 weeks		5-7 days	A V
Second line	Cefotaxime iv	50mg/kg/dose	6-8 hours	5-7 days	B E
Third line	Meropenem iv	Meropenem 60mg/kg/d divided in 3 doses		5-7 days	C E

If meningitis is suspected, first line therapy: ampicillin + cefotaxime.

2.8.2 Neonatal Meningitis

A bacterial infection of meninges in the first month of life. Meningitis should be considered in any neonate being evaluated for sepsis or infection as most organisms implicated in neonatal sepsis and neonatal meningitis are similar.

Causes/risk factors
- **Gram-positive:** Group B haemolytic streptococcus (GBS), S. epidermidis, S. aureus, Listeria.
- **Gram-negative:** E. Coli, Klebsiella, Citrobacter, Enterobacter.
- Open defects or with indwelling devices such as ventriculoperitoneal (VP) shunts.

Signs and symptoms
- Tachycardia, bradycardia, tachypnoea, lethargy, hypotonia, irritability (always look at trends in the observation chart over last 24 hours).
- Temperature instability.
- Altered level of consciousness.
- Hypoglycaemia.
- Bulging/full fontanel.
- Vomiting.
- Convulsions.
- Feeding problems.
- Apnoea (+/- desaturations).

Investigations
- Lumbar puncture
- The CSF appears cloudy.
  - o Protein concentration is increased above age-appropriate normal values (see Table 21).
  - o Leucocyte count is increased with a predominance of polymorph nuclear leucocytes.
  - o Glucose concentration is low, <2/3 of blood glucose.
  - o Gram stain, microscopy, culture and sensitivity of CSF.
  - o Blood cultures: for microscopy, culture and sensitivity.

Non-pharmacological Management

- Admit to NICU, if available.
- Maintain infant temperature between 36.5-37.5°C.
- Monitor neurological status including:
  - Pupil reaction to light and size of pupils.
  - Neurological exam (reflexes and tone).
  - Note any seizures.
  - Head circumference (once per day during the acute illness, once per week when stable).

- Monitor:
  - Vital signs.
  - Blood glucose.
  - Haematocrit.
  - Fluid balance (hydration).
  - Blood gases (if available).

- Ensure adequate nutrition:
  - Limit total daily fluid intake, IV and oral, do not exceed the daily requirements for age to prevent fluid overload - monitor daily weight.

Pharmacological Management

Do not delay antibiotic treatment. Start antibiotics immediately after lumbar puncture. If lumbar puncture has to be delayed, start the antibiotics.

- **Antibiotic choice based on culture results**

	Medicine	Dose	Frequency	Duration	Codes
Group B (3-haemolytic streptococci)	Cefotaxime iv	1 month – 18 years iv; 50mg/kg/day in 3 divided doses		14 days	B E
Listeria mono cytogenes	Ampicillin iv or po	1 month – 18 years; 15-30mg kg/ dose (max 500mg) given four times daily orally 1 month to 18 yrs; 25mg/kg/dose (max 1g) given 6 hourly may be doubled in severe infection (iv)		21 days	A V
Listeria meningitis	Ampicillin iv	100mg/kg/dose 6-8 (max 2g) every 6 hours		21 days	A V
Gram negative bacteria	Cefotaxime iv	1 month –18 years iv 50mg/kg/dose; 6-8 hourly		14 days	B E

For patients with no response to empiric antibiotics after 5-7 days and a negative CSF culture, or patients intolerant of ampicillin and cephalosporins. Consider anaerobic bacteria, and treat with:

	Medicine	Dose	Frequency	Duration	Codes
	Metronidazole	Apply to the eye	Every 8 hours	14 days	A V
Methicillin resistant Staphylococci	Vancomycin iv	20mg/kg	Every 12 hours	21 days	A V
Sensitive Staphylococci	Cloxacillin po or iv	12-25mg/kg	Every 6 hours	3 days	B E
Pseudomonas aeruginosa	Ceftazidime iv	30-50mg/kg	Every 8 hours	3 days	C E
for fever	Paracetamol iv or po	10 – 15 mg/kg/dose 6-hourly when needed until fever subsides			A V

- ***Convulsions, see neonatal seizures.***
- Raised intracranial pressure or cerebral oedema:
  - Avoid fluid overload (monitor daily weight).
  - Reduce to 2/3 of the maintenance dose IV and oral.
  - Do not exceed the maintenance requirements for age.

2.8.3 Congenital Infections (Syphilis)

Table 7 Management of Congenital Syphilis

Mother's RPR • +ve, time > 14 • Untreated • Treated <1 month before delivery • Unknown	• Hepatospleno-megaly • Petechiae • Pallor • Low birth weight • Respiratory distress • Blisters on hands and feet • Osteitis • Large pale placenta	• Mother RPR positive AND • Any of the clinical signs listed	CONGENITAL SYPHILIS	• Notify • Admit to neonatal unit • Procaine Penicilin 50 000 units/kg IM daily for 10 - 14 days, or • Penicilin G G 150 00 units /kg IV 12 hourly for 10 - 14 days
		• Mother RPR positive AND • Mother treated >1 month before delivery AND	CONGENITAL INCOMPLETELY TREATED FOR SYPHILIS EXPOSURE	• Administer Benzathine Penicilin 50 000/kg IM - one dose only to baby • Ensure mother completes treatment
		• Mother RPR status is not known AND • Baby is well	UNKNOWN MATERNAL RPR. PROPHYLAXIS REQUIRED	• Administer Benzathine Penicilin 50 000/kg IM - one dose only to baby • Ensure mother has RPR test and reclassify
		• Mother RPR positive AND • Fully treated at least one month before delivery • Baby is well	COMPLETED TREATMENT FOR SYPHILIS EXPOSURE	• No treatment required

2.8.4 Minor Neonatal Infections

Cutaneous infections: pustules and vesicles

	Medicine	Dose	Frequency	Duration	Codes
Clean lesions	Chlorhexidine antiseptic		Apply 2-3 times daily	7 days	A E
or	Gentian violet 0.5% solution or any available antiseptic		Apply 2-3 times daily	7 days	A E
If there are no signs of generalised infection (no danger signs)					
	Doxycycline po	25mg/kg	Every 12 hours	5 days	A V

- If there are danger signs or if the pustules are extensive, hospitalise the newborn and treat with antibiotics against staphylococcus aureus.

Candidiasis (buttocks)

- Nappy candidiasis will appear as a red nappy rash often involving the skin creases and may have satellite lesions.

	Medicine	Dose	Frequency	Duration	Codes
	Nystatin cream	apply 2-3 times daily or after every nappy change		14 days	A E
or	Clotrimazole cream	apply 2-3 times daily or after every nappy change		14 days	A E

Thrush (oral candidiasis)

	Medicine	D ose	Frequency	Duration	Codes
	Nystatin oral solution po	Apply 4 times daily		14 days	A E
plus	Nystatin cream	Apply to mother's breasts after feeding		14 days	A E
If extensive or not responding	Fluconazole po	6-12mg/kg	Once daily	14 days	B E

Neonatal conjunctivitis

- Characterised by redness of conjunctivas or purulent eye secretions in the newborn.
- The eyes must be washed with physiologic saline or boiled water (boiled, then let to cool down) with a sterile gauze.

	Medicine	Dose	Frequency	Duration	Codes
	Metronidazole po or iv		Four times daily	7 days	A V
If gonococcal conjunctivitis (conjunctivitis appearing at birth or very shortly thereafter at very shortly thereafter) or chlamydial conjuctivitis is suspected add;)					
	Ceftriaxone im	50mg/kg, max. 1000mg	At once		B E
Plus	Azithromycin po	20mg/kg	Once daily	3 days	B E
or	Erythromycin po	50mg/kg	Every 12 hourly	14 days	A V

CHAPTER 3

CHILDHOOD GROWTH/ DEVELOPMENT MILESTONES

Weight Gain

- Term neonates may lose up to 10% of their birth weight in the first few days of life, typically regain birth weight by 14 days
- Newborns gain approximately 30g per day until 3 months
- Infants gain approximately 20g per day between 3 and 6 months, and approximately 10g per day between 6 and 12 months
- Infants typically double their birth weight by 4 months, triple their birth weight by 12 months
- Children typically gain approximately 2 kg per year between 2 years and puberty

Linear Growth

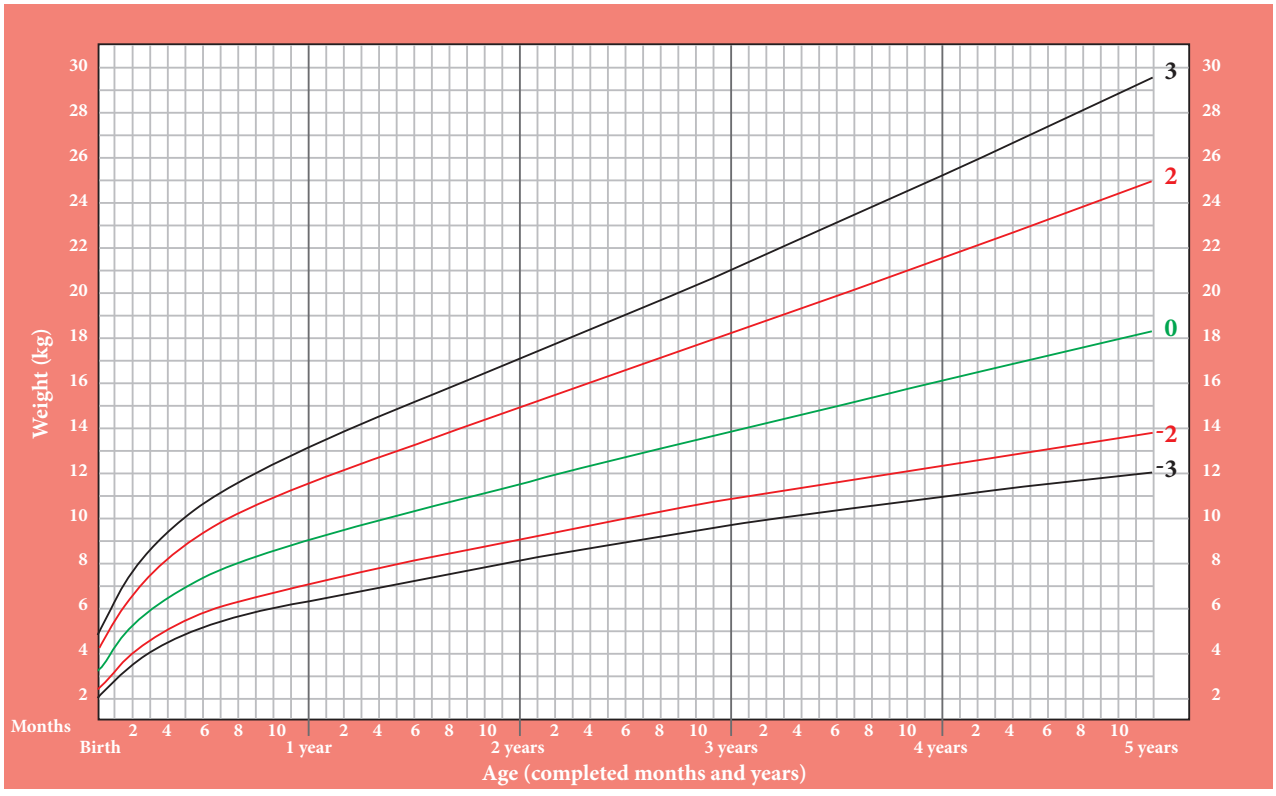
- Infants grow 25cm during the first year of life
- Children reach half of their adult height by 24-30 months
- Children grow 2 inches per year between 4 years old and puberty

***Note*: Please *refer* to WHO growth charts in child health card and in malnutrition guidelines for detailed monitoring of child's weight and height.**

Weight-for-age GIRLS

Birth to 5 years (z-scores)

World Health Organization

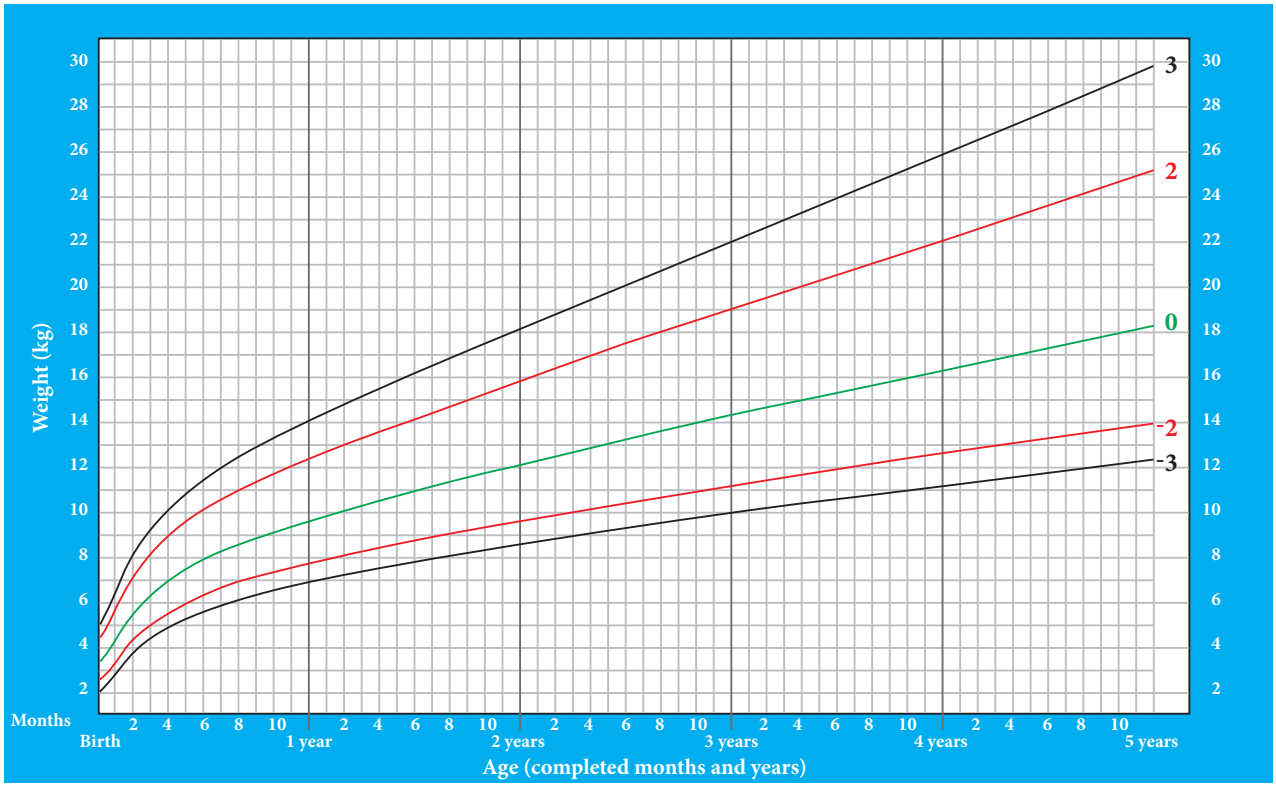


WHO Child Growth Standards

Weight-for-age BOYS

Birth to 5 years (z-scores)

World Health Organization



WHO Child Growth Standards

Developmental Milestones

- Below maps the typical development for children age 2 months to 5 years
- For children with >2-3 month delays, especially if delayed in multiple areas of development (e.g. language and motor delays), refer to occupational therapist or speech therapist as indicated.

Table 8

Age	Gross Motor	Fine Motor	Language	Social
2-4 months	Pushes up when lying prone (4 mo) holds head steady	(4 mo) brings hands to mouth	Startles to loud noise Turns head toward sound	Smiles Pays attention to faces
6 months	Begins to sit without support Rolls over both directions	Pass toy from one hand to other	Babbling	Responds to name
9 months	Pulls to stand Crawls	Inferior pincer grasp Points with finger	Says mama/baba nonspecifically Immature jargon	Stranger anxiety Understands "No" Watches something as it falls
12 months	Starts to walk	Marks with crayon Bangs 2 things together Finds hidden things	2 words other than Mom/dad Follows 1 step command	Responds to name Drinks from cup
18 months	Runs stiffly Walks up-stairs with 1 hand held Seat self in small chair	Makes 4 cube tower Scribbles Draw vertical stroke Feeds self, spilling food Removes clothes	Speaks 10-20 words follows 2- step command	Points to show interest Separation anxiety Cause and effect

Table 8 *(continued)*

Age	Gross Motor	Fine Motor	Language	Social
2 years	Jumps with both feet off floor , Runs well Walks up and down stairs alone Kicks ball	Draws horizontal line Uses spoon Puts on simple clothes	Using personal pronouns Knows body parts Uses 2 word phrases 50% speech understandable	Make believe Parallel play
3 years	Walks own stair alternating feet Climbs well	Copy circle	Uses 4-5 word sentences Tells stories 50% speech understandable	Shows empathy Plays cooperatively Asks "why?"
4 years	Hops on 1 foot	Copy square Catches ball	Colors, numbers 100% speech understandable	Buttons clothes Dresses with supervision
5 years	Skips Balances on 1 foot for 5 seconds	Copy triangle		Aware of gender

CHAPTER 4

TRIAGE OF ALL SICK CHILDREN

EMERGENCY SIGNS:

If any sign is positive: call for help, assess amd siscotate give treatment (s), draw the blood for emergency laboratpriy investigations (glucose, malaria smear, Hhb).

ASSESS		TREAT
		Do not move neck if you suspect cervical spine injury, but open the airway.
Coma/ convulsing ■ Coma or ■ Convulsing (now)	***IF COMA OR CONVULSION***	▶ Manage the airway ▶ If convulsing, give diazepam rectally ▶ Position the unconscious child (if head or neck trauma is suspected, stabilise the neck first) ▶ Give IV glucose.
Severe dehydration *(only in a child with diarrhoea)* Diarrhoea plus any two of these signs: ■ Lethargy ■ Sunken eyes ■ Very slow skin pinch ■ Unable to drink or drinks poorly	***DIARRHOEA PLUS***	▶ Make sure the child is warm. **If no severe malnutrion:** ▶ Insert an IV line and begin giving fluids rapidly following and diarrhoea treatment plan C in hospital. **If severe malnutrion:** ▶ Do not insert an IV line. ▶ Proceed immediately to full assessment and treatment .

PRIORITY SIGNS
These children neeed prompt assessment and treatment

- Tiny infant (<2 months)
- Temperature very high
- Trauma or other urgent surgical condition
- Pallor (severe)
- Poisoning (history of)
- Pain (severe)
- Respiratory disress
- Restless, continuously irritable or lethargic
- Referral (urgent)
- Malnutrition: visible severe wasting
- Oedema of both feet or face
- Burns (major)

Note: If a child has trauma or other surgical problems, get surgical help or follow surgical guidelines.

NON-URGENT
Proceed with assessment and further treatment according to the child's priority

Priority signs

These children need prompt assessment, treatment and referral

- Tiny infant (< 2 months)
- Temperature very high
- Malnutrition: visible severe wasting
- Oedema of both feet or face
- Burns (major)
- Trauma or other urgent surgical condition
- Pallor (severe)
- Poisoning (history of)
- Pain (severe)
- Respiratory distress
- Restless, continuously irritable, or lethargic
- Malnutrition: visible severe wasting
- Oedema of both feet or face
- Burns (major)

Note: **If a child has trauma or other surgical problems, get surgical help or follow surgical guidelines.**

Non-urgent

Proceed with assessment and further treatment according to the child's priority.

4.1 General guidelines on the use of Antibiotics

- Always do blood cultures in suspected sepsis.
- Supportive measures are often more important than antibiotics themselves: for example, fluids in diarrhoea and vomiting;
- Antibiotics should be given in the full dosage appropriate for the age and weight of the child; **dosage is best calculated according to body weight** up to 40kg (do not exceed the adult dose);
- Change to oral administration wherever possible (except for meningitis); benzylpenicillin intramuscularly/intravenously can be changed to procaine penicillin intramuscularly (if the response is good) once child is afebrile.

CHAPTER 5

EMERGENCY CONDITIONS

5.1 Paediatric Vital Signs

Identification of normal versus abnormal vital signs in children is the first step in recognizing an "unstable" paediatric patient. Children are able to compensate better than adults, so often their vital signs will be normal and then "crash," making it important that providers keep a close eye on children that may worsen.

5.2 Altered Mental Status/Loss of Consciousness

Table 10 Vital Signs in Children

VITAL SIGNS IN CHILDREN

Normal Heart Rates (per Minute) by Age*

Age	Awake Rate	Mean	Sleeping Rate
Newborn to 3 months	85 to 205	140	80 to 160
3 months to 2 years	100 to 190	130	75 to 160
2 years to 10 years	60 to 140	80	60 to 90
>10 years	60 t0 100	75	50 to 90

Normal Respiratory Rates by Age*

Age	Breaths per Minute
Infant (<1 year)	30 to 60
Toddler (1 to 3 years)	24 to 40
Pre-schooler (4 to 5 years)	22 to 34
School-age child (6 to 12 years)	18 to 30
Adolescent (13 to 18 years)	12 to 16

Normal Blood Pressure by Age*

Age	Systolic Blood Pressure (mm Hg)		Diastolic Blood Pressure (mm Hg)	
	Female	Male	Female	Male
Neonate (1 day	60 to 76	60 to 74	31 to 45	30 to 44
Neonate (4 days)	67 to 83	68 to 84	37 to 53	35 to 53
Infant (1 month)	73 to 91	74 to 94	36 to 56	37 to 55
Infant (3 months)	78 to 100	81 to 103	44 to 64	45 to 65
Infant (6 months)	82 to 102	87 to 105	46 to 66	48 to 68
Child (1 year)	86 to 104	85 to 103	40 to 58	37 to 56
Child (2 years)	88 to 105	88 to 106	45 to 63	42 to 81
Child (7 years)	96 to 113	97 to 115	57 to 75	57 to 75
Adolescent (15 years)	110 to 127	113 to 131	65 to 83	64 to 83

Threshold by Age of Systolic Blood Pressure Indicating Hpotension

Age	Systolic Blood Pressure
Term neonates (0 to 28 days)	Less than 60 mm Hg
Infants (1 to 12 months)	Less than 70 mm Hg
Children 1 to 10 years (5^{th} blood pressure percentile)	Less than 70+ (age in years x 2) mm Hg
Children >10 years	Less than 90 mm Hg

*From the Paediatric Advanced Life Support Manual from the American Heart Association

Differential
Altered mental status, including loss of consciousness or seizures, can be due to a myriad of etiologies.

The most common in paediatrics include:
- Electrolyte disturbances, including low glucose (hypoglycemia)
- Infections (including meningitis or malaria)
- Trauma (refer to last chapter for non-accidental trauma)
- Ingestion/poisonings
- Cardiopulmonary

Testing/diagnosis
Since the differential diagnosis for altered mental status is so broad, proper history taking and a thorough physical exam to help guide your workup is essential. A history of diarrhea may lead you to suspect electrolyte disturbances, a fever may lead you to suspect infection, and an irregular heartbeat or trouble breathing may be due to a cardiopulmonary cause. Initial workup should target the most likely causes and can include:
- Glucose (point of care) and other electrolytes
- Full blood count
- Liver function tests
- Malaria rapid test (if in endemic areas)
- Lumbar puncture (if meningitis suspected)
- Blood cultures, if available

Table 11 Treatment of Meningitis

Types and Cause of Meningitis	Treatment	Treatment Notes
Cryptococcal meningitis *Cryptococcus neoformans*-Caused by a fungus; common opportunistic infection in immunosuppressed patients	*Refer*	• *Refer* patients to a referral hospital for treatment with amphotericin B infusion.
Streptococcal meningitis *Streptococcus pneumonia*	**Children (10–14-day course)—** • Ceftriaxone 100 mg/kg IV or IM in 1–2 divided doses.	*Refer* if there is no improvement.
Haemophilus influenzae	**Children (10-day course)—** • Ceftriaxone 100 mg/kg IV or IM in 1–2 divided doses.	
Neisseria meningitidis	**Children (up to a 14-day course)—** • Ceftriaxone 100 mg/kg IV or IM in 1–2 divided doses.	
TB meningitis *Mycobacterium TB*	Treatment is in two phases: • **Intensive phase**: Give 2-month daily course Of ethambutol, isoniazid, rifampicin, and pyrazinamide. • **Continuation phase:** Give 6-month daily course of rifampicin and isoniazid. • Steroids 1-2mg/kg Prednisone equivalent for 4-6 weeks	**Cautions:** Ethambutol: Use with caution in children <5 because of the risk of optic neuritis.

Types and Cause of Meningitis	Treatment	Treatment Notes
Neonatal meningitis	• See neonatology section for dosing of cefotaxime for meningitis	• Organisms causing neonatal meningitis are similar to those causing neonatal septicaemia and pneumonia (i.e., *S. pneumoniae,* group • A and B streptococci, and enteric Gram- negative bacilli). • As with neonatal pneumonia, refer all cases.

General treatment

Treatment will be guided based on the suspected cause of the altered mental status. Unless there is a high suspicion of fluid overload/congestive heart failure, give a bolus of IV fluids containing dextrose (20 ml/kg) and start maintenance IV fluids *(see section 7)*.

- For convulsions/seizures lasting longer than five minutes: *See section 11.*
- Correct electrolyte disturbances if discovered.
- Meningitis: See kinds of meningitis and appropriate treatment below.

5.3 Acute Ingestions/Poisonings

The entry into the body of toxic substances in amounts that cause dysfunction of body systems.

Causes

- Microorganisms (food poisoning)
- Fluids and gases (organic) (e.g., agricultural chemicals, petrol, paraffin, carbon monoxide)
- Metal poisoning (inorganic) (e.g., lead, mercury, copper)
- Alcohol and medicines (in excessive amounts)

Management

If possible, refer all patients who show signs of poisoning to a hospital. Send a note of what is known and what treatment has been given. Also refer patients who have taken slow-acting poisons even if they appear well. Slow-acting poisons include:

- Aspirin
- Iron
- Paracetamol
- Tricyclic antidepressants (e.g., amitriptyline, imipramine)
- Paraquat®

Identification of the ingested poison or medication is really important and helps guide treatment. Make every effort to obtain the name of the pill for future providers, but do not let this delay transport of the patient.

Take the following general measures for poisoning:

Airway—often impaired in unconscious patients

- Ensure the airway is cleared and maintained; insert an airway if available.
- Depending on the presentation of symptoms, position patient semi-prone to minimise risk of inhalation of vomitus.

Breathing—
- Assist ventilation if necessary.
- Give oxygen to correct hypoxia.

Circulation—
- Hypotension is common in severe poisoning with CNS depressants.
- A systolic BP that is hypotensive for the patient's age may cause irreversible brain or renal damage.
- Depending on the presentation of symptoms, carry the patient head down on the stretcher, and nurse in this position in the ambulance.
- Set up an IV infusion.
- Fluid depletion without hypotension is common after prolonged coma and after aspirin poisoning because of vomiting, sweating, and hyperpnoea.
- Hypertension is less common but may be associated with sympatho- mimetic poisoning (e.g., amphetamines, cocaine).
- Cardiac conduction defects and arrhythmias may occur in acute poisoning, especially with tricyclic antidepressants but these often respond to correction of any hypoxia or acidosis.

Body temperature—
- Hypothermia may develop in patients with prolonged unconsciousness, especially after overdose of barbiturates or phenothiazines (e.g., chlorpromazine, trifluoperazine).
- Cover the patient with a blanket.

Seizures—
- Do not treat a single brief convulsion.
- If convulsions are prolonged or recur frequently, give

	Medicine	Dose	Frequency	Duration	Codes
	Diazepam iv or pr	400 micrograms (0.4 mg)/kg per dose PR or 200 micrograms (0.2 mg/kg) iv. Do not give IM.			B V

Removal and elimination of the poison
- *Remove poison from the stomach.* Balance the dangers of attempting to empty the stomach with the likely toxicity of any swallowed poison as determined by the type of poison and amount swallowed.
  - o Perform gastric lavage (only useful if done within 2 hours of poisoning).

Cautions:
- Do not attempt gastric lavage in drowsy or comatose patients because of the risk of inhaling stomach contents.
- Do not attempt gastric lavage with corrosive or petroleum products.

Consider using emetics only in the following situations:
- In fully conscious patients
- If poison is not corrosive or a petroleum product
- If poison is not absorbed by activated charcoal
- If gastric lavage is inadvisable or impossible

Medicine	Dose	Frequency	Duration	Codes
Ipecacuanha syrup 0.14% po	Children: 6–18 months: 10 mL followed by water. Older children: 15 mL followed by water. Repeat once if no response after 20 minutes. Vomiting usually occurs within 15–45 minutes of the first dose.			A E

Caution:

Ipecacuanha may cause respiratory depression. Do not use, therefore, with paraffin poisoning or in unconscious patients.

Prevent absorption of the poison.

- Oral activated charcoal can bind many poisons in the stomach and so reduce their absorption. It is safe and especially useful for poisons toxic in small amounts (e.g., anti-depressants).
- Grind charcoal tablets into a fine powder before mixing with 100–200 mL of water.
- Give activated charcoal 25g (50g if severe)
- If patient unable to swallow the charcoal and water mixture (slurry), give by gastric lavage tube.

5.3.1 Acute Organophosphate Poisoning

Organophosphates are ingredients of some pesticides and insecticides intended for agricultural and household use. Poisoning occurs by ingestion, inhalation, or absorption through the skin.

Causes

Acute organophosphate poisoning may be accidental (e.g., rat poison), intended (i.e., suicidal or homicidal), or occupational hazard (e.g., agricultural workers).

Symptoms and signs

- Patient may smell of the chemicals
- Constricted pupils
- Cold sweat, anxiety, restlessness
- Abdominal pain, diarrhoea, and vomiting
- Twitching, convulsions
- Bradycardia
- Excessive salivation, difficulty in breathing

Nonpharmacological management

- Remove contaminated clothing.
- Wash contaminated skin with lots of cold water.
- Establish and maintain the airway. Artificial respiration with air or oxygen may be required during the first 24 hours after poisoning (B).
- Perform gastric lavage if the poison was ingested.

Pharmacological management

Medicine	Dose	Frequency	Duration	Codes
Atropine iv/im	20 micrograms/kg per dose. Repeat dose every 20–30 minutes until signs of atropinisation occur (i.e., pupil dilatation, hot dry skin, dry mouth, fast pulse). Give IV fluids as needed for dehydration, hypovolaemia, and shock.			B V

Prevention
- Label agricultural and domestic pesticides properly
- Store such products away from children
- Wear protective clothing when using the products

5.3.2 Paraffin And Petroleum Products Poisoning

Includes paraffin, petrol, paint thinners, organic solvents

Cause
- Accidental or intentional ingestion

Symptoms and signs
- Patient may smell of paraffin or other petroleum product
- Burning sensation in mouth and throat
- Vomiting, diarrhoea
- Cough, dyspnoea

Management
Treatment is supportive and symptomatic. The main danger is damage to lung tissue.

Caution: Avoid gastric lavage or use of an emetic because they may lead to inhalation of the gastric contents causing pneumonitis.

- Give plenty of oral fluids (preferably milk).
- Activated charcoal (A) may be used: 50g; repeat PRN every 4 hours.
- Refer if complications occur (e.g., pulmonary oedema, pneumonia).

Prevention
- Store paraffin and other products safely (e.g., in a locked cupboard).

5.3.3 Aspirin Poisoning

Symptoms and signs
- Hyperventilation
- Tinnitus, deafness
- Vasodilation
- Sweating
- Coma (if very severe poisoning)
- Complex acid-base disturbances

Management
- Gastric lavage is worthwhile up to 4 hours after poisoning because stomach emptying is delayed.

	Medicine	Dose	Frequency	Duration	Codes
	Activated charcoal	50g repeated as needed every 4 hours to delay absorption of any remaining salicylate.			A E

- Monitor and manage fluids and electrolytes to correct acidosis, hyperpyrexia, hypokalaemia, and dehydration.
  - o If hypoglycaemia occurs, give

	Medicine	Dose	Frequency	Duration	Codes
	Dextrose 50% iv	1ml/kg as bolus			A V
Anticipate and treat convulsions					
	Medicine	**Dose**	**Frequency**	**Duration**	**Codes**
	Diazepam iv or pr	400 micrograms (0.4 mg)/kg per dose PR or 200 micrograms (0.2 mg/kg) iv. Do not give IM.			B V

5.3.4 Paracetamol Poisoning

Symptoms and signs

- History of ingesting paracetamol tablets, accidentally or intentionally.
- As few as 10–15 g (20–30 tablets) may cause severe hepatic and renal damage.
- Nausea and vomiting (usually settle within 24 hours)

Nonpharmacological management

- If poisoning took place <2 hours before, empty the stomach to remove any remaining medicine using gastric lavage or an emetic.
- ***Refer*** urgently to hospital despite few significant early symptoms. Maximal liver damage occurs 3–4 days after poisoning.

Pharmacological management

- If poisoning took place <12 hours before, give:

	Medicine	Dose	Frequency	Duration	Codes
	Methionine IM	2.5g at once. Repeat 3 times at 4-hour intervals.			B E

5.3.5 Iron Poisoning

Symptoms and signs

- Most common in children who accidentally ingest iron tablets.
- Nausea, vomiting, abdominal pain, diarrhoea
- Haematemesis
- Rectal bleeding
- Later: hypotension, coma, hepatic necrosis

Pharmacological management

	Medicine	Dose	Frequency	Duration	Codes
	Desferrioxamine 15 mg/kg/hour by continuous IV infusion in 0.9% sodium chloride (normal saline)				B E
or	5% Dextrose infusion	(maximum dose: 80 mg/kg/24 hours)			A V

5.3.6 Carbon Monoxide Poisoning

Usually due to inhalation in confined spaces of smoke, car exhaust, or fumes caused by the incomplete combustion of fuel gases (e.g., use of charcoal stoves in unventilated rooms).

Symptoms and signs
They are mainly due to hypoxia and include headache, nausea, vomiting, weakness, collapse and coma leading to death.

Management
Move person to fresh air and clear the airway.
- Give oxygen 100% as soon as possible **(A)**.
- Give artificial respiration as required. Continue until adequate spontaneous breathing starts.
- In severe poisoning, anticipate cerebral oedema and treat with

	Medicine	Dose	Frequency	Duration	Codes
	Mannitol 20% iv	1g/kg by rapid infusion	Once then assess need to continue		B E

- *Refer* to hospital because of the possibility of delayed complications.

5.3.7 Barbiturate Poisoning

Symptoms and signs
Respiratory depression and coma

Nonpharmacological management
- Monitor vital signs.
- Perform gastric lavage.

Pharmacological
- Ipecacuanha can be given to induce vomiting .
- *Caution*: Ipecacuanha may cause respiratory depression. Do not use, therefore, in paraffin poisoning or in unconscious patients.
- Activated charcoal may be used to adsorb the poison.

5.3.8 Narcotic Analgesic Poisoning

Causes
Poisoning by morphine, pethidine, codeine, and other opioids

Symptoms and signs
- Respiratory depression
- Pinpoint pupils
- Coma

Nonpharmacological management
- Use ABCD.

Pharmacological management

	Medicine	Dose	Frequency	Duration	Codes
	Naloxone iv	0.01 mg/kg IV once; may repeat with 0.1 mg/kg if respiratory function does not improve			B V

5.3.9 Warfarin Poisoning

Warfarin is an ingredient in some rat poisons.

Management

- Empty the stomach with ipecacuanha as in 19.10.1 or gastric lavage.
- *Caution:* Ipecacuanha may cause respiratory depression. Do not use in unconscious patients.
- Give activated charcoal to absorb any remaining poison.
- If there is major bleeding,

	Medicine	Dose	Frequency	Duration	Codes
	Phytomenadione (Vitamin K) iv	5mg at once very slowly			B V

5.3.10 Methyl Alcohol (Methanol) Poisoning

Methanol is used as an industrial solvent and is an ingredient of methylated spirits.

Symptoms and signs

- Similar to alcohol intoxication or poisoning but milder
- Symptoms do not usually appear until 12–24 hours after ingestion and may include headache, dizziness, nausea, vomiting, vasomotor disturbances, CNS depression, and respiratory failure.
- Toxic metabolites may cause severe acidosis and retinal or optic nerve damage.

Management

- Empty the stomach with ipecacuanha or gastric lavage.
- Correct metabolic acidosis with sodium bicarbonate solution 5% (baking soda) PO. Leave the solution in the stomach.
- In severe cases —

	Medicine	Dose	Frequency	Duration	Codes
	Sodium bicarbonate 8.4% iv	50ml slow infusion. Monitor plasma pH			B V
plus	alcohol 40% (whisky or brandy)	30-35ml in 100ml water every 3hours until acidosis has been corrected.			B N

  - o Keep the patient warm.
  - o Protect the eyes from strong light.
  - o Refer to hospital for further management.

Caution: Ipecacuanha may cause respiratory depression. Do not use in unconscious patients.

5.3.11 Other Chemical Or Medicine Poisoning

Management

For ingested poisons—

- Induce vomiting by giving ipecacuanha syrup.
- *Caution*: Do *not* use, therefore, in paraffin poisoning or in unconscious patients.
- Carry out nasogastric suction and gastric lavage.
- Give activated charcoal (A).
- Provide symptomatic treatment as necessary (e.g., for pain, dehydration).
- ***Refer*** patient for further management if the condition deteriorates.

5.3.12 Food Poisoning

Illness caused by the consumption of food or water contaminated by certain pathogenic micro organisms. Food poisoning usually affects large numbers of people, after ingestion of communal food in homes, hospitals, hotels and parties.

Causes

Can be infective or toxic—

- Infective: by bacteria (e.g., *Salmonella typhimurium, Campylobacter jejuni, Bacillus cereus*)
- Toxic: (e.g., by toxins from *Staphylococcus aureus* and *Clostridium botu linum*)
  - o Symptoms and signs
- Nausea, vomiting
- Intermittent abdominal pain (colic) with associated diarrhoea
- Fever (especially if poisoning is the infective type)
- May be self-limiting; features disappear without specific treatment

Botulism—

- Paralysis of skeletal, ocular, pharyngeal, and respiratory muscles
- ***Refer*** to hospital for further management.

Investigations

- Good history and examination is important for diagnosis
- Stool: examination for C&S

Management

- Establish the cause and treat accordingly.
- Give oral or IV fluids for rehydration as required.

5.4 Shock

Shock is the inability of the body to maintain blood perfusion to vital organs, which is recognised as hypotension. If blood pressure does not improve after initial fluid bolus, give second fluid bolus (20 ml/kg) and prepare epinephrine. Time is essential, so try to anticipate the next step if things don't improve and get it ready.

Causes

- Excessive haemorrhage: trauma, peptic ulcer
- Excessive fluid loss: diarrhoea, vomiting, burns

Symptoms and signs
Feeling faint, palpitations, sweating, restlessness, clouding of consciousness, pallor, cold extremities, tachycardia and hypotension: systolic BP <90 mm Hg.

Types of Shock	Description	Additional Symptoms
Hypovolaemic shock	Most common type of shock. Primary cause is loss of fluid from circulation due to haemorrhage, burns, diarrhoea, or other condition.	Weak thready pulse, cold and clammy skin
Cardiogenic shock	Caused by the failure of the heart to pump effectively (e.g., in myocardial infarction, cardiac failure)	Distended neck veins, weak or absent pulses
Septic shock	Caused by an overwhelming infection leading to vasodilation	Elevated body temperature
Neurogenic shock	To the spinal cord, resulting in a sudden decrease in peripheral vascular resistance and hypotension	Warm and dry skin
Anaphylactic shock	Caused by a severe allergic reaction to an allergen or medicine	Bronchospasm, angioedema, and/or urticaria

5.4.2 Anaphylactic shock

A severe allergic reaction that may occur after an injection or exposure to any allergen. Common causes are medicines, immunisations, snake bites, insect bites or stings, foods, pollen, and dust.

Symptoms and signs
- Collapse with shock
- Bronchospasm
- Laryngeal oedema

Emergency management
- Resuscitate (ABCD) immediately (see table on Cardiac Arrest section).
- Assess the breathing.
- If the patient is breathing, give:

	Medicine	Dose	Frequency	Duration	Codes
	Oxygen 100% via nasal cannula	4-6 litres per minute			A V

If the patient is not breathing:
- Secure an airway
- Ventilate with Ambu Bag® or ventilator
- Assess the heartbeat.
- If there is no heartbeat, perform CPR.
- If the patient is in shock
- Lay the patient flat.
- Administer IV solutions.

	Medicine	Dose	Frequency	Duration	Codes
	0.9% Sodium chloride (normal saline) IV	0.9% sodium chloride (normal saline) IV	20 mL/kg in first 20–60 minutes		A V
or	Ringer's lactate solution IV	1g/kg by rapid infusion	20 mL/kg in first 20–60 minutes		A V
or	Half strength darrows with 5% dextrose IV	1g/kg by rapid infusion	20 mL/kg in first 20–60 minutes		A V

Pharmacological management
Children—

Medicine	Dose	Frequency	Duration	Codes
If the patient is conscious adrenaline 1:1000 IV, sc or endobronchial	Give adrenaline 1:1000 SC as follows; <2 years: 0.1 mL; 2–5 years: 0.2 mL; 6–12 years: 0.3 mL; >12 years: 0.5 mL stat			A V
If the patient is unconscious adrenaline 1:1000 as slow IV	1mL diluted with 0.9% sodium chloride (normal saline) (A) to make 0.1 mL/kg. Endobronchial through endotracheal tube for cardio-respiratory arrest (same dose). Repeat every 5 minutes when necessary for a maximum of three doses.			A V
plus hydrocortisone IV	100mg immediately /kg			A V
and promethazine IM	0.25mg/kg at once to counteract histamine release			A V

Refer
- Run fluids and refer as soon as possible.
- A nurse or paramedic must accompany patient.

5.4.3 Hypovolaemic shock

This clinical picture arises from loss of body fluids resulting in an inadequate supply of blood to vital organs in the body. Common causes are severe burns, severe bleeding, severe reactions to medicines, severe dehydration with persistent vomiting and diarrhoea or cholera (epidemic), massive heart attacks, or severe infection in the blood stream (septicaemia or septic shock).

Symptoms and signs
- Primary signs—
    - o Thirst
    - o Feels cold
    - o Fully conscious at first
    - o Pallor
    - o Pulse rapid and feeble
    - o Blood pressure below the normal: 90/60 or less.
    - o Skin cold and clammy
- Other signs, depending on the cause of the shock
    - o Dehydration in gastroenteritis or cholera

Nonpharmacological management
- Ensure that the airway is clear.
- Stop any major bleeding.
- Assess the cardiac function.
- Place the patient in the anti-shock position: feet up with head down.

- Insert wide-bore IV cannula, and make sure it is running well

Pharmacological management
Children—

Medicine	Dose	Frequency	Duration	Codes
If there is wheezing, give adrenaline 1:1000 IV	Give adrenaline 1:1000 SC as follows; <2 years: 0.1 mL; 2–5 years: 0.2 mL; 6–12 years: 0.3 mL; >12 years: 0.5 mL stat			A V
In infections, amoxycillin IM	5mg/kg	Every 6 hours	7 days	A V
In Penicillin allergy, give Erythromycin po	10-15mg/kg	Every 6 hours	7 days	A V
and Gentamicin IM/IV	7.5mg	Every 6 hours	7 days	A V

***Refer* all cases immediately.**

5.4.4 Cardiac Arrest

The most common underlying cause of cardiac arrest in children is respiratory failure and hypoxia resulting from lung or airway disease or injury. The following conditions may cause hypoxia in children and thus may lead to cardiac arrest:

- Croup
- Bronchiolitis
- Asthma
- Pneumonia
- Birth asphyxia
- Inhalation of foreign body
- Pneumothorax
- Hypoxia is the most common cause of bradycardia or cardiac arrest in children. Asystole is the most common cardiac arrest rhythm in infancy and childhood, usually preceded by bradycardia. Cardiac arrhythmias are unusual in children, unless due to severe electrolyte abnormalities or drug overdose.

Emergency treatment

- Diagnose rapidly and mentally note the time of starting.
- Commence resuscitation immediately.
- Summon skilled help.
- Start cardiac massage for immediate treatment.
- Place the patient on a firm, flat surface.
- Initiate ABCD sequence of CPR *(see Table 13)*.
- If possible, get someone to document medication and progress.

—OR—

- Collect all ampoules used and total them at the end.
- The cardinal objective is to stabilise the patient for immediate referral.

Table 13: ABCDs of Cardiac Arrest in Children

Step	Actions
A: Airway	Ensure the airway is patent (open). • Child over 5 years— o Make a fist with one hand. o Place immediately below the child's xiphisternum. o Grasp the child with the other hand. o Apply force (1–6 times) in the direction of the upper thoracic spine. • Child under 5 years— o Place the child face-down on one arm of the health worker. o Deliver 1–4 sharp blows to the lower thoracic back with the hand.
B: Breathing	• Check for breathing. • If no breathing, then apply artificial respiration.
C: Circulation	• Check the heartbeat. Carotid in the older child —OR—Femoral—OR—Brachial pulse • If there is no pulse, start cardiac compressions or massage. Rate of compressions: 80–100 beats per minute • Continue with ventilation in between chest compressions. Initiate CPR if there is no pulse or no breathing. • Keep patient covered and warm while resuscitating. • Ventilate if there is a pulse, but no breathing. • Continue until return of the pulse, respiration, or both.
D: Drip, doctor, drugs	• Put up IV fluid: either 0.9% sodium chloride (normal saline) (A) or Ringer's lactate (A) solution. • Call for assistance (the doctor or another nurse) without stopping CPR. • Initial emergency medicine treatment: Adrenaline 1:1000, initially 10 micrograms/kg IV or via endotracheal tube. Adrenaline 1:1000, 1 mL diluted to 9 mL from the drip. Dosage: 0.1 mL/kg. For following and subsequent doses, a 5–10 fold increase is recommended. Repeat every 3 minutes when needed for 3–4 doses. • Bradycardia or slow heart rate—Hypoxia is the most common cause of bradycardia, so adequate ventilation or oxygenation is usually all that is needed Atropine 0.02 mg/kg IV to a maximum of 1 mg (A). Alkalizing agents (e.g., sodium bicarbonate) have not been shown to be useful during acute resuscitation. —PLUS— • After the first dose of adrenaline, administer medication down the endotracheal tube within 2–3 minutes. Adrenaline dose via this route is 10 times the standard dose. Atropine can also be given via the endotracheal tube. • *Fluid therapy—* o Administer a bolus of 5–20 mL of 0.9% sodium chloride (normal saline) (A) to follow the IV or intraosseous injection of any medicine used in resuscitation, especially if the injection is peripheral. o Sick children, especially infants, may be hypoglycemic. Look for evidence during resuscitation. Treat proven hypoglycaemia with 10% dextrose solution (B) 5 mL/kg IV. • *Medicine administration route—* o IV via a free-running drip: Use 60 drops per mL administration sets for all drips unless hypovolaemia is thought to be responsible for the cardiac arrest. o Intraosseous route: Resuscitation medicines, fluids, and blood can be safely given by this route. ▪ Medicines rapidly reach the heart. ▪ Access is safe, simple, rapid. ▪ – Tibial technique: 2–3 cm below the knee.

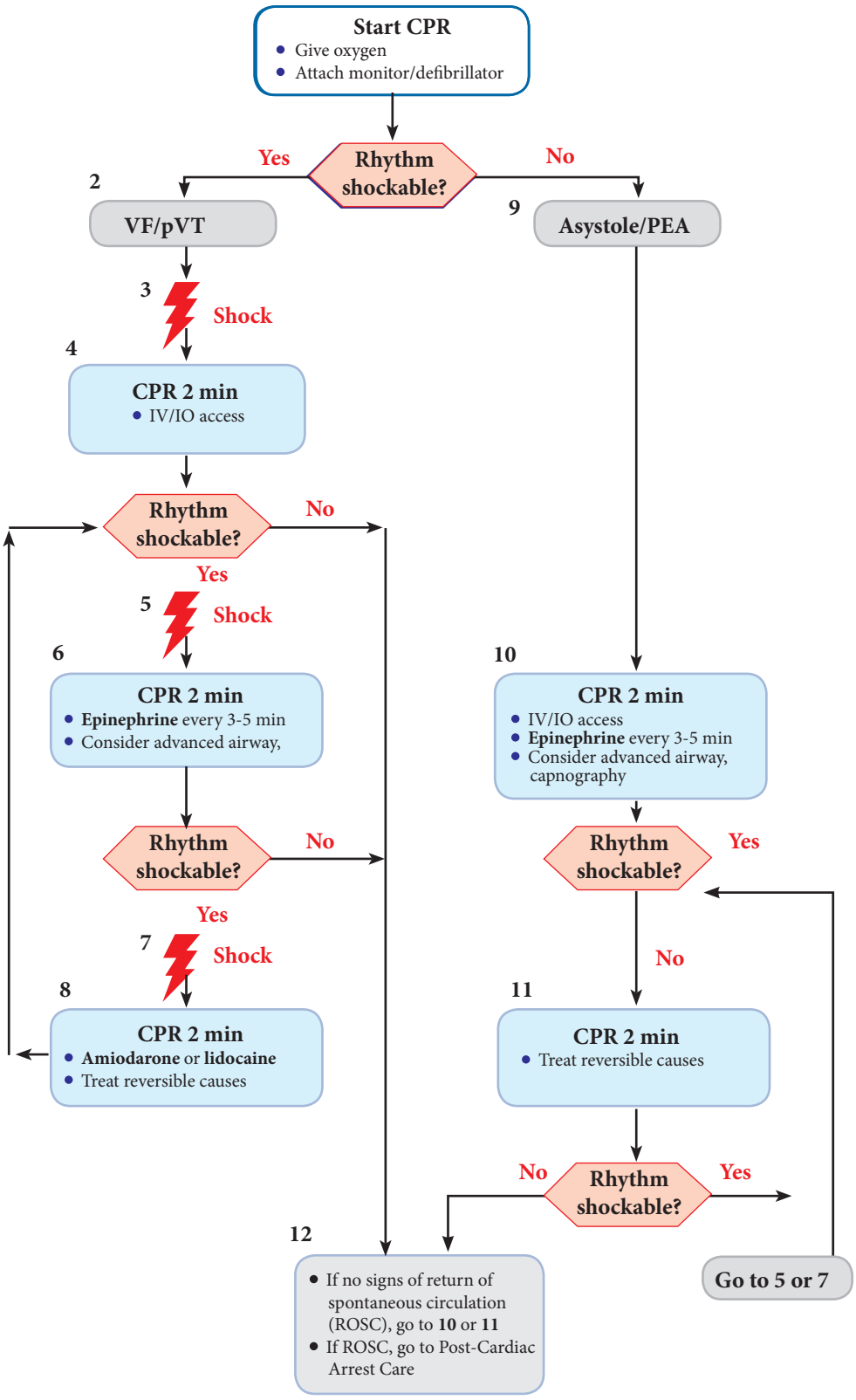
5.4.5 Abdominal pain

The majority of abdominal pain in paediatric patients is not an emergency, however there are a few "not to miss" diagnoses to be aware of. These include appendicitis, bowel obstruction, ovarian torsion (which may require surgical intervention) and intussusception (which may require decompression). Constipation and acute gastroenteritis are very common causes but should only be relied upon as the correct diagnosis once the "not to miss" are ruled out.\

Appendicitis

Appendicitis is an infection of the appendix and requires antibiotics and prompt surgical intervention.

Cardiac Arrest Algorithm for Children *(Adopted from AHA 2015 guidelines)*



CPR Quality

- Push hard (≥⅓ of anteroposterior diameter of ches) and fast (100-120/min) and allow complete chest recoil.
- Minimise interruptions in compressions.
- Avoid excessive ventilation.
- Change compressor every 2 minutes, or sooner if fatigued.
- If no advanced airway, 15:2 compression-ventilation ratio.

Shock Energy for Defibrillation

First shock 2 J/kg, second shock 4 J/kg, subsequent shocks ≥4 J/kg, maximum 10 J/kg or adult dose.

Drug Therapy

- **Epinephrine IV/IO dose:** 0.01mg/kg (0.1 mL/kg of the 0.1 mg/mL concentration). Repeat every 3-5 minutes. If no IO/IV access, may give endotracheal dose: 0.1 mg/kg (0.1 mL/kg of the 1 mg/mL concentration.
- **Amiodarone IV/IO dose**: 5 mg/kg bolus during cardiac arrest. May repeat up to 2 times for refractory VF/pulseless VT.

-OR-

Lidocaine IV/IO dose: Intial: 1mg/kg loading dose. Maintenance: 20-50 mcg/kg per minute infusion (repeat bolus dose if infusion initiated > 15 minutes after initial bolus therapy).

Advanced Airway

- Endotracheal intubation or supraglottic advance airway
- Waveform capnography or capnometry to confirm and monitor ET tube placement
- Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions

Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes

- **H**ypovolemia
- **H**ypoxia
- **H**ydrogen ion (acidosis)
- **H**ypoglycemia
- **H**ypo-/hyperkalemia
- **H**ypothermia
- **T**ension pneumothorax
- **T**amponade, cardiac
- **T**oxins
- **T**hrombosis, pulmonary
- **T**hrombosis, coronary

The likelihood of appendicitis is based on the presence of the following signs:

- Fever (Temp greater than 38 degrees Celsius)
- Abdominal pain (often in the right lower quadrant, but can also migrate to periumbilical)
- Loss of appetite/anorexia
- Nausea/vomiting
- Leukocytosis (WBC > 10,000)
- Left shift (ANC >7,500)
  - o Diagnosis: Ultrasound and CT scan
- Treatment: IV antibiotics should be started, and surgical consultation should be made. Refer to a tertiary care center if needed.

Bowel obstruction

Presents with abdominal cramping, distension, vomiting, and a lack of flatus or stool.

- X-ray will show distended bowel loops with air fluid levels.
- Treatment should consist of fluid resuscitation, no food/liquid by mouth, and placement of a nasogastric tube.

Intussusception

- Intussusception is when a segment of intestine "telescopes" into another segment. This usually occurs in children less than two years of age but can also occur in older children.
- Symptoms can include colicky abdominal pain, abdominal distension, vomiting, tenderness, and bloody diarrhea ("currant jelly stool"). In some cases, one can feel a palpable mass in the right lower quadrant.
- Treatment: IV fluids and placement of a nasogastric tube should be done first. Provide antibiotics if there are signs of infection (such as a fever). An enema (air or barium) is both diagnostic and therapeutic.

Diarrhea (infectious gastroenteritis)

Acute gastroenteritis is a common abdominal infection in kids marked by abdominal pain, diarrhea, and vomiting.

- It is usually caused by viruses, so supportive treatment is key.
- Children may require IV fluids if they are severely dehydrated and/or cannot tolerate fluids by mouth.
- Deworming

	Medicine	Dose	Frequency	Duration	Codes
Albendazole po		200mg if less than 2 years and 400 at once if more than 2 years old			A V

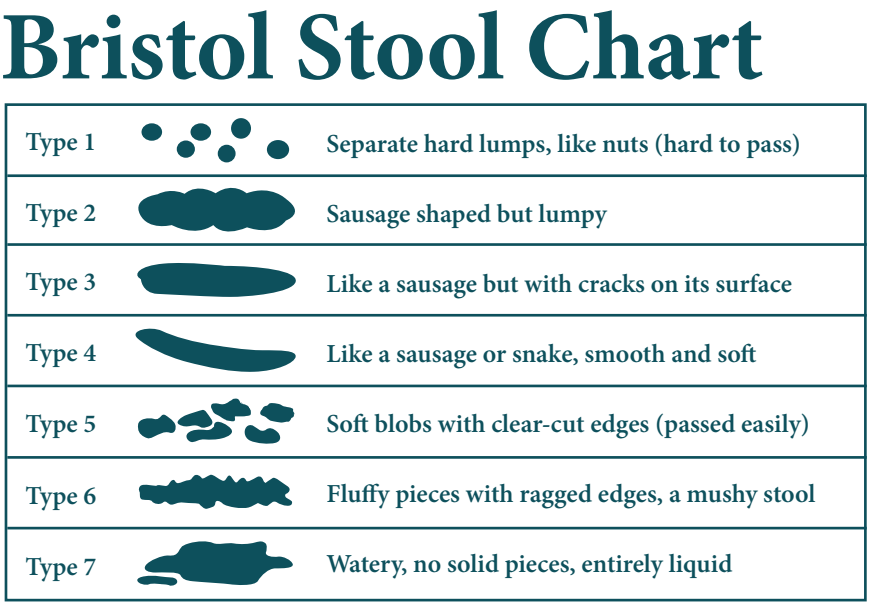
Should be provided if it has not been given recently.

Constipation

Constipation is marked by abdominal pain with hard stools. It can be caused by a suboptimal diet, lack of oral fluids, or children avoiding stooling.

- Treatment consists of increasing water intake, timed voiding, increase in foods with fiber/fruits and vegetables, and pharmacologic inventions such as polyethylene glycol or bisacodyl.

Figure 7: Bristol stool chart for stool classification



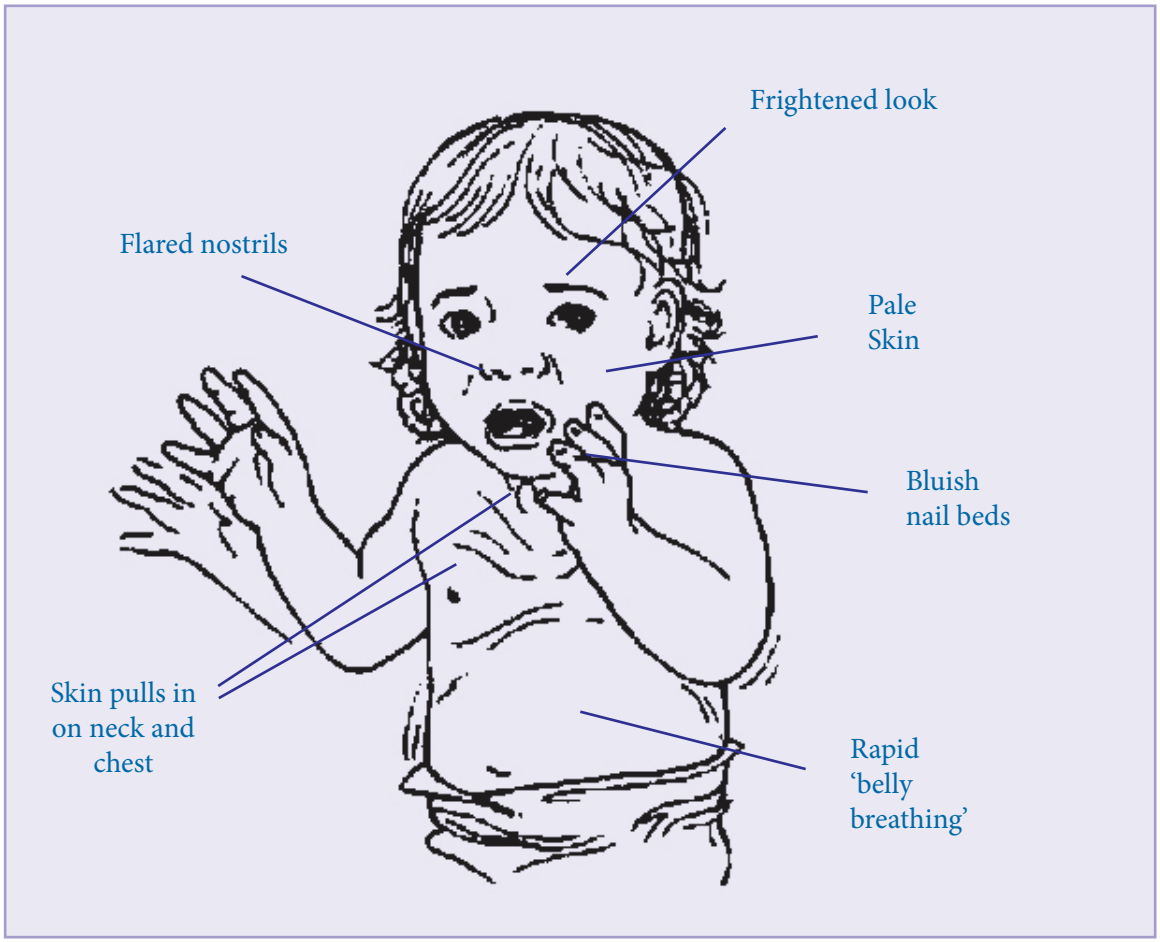
Bristol stool chart for stool classification (https://badgut.org/information-centre/a-z-digestive-topics/bullet-journal/bristol-stool-chart/)

5.4.6 Respiratory distress

Respiratory distress in children can have a range of different etiologies, including pneumonia, asthma, foreign body aspiration, and anaphylaxis. Tuberculosis, which can also present with respiratory distress, is covered in Chapter 8.

- It is important to recognise a child in respiratory distress, which includes an increased respiratory rate, low oxygen saturation (less than 90%), nasal flaring/grunting (in infants), or use of accessory muscles (in-drawing muscles between the ribs or below the rib margin). Prompt evaluation is required to determine if supplemental oxygen is needed, as well as other interventions.
- The first intervention should always be to provide oxygen supplementation, by face mask or nasal cannula
- If the child is not breathing, start bag valve mask ventilation. See cardiac arrest section if there is no pulse.

Figure 8. Signs of respiratory distress in young children



Signs of respiratory distress in young children (from https://www.nationwidechildrens.org/conditions/respiratory-distress)

Infections (including pneumonia)

Respiratory infections often have a constellation of symptoms that may include cough, nasal congestion, fever, and sputum production. It's difficult to determine whether an infection is caused by a virus or bacteria but knowing that the majority of respiratory complaints in children are caused by viruses is helpful. If a child is in respiratory distress, the cough lasts greater than two weeks, or a chest x-ray shows a focal consolidation, antibiotics are warranted. Otherwise, supportive care with or without Paracetamol, is first-line treatment.

Figure 9: Cough Algorithm

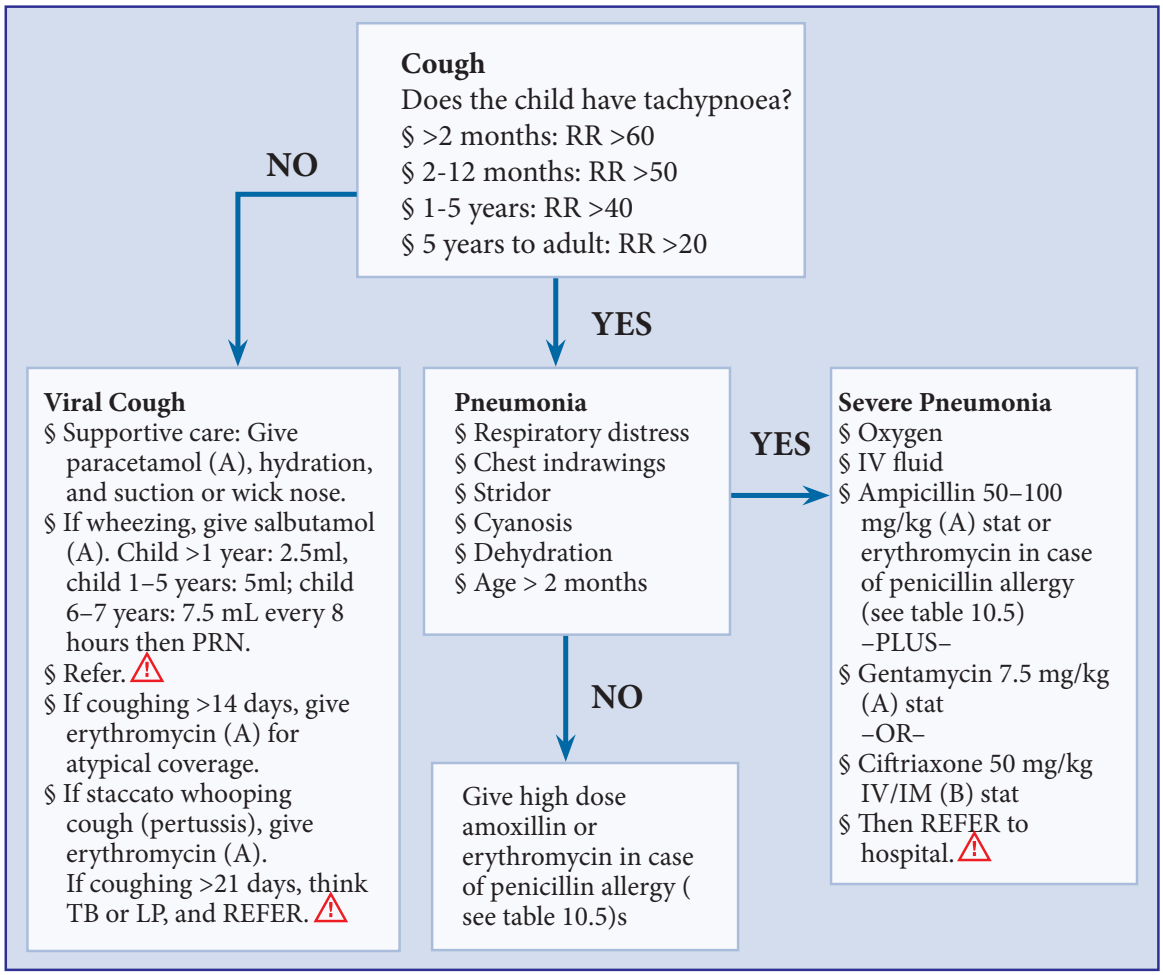


Table 14: Dosages of amoxicillin and erythromycin for children with pneumonia

Weight (kg)	Amoxicillin (A) High dose (80–100 mg/kg/day)* Give every 12 hours for 5 days		Erythromycin (A) (30–50mg/kg/day) Give 8 hours for 5 days	
	Capsule (250 mg)	Suspension (1250 mg/5 mL)	Capsule (250 mg)	Suspension (1250 mg/5 mL)
>4	–	5 mL	–	2.5 mL
4 to >6	–	10 mL	–	2.5 mL
6 to >10	–	15 mL	–	5 mL
10 to >15	2 capsules	20 mL	1 capsule	10 mL
15 to >25	3 capsules	30 mL	1 capsule	10 mL
>25	4 capsules	–	2 capsules	–

**Follow up in two days. If the child is not improving on amoxicillin or erythromycin, then consider TB, LIP, or asthma.

Asthma in children

- Wheezing or coughing that occurs with exercise laughing or crying in the absence of an apparent respiratory infection and shows clinical improvement after 2-3 months of controller treatment and worsening after cessation.
- Triggers can vary between individuals but can include smoke, cold air, illnesses, pets, and pollen.

- It can sometimes be difficult to distinguish between a viral pneumonia (with wheezing) and an asthma attack, especially because a viral infection can be a trigger for an asthma attack. If you suspect asthma, especially in a kid with a history of atopy (eczema, seasonal allergies) give a nebuliser treatment and assess for improvement.

Predisposing factors

Atopy

- A personal or family history of atopy: Allergic Rhinitis, Allergic Conjunctivitis, Asthma Eczema.

Coexisting medical condition

- Asthma may be aggravated by conditions such as Rhinitis, Obesity, and gastro esophageal reflux.

Medication

- Use of medication such as aspirin, non-steroidal anti-inflammatory and beta blockers should be noted.

Investigation

- Peak flow meter for children > 5 years
- Spirometer for children > 5 years
- FBC with differential (look for eosinophilia)
- Response to Broncho dilator-Salbutamol (MDI) 2 puff or nebulise and check response after 20 minutes.

Step wise treatment of asthma in children

Step 1 - Mild intermittent asthma

	Medicine	Dose	Frequency	Duration	Codes
	Salbutamol inhaler	100-200mcg when necessary using spacer			A V

Steroid can be added if the patient has a risk of exacerbation. The use of spacer devices in children should be emphasised.

Step 2 - Mild persistent asthma

	Medicine	Dose	Frequency	Duration	Codes
	Salbutamol inhaler	100-200mcg (2 puffs) when necessary every 20-30 minutes			A V
plus	Beclomethasone inhaler (high dose)	200-600mcg	2-4 times daily	long term	A V
or	Montelukast po	5-10mg	at night	long term	B E

Montelukast 10mg po daily can be used instead of beclomethasone. If asthma is not controlled with montelukast after one-month switch to Beclomethasone.

Step 3 – Moderate persistent asthma

	Medicine	Dose	Frequency	Duration	Codes
	Salbutamol inhaler	100-200mcg (2 puffs) when necessary every 20-30 minutes			A V
plus	Beclomethasone inhaler (high dose)	500-1000mcg	2-4 times daily	long term	A V
or					
	Beclomethasone inhaler (high dose)	200-600mcg	2-4 times daily	long term	A V

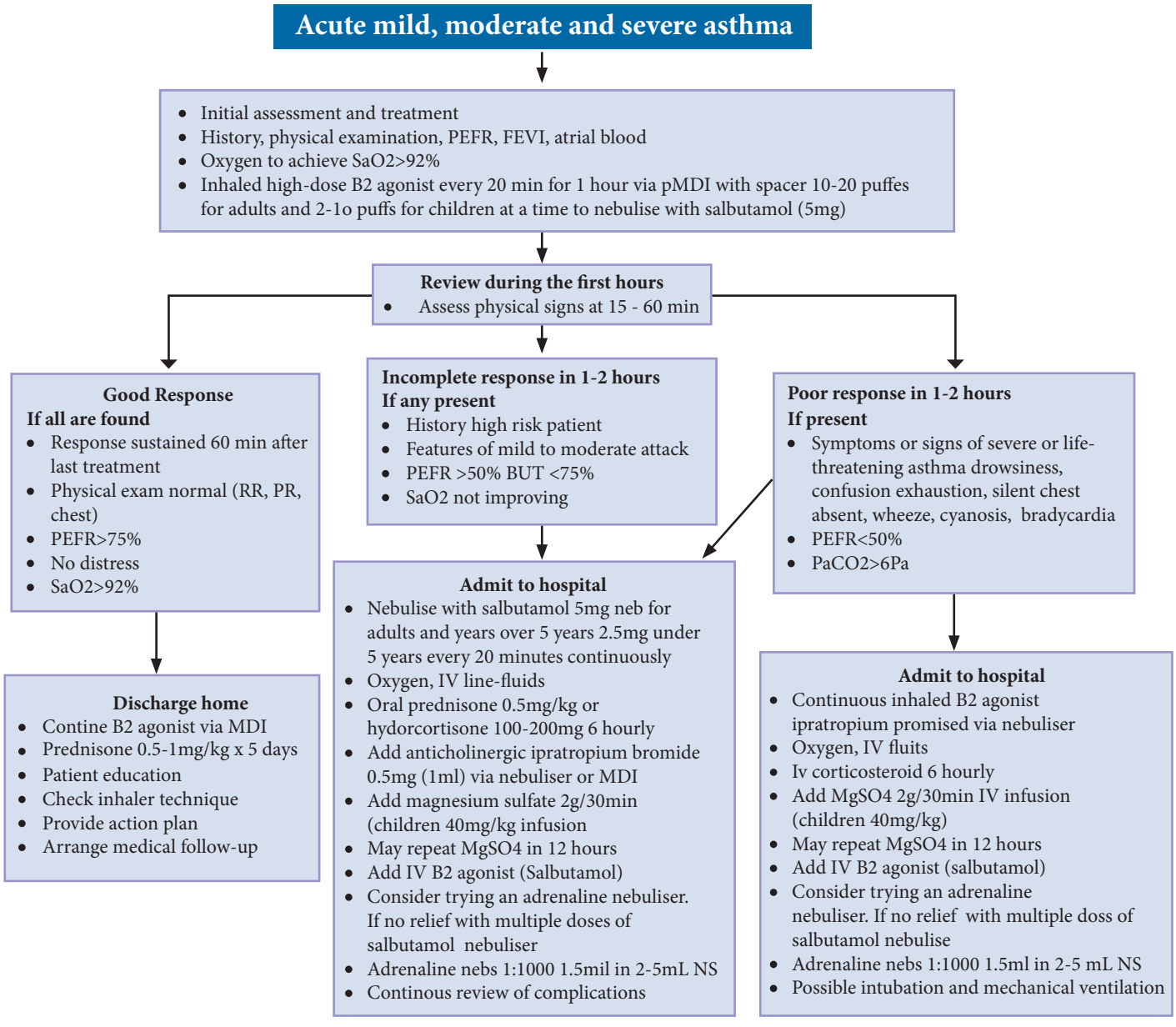
	Medicine	Dose	Frequency	Duration	Codes
plus	Salmeterol inhaler	50mcg	When necessary		B E
or	Montelukast po	5-10mg	At night	long term	B E

Salmeterol should always be prescribed with ICS and for children above 6 years

	Medicine	Dose	Frequency	Duration	Codes
	Beclomethasone inhaler low dose	200-600mcg	2-4 times daily	long term	A V
	Beclomethasone inhaler (high dose)	500 - 1000 mcg	When necessary		B E
or	Montelukast po	5-10mg	At night	long term	B E

***Step 4: *Refer* to specialist**

Algorithm for management of acute asthma



Foreign body aspiration

If a child's breathing is stridorous, or they have noisy breathing that does not seem to improve with a nebuliser or oxygen, make sure you have evaluated for a foreign body. Visual inspection of the mouth is important, and imaging can also assist (for example, a chest x-ray).

Bronchiolitis

Bronchiolitis is a common lung infection in young children and infants (less than two years of age) that is caused by a virus (most commonly RSV). It causes inflammation and congestion in the small airways (bronchioles) of the lung, leading children to have wheezing/rhonchi/crackles on auscultation of the lungs bilaterally. Usually supportive treatment at home is sufficient. Sometimes, a child may need to be admitted to the hospital for oxygen support, IV hydration, and suctioning of nasal and oral secretions if they are in respiratory distress.

Bronchodilators (salbutamol), antibiotics and steroids have not been shown to be effective in the outcome of bronchiolitis.

Pertussis (whooping cough)

- Pertussis (whooping cough) is characterised by a paroxysmal cough which consists of a deep inspiration, followed by a series of short coughs which end in a whooping sound.
- Administration of antibiotic therapy early in the coryzal phase of the disease may shorten the course of illness.

	Medicine	Dose	Frequency	Duration	Codes
OR	Beclomethasone inhaler low dose	200 - 600 mcg	2-4 times daily		B E

Croup

- Croup is a clinical syndrome characterised by inflammation of the larynx and trachea. It involves primarily children under 3 years of age and is commonly preceded by an upper respiratory tract infection. It has a more gradual onset than epiglottitis. In many developed countries, croup is caused by viruses such as parainfluenza or influenza virus. Secondary bacterial infection is rare and antimicrobials are rarely indicated.

Etiology

- Parainfluenzal and RSV viruses.

Symptoms

- Fever
- Loud barking cough
- Usually 6 months to 6 years –peak incidence 1-2 years

Grading system for croup	
Croup score	**Clinical features**
Grade 1 mild	Stridor at rest without retractions and not in distress
Grade 2 moderate	Stridor at rest with sternal and chest wall retractions
Grade 3 Severe	Marked respiratory distress indicted by irritability, restless, agitated pallor, cyanosis tachycardia and exhaustion (i.e. impending airway obstruction)

Treatment

Grade 1 Mild croup

- Manage at home

	Medicine	Dose	Frequency	Duration	Codes
	Prednisolone po	1mg/kg	daily in the morning	3 days	A E

- Advise to come back if the child shows signs of Grade 2 or 3 croup

Grade 2 Moderate croup

- Admit to the hospital

	Medicine	Dose	Frequency	Duration	Codes
	Prednisolone po	1mg/kg	daily in the morning		A E
	Adrenaline nebs	1:1000	when necessary		B V

Grade 3 Severe croup

- Admit to intensive care

	Medicine	Dose	Frequency	Duration	Codes
	Oxygen inhaled	6 litres/min	2-4 times daily		B V
plus	Adrenaline nebs	6 litres/min plus adrenaline nebs 1:1000 0.5ml – 5ml/kg. Repeat the dose if there is no response at 10-15 minutes.			B V
	Dexamethasone im	0.3mg/kg	Immediately, then repeat after 6 hours if necessary		C V

- May need endotracheal intubation (if going into respiratory failure)

Epiglottitis

- Epiglottitis presents as an acute, severe infection of the epiglottis and aryepiglottic folds accompanied by fever, a cherry red epiglottis and drooling. Severe disease is characterised by stridor, chest in drawing, hoarseness and inability to swallow. The patient should be admitted to hospital. Airway obstruction is always severe and intubation or tracheostomy is often needed, where available.

Treatment

	Medicine	Dose	Frequency	Duration	Codes
	Ceftriaxone IM/IV	(children >2 months: 100mg/kg; maximum 2g) i.v. or i.m. every 24 hours for 5 days			B E
	Cefotaxime IM/IV	50mg/kg (maximum 2g)	every 8 hours	5 days	C E

- Please see section 8 for further information on respiratory conditions in children.

CHAPTER 6

DIARRHOEA IN CHILDREN/ GASTROENTERITIS

What is diarrhoea?
Diarrhea occurs when stools contain more water than normal, and are loose or watery. In many regions diarrhoea is defined as three or more loose or watery stools in a 24-hour period. Children between the ages of 6 months and 2 years often have diarrhoea. It is more common in settings of poor sanitation and hygiene, including a lack of safe drinking water.

The three essential elements in the management of all children with diarrhoea are rehydration therapy, zinc supplementation and counselling for continued feeding and prevention.

Antibiotics should not be used except for children with bloody diarrhoea (probable shigellosis), suspected cholera with severe dehydration and other serious non-intestinal infections such as pneumonia and urinary tract infection. Antiprotozoal drugs are rarely indicated.

'Antidiarrhoeal' drugs and anti-emetics should not be given to young children with acute or persistent diarrhoea or dysentery: they do not prevent dehydration or improve nutritional status, and some have dangerous, sometimes fatal, side-effects.

Assessment of Child presenting with diarrhoea

History
A careful feeding history is essential in the management of a child with diarrhoea. Inquiries should also be made about:
- Frequency of stools
- Number of days of diarrhoea
- Blood in stools
- Report of a cholera outbreak in the area
- Recent antibiotic or other drug treatment
- Attacks of crying with pallor in an infant

Examination
Look for:
- Signs of some dehydration or severe dehydration:
  - o Restlessness or irritability –lethargy or reduced level of consciousness
  - o Sunken eyes
  - o Skin pinch returns slowly or very slowly
  - o Thirsty or drinks eagerly, or drinking poorly or not able to drink
  - o Blood in stools

Signs of severe malnutrition
- Abdominal mass
- Abdominal distension.

There is no need for routine stool microscopy or culture in children with non-bloody diarrhoea.

Differential diagnosis in a child presenting with diarrhoea
Acute (watery) diarrhea

- More than three loose stools per day
- No blood in stools

Cholera
- Profuse watery diarrhoea with severe dehydration during cholera outbreak – Positive stool culture for Vibrio cholerae.

Dysentery
- Blood mixed with the stools (seen or reported)

Persistent diarrhoea
- Diarrhea lasting ≥ 14 days

Diarrhea with severe malnutrition
- Any diarrhoea with signs of severe acute malnutrition.

Diarrhea associated with recent antibiotic use
- Recent course of broad-spectrum oral antibiotics

Intussusception
- Blood and mucus in stools
- Abdominal mass
- Attacks of crying with pallor in infant or young child

Acute diarrhoea

Assessing dehydration

For all children with diarrhoea, their hydration status should be classified as severe dehydration, some dehydration or no dehydration and appropriate treatment given. In a child with diarrhoea, assess the general condition, look for sunken eyes, make a skin pinch, and offer the child fluid to see if he or she is thirsty or drinking poorly.

Table 15: Assessment of Dehydration

Signs	Classification	Management
Two of the following signs: • Lethargic or unconscious • Sunken eyes • Not able to drink or drinking poorly • Skin pinch goes back very slowly.	**SEVERE DEHYDRATION**	• If child has no other severe classification: o Give fluid for severe dehydration (Plan C) OR • If child also has another severe classification: o Refer URGENTLY to hospital with mother giving frequent sips of ORS on the way o Advise the mother to continue breastfeeding • If child is 2 years or older and there is cholera

Table 15: Assessment of Dehydration *(continued)*

Signs	Classification	Management
Two of the following signs: • Restless, irritable • Sunken eyes • Drinks eagerly, thirsty • Skin pinch goes back slowly	**SOME DEHYDRATION**	• If child also has a severe classification: • URGENTLY to hospital with mother giving frequent sips of ORS on the way • Advise the mother to continue breastfeeding
Not enough signs to classify as some or severe dehydration	**NO DEHYDRATION**	• Give fluid, zinc supplements and food to treat diarrhoea at home

Severe dehydration

Children with severe dehydration require rapid IV rehydration with close monitoring, followed by oral rehydration and zinc once the child starts to improve sufficiently.

Diagnosis

Severe dehydration should be diagnosed if any two signs or symptoms of severe dehydration are present in a child with diarrhoea.

Treatment

- Children with severe dehydration should be given rapid IV rehydration followed by oral rehydration therapy.
- Start IV fluids immediately. While the drip is being set up, give ORS solution if the child can drink.
- ***Note:*** The best IV fluid solutions for rehydration are isotonic solutions: Ringer's lactate solution (called Hartmann's solution for Injection) and normal saline solution (0.9% NaCl). Do not use 5% glucose (dextrose) solution or 0.18% saline with 5% dextrose solution, as they increase the risk for hyponatraemia, which can cause cerebral oedema.
- Give 100 ml/kg of the chosen solution.
- For more information, see treatment plan C in hospital (*Figure 10*)

Some dehydration

In general, children with some dehydration should be given ORS solution for the first 4 h at a clinic, while the child is monitored and the mother is taught how to prepare and give ORS solution.

Diagnosis

If the child has two or more of the following signs, he or she has some dehydration:

- Restlessness or irritability
- Thirsty and drinks eagerly
- Sunken eyes
- Skin pinch goes back slowly.

Note that if a child has only one of the above signs and one of the signs of severe dehydration (e.g. restlessness or irritable and drinking poorly), then the child also has some dehydration.

Treatment

- In the first 4 h, give the child ORS solution according to the child's weight (or age if the weight is not known).
- If the child wants more to drink, give more.
- Show the mother how to give the child ORS solution: a teaspoonful every 1–2 min if the child is < 2 years; frequent sips from a cup for an older child.
- Check regularly to see whether there are problems. – If the child vomits, wait 10 min; then, resume ORS solution more slowly (e.g. a spoonful every 2–3 min).
- If the child's eyelids become puffy, stop ORS solution, reduce the fluid intake and continue with breast milk. Weigh the child, and monitor urine output.
- Advise breastfeeding mothers to continue to breastfeed whenever the child wants.
- Check blood glucose or electrolytes if possible in a child who is restless or irritable and convulsing, in case hypoglycaemia or hyponatremia is present. Manage the child accordingly; if blood glucose measurement is not possible, give IV glucose or oral sugar.
- If the mother cannot stay for 4 h, show her how to prepare ORS solution and give her enough ORS packets to complete rehydration at home plus enough for 2 more days.
- Reassess the child after 4 h, checking for signs of dehydration listed earlier.
- ***Note:*** Reassess the child before 4 h if he or she is not taking the ORS solution or seems to be getting worse.
- If there is no dehydration, teach the mother the four rules of home treatment: treatment plan C (*Figure 10*)
- If the child still has some dehydration, repeat treatment with ORS solution for another 4 h, as above, and start to offer food, milk or juice and breastfeed frequently.
- If there are signs of severe dehydration: treatment plan C (*Figure 10*)

No dehydration

Children with diarrhoea but no dehydration should receive extra fluids at home to prevent dehydration. They should continue to receive an appropriate diet for their age, including continued breastfeeding.

Diagnosis

- Diarrhea with no dehydration should be diagnosed if the child does not have two or more signs that characterise some or severe dehydration.

Treatment

- Treat the child as an outpatient.
- Counsel the mother on the four rules of home treatment:
  - o Give extra fluid.
  - o Give zinc supplements.
  - o Continue feeding.
  - o Know when to return to the clinic.
- See treatment plan A (*Figure 10*)

Persistent diarrhea

Persistent diarrhoea is diarrhoea, with or without blood, that begins acutely and lasts for ≥ 14 days. When there is some or severe dehydration, persistent diarrhoea is classified as 'severe'.

Severely malnourished children with severe persistent diarrhoea require hospitalisation and specific treatment.

Perform stool microscopy for parasites such as Isospora and Cryptosporidium.

Severe persistent diarrhoea

Diagnosis

- Infants or children with diarrhoea lasting ≥14 days with signs of dehydration have severe persistent diarrhoea and require hospital treatment.
- Assess the child for signs of dehydration

Treatment

- Give fluids according to treatment plan B or C, as appropriate
- Examine every child with persistent diarrhoea for non-intestinal infections such as pneumonia, sepsis, urinary tract infection, oral thrush and otitis media, and treat appropriately.
- Give micronutrients and vitamins.
- Treat persistent diarrhoea with blood in the stools with an oral antibiotic effective for Shigella
- Give oral metronidazole at 10 mg/kg three times a day for 5 days only if:
  - o microscopic examination of fresh faeces reveals trophozoites of Entamoeba histolytica within red blood cells; or
  - o trophozoites or cysts of giardia are seen in the faeces, or two different antibiotics that are usually effective for Shigella locally have been given without clinical improvement.
  - o if stool examination is not possible, when diarrhoea persists for > 1 month

Supplememtary multivitamins and minerals

Give all children with persistent diarrhoea daily supplementary multivitamins and minerals for 2 weeks. These should provide as broard a range of vitamins and minerals as possible, including at least two recommended daily allowances of folate, vitamin A, zinc, magnesium and copper.
As a guide, one reommended daily allowance for a child aged 1 year is:

- Folate, 50 µg
- Zinc, 10 mg
- Vitamini A, 400 µg
- Iron, 10 mg
- Copper, 1 mg
- Magnesium, 809

Feeding

Careful attention to feeding is essential for all children with persistent diarrhoea. Breastfeeding should be continued for as often and as long as the child wants. Other food should be withheld for 4–6 h only for children with dehydration.

Feeding should be restarted as soon as the child can eat. Food should be given six times a day to achieve a total intake of at least 110 calories/kg per day. Many children will eat poorly, however, until any serious infection has been treated for 24–48 h. These children may require nasogastric feeding initially.

The diet should contain at least 70 calories/100 g, provide milk or yoghurt as a source of animal protein, but no more than 3.7 g lactose/kg per day and should provide at least 10% of calories as protein.
Involve dieticians in nutritional therapy when possible.

Persistent diarrhoea (non-severe)

Children with non-severe persistent diarrhoea do not require hospital treatment but need special feeding and extra fluids at home.

Diagnosis
Children with diarrhoea lasting ≥ 14 days but with no signs of dehydration or severe malnutrition
Treatment
- Treat the child as an outpatient.
- Give supplementary multivitamins and minerals.
- Prevent dehydration
- Give fluids according to treatment plan A (*Figure 10*)

Dysentery
Dysentery is diarrhoea presenting with frequent loose stools mixed with blood (not just a few smears on the surface). Most episodes are due to Shigella, and nearly all require antibiotic treatment. Shigellosis can lead to life-threatening complications, including intestinal perforation, toxic megacolon and haemolytic uraemic syndrome.

Diagnosis
The diagnostic signs of dysentery are frequent loose stools mixed with visible red blood. Other findings on examination may include:
- Abdominal pain
- Fever
- Convulsions
- Lethargy
- Dehydration
- Rectal prolapse.

Treatment
Most children can be treated at home.

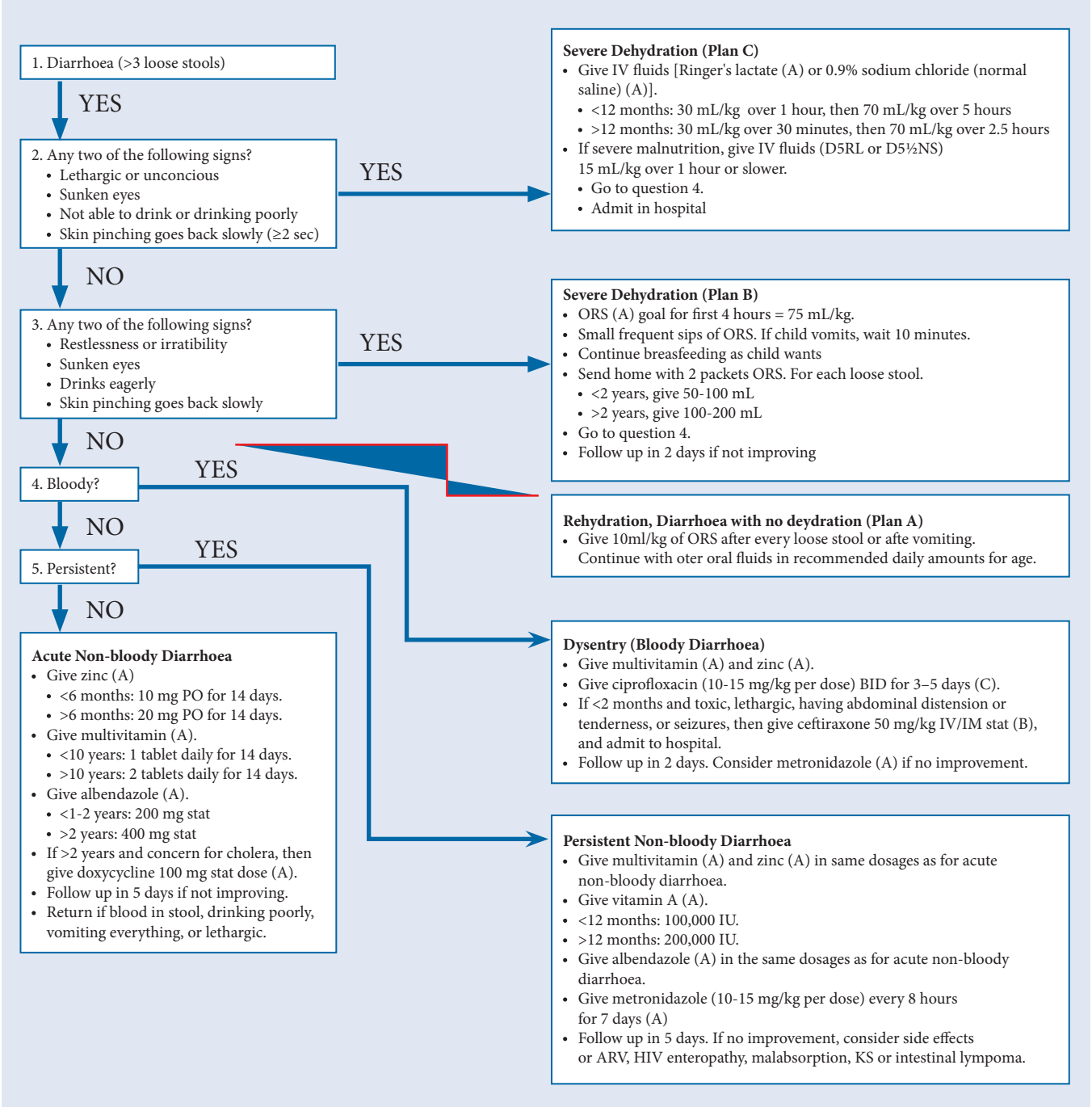
Admit to hospital:
- young infants (< 2 months old)
- severely ill children, who look lethargic, have abdominal distension and tenderness or convulsions
- children with any another condition requiring hospital treatment. Treat with the following:

	Medicine	Dose	Frequency	Duration	Codes
	Ciprofloxacin po	15mg/kg	every 12hours	3 days	A E
In severe cases	Ceftriaxone IV/IM	50-80mg/kg	daily	3 days	B V
or	Zinc sulphate po	20mg	daily	7-10days	A E

Complications
- **Dehydration:** Dehydration is the commonest complication of dysentery, and children should be assessed and managed for dehydration irrespective of any other complication. Give fluids according to treatment plan A, B or C, as appropriate.
- **Potassium depletion:** Potassium depletion can be prevented by giving ORS solution (when indicated) or potassium-rich foods such as bananas, coconut water or dark-green leafy vegetables.
- **High fever:** If the child has high fever (≥ 39 °C) that appears to be causing distress, give paracetamol and consider severe bacterial infection.
- **Rectal prolapse:** Gently push back the rectal prolapse using a surgical glove or a wet cloth. Alternatively, prepare a warm solution of saturated magnesium sulfate, and apply compresses with this solution to reduce the prolapse by decreasing oedema.

- **Convulsions:** A single convulsion is the commonest finding. If they are prolonged or repeated, give diazepam (see chart 9, p. 15). Avoid giving rectal diazepam. Always check for hypoglycaemia.
- **Haemolytic uraemic syndrome:** Where laboratory tests are not possible, suspect haemolytic uraemic syndrome in patients with easy bruising, pallor, altered consciousness and low or no urine output.
- **Toxic megacolon:** This usually presents with fever, abdominal distension, pain and tenderness with loss of bowel sounds, tachycardia and dehydration. Give IV fluids for dehydration, pass a nasogastric tube, and start antibiotics.

Figure 10: Algorithm for Management of Diarrhoea



CHAPTER 7

FLUID RESUSCITATION

Fluid resuscitation is providing fluids to either make up a fluid deficit (i.e. dehydration) or provide the daily fluid a human body needs when the patient is unable to hydrate themselves. Fluids are either given as a "bolus" (generally considered as quickly as possible, or over a short duration of 10 to 60 minutes) or as "maintenance therapy" (calculated as the daily fluid volume required for a body, usually by weight).

Bolus fluids

Bolus fluids are used when a patient comes in and their blood pressure or heart rate indicates they are not able to maintain blood perfusion to their vital organs. In most cases, a bolus will be 20 mL/kg, however in patients with conditions that can have fluid overload (congestive heart failure, kidney failure) 10 mL/kg is recommended.

- 20 mL/kg for most patients
- Isotonic fluids should be used
  - o Ringer's lactate or
  - o Normal saline (0.9%).
- Use of hypotonic fluids (i.e. 5% dextrose in water, 0.45% saline) as these fluid types will have water travel outside of the vasculature, so not as much of the volume will go to support perfusion. These fluids are not recommended.

Table 16: Bolus IV fluids in shock management for children with and without severe malnutrition-quick reference for children under 20 kg

Age/weight	IV fluid volume (20 mL/kg)
2 months (<4 kg)	75 mL
2 to <4 months (4 to <6 kg)	100 mL
4 to <12months (6 to <10 kg)	150 mL
1 to <3 years (10 to <14 kg)	250 mL
3 to <5 years (14 to 19 kg)	350 mL

Note: The WHO recommends conservative fluid therapy (15 ml/kg over one hour in children with shock with severe malnourishment) due to concern for fluid overload. There is a lot of controversy about fluid management, however we continue to recommend fluid boluses at 20 mL/kg for both standard and severe malnourishment circulatory support in shock.

Maintenance fluids

Maintenance fluids are given based on the calculation of the daily fluids a body will need, which tries to take into account the fluid you lose via urine and stool as well as sweat, breathing, and burning calories. Intravenous fluids such as D5-1/2NS (dextrose 5% with .45% normal saline) D5-NS (dextrose 5% with .9% normal saline), or NS (.9% normal saline) are used when a patient cannot take the fluids they need by mouth (i.e. excessive vomiting, altered mental status, respiratory distress, etc.)

- The amount of fluids a body needs are calculated using the following:
  - o 100 ml/kg for the 1st 10 kg of weight
  - o 50 ml/kg for the 2nd 10 kg of weight
  - o 20 ml/kg for the remaining weight

You can also think about this on an hourly rate, since this is how fluids are delivered in a hospital. They are calculated using the following:

- 100 ml/kg/24-hours = 4 ml/kg/hr. for the 1st 10 kg
- 50 ml/kg/24-hours = 2 ml/kg/hr. for the 2nd 10 kg
- 20 ml/kg/24-hours = 1 ml/kg/hr. for the remainder

For example, if a child weighs 22 kg, we give:

- 100 mL/hr. for the first 10 kg (100 x 10) + 50 mL/hr. for the second 10 kg (50 x 10), and 20 mL/kg for the additional 2 kg (20 x 2)= 1,540 mL/24 hours. Dividing that into 24 hours would give us 64 mL/hr.
- Adult maintenance fluids are usually given at 100 mL/hr. (or 2400 mL/day), so this would be your maximum volume rate (unless under specific circumstances).

Table 17: Dosing schedule in fluid resuscitation

Body weight (kg)	Daily maintenance fluid (mL/24 hours)	Hourly maintenance fluid (mL/hr.)
1 to 10	100 mL x weight (kg)	4 mL x weight (kg)
>10 to 20	1000 mL plus 50 x weight (kg) that is over 10 kg	40 mL plus 2 x weight (kg) that is over 10 kg
>20	1500 mL plus 20 x weight (kg) that is over 20 kg	60 mL plus 1 x weight (kg) that is over 20 kg

CHAPTER 8

RESPIRATORY CONDITIONS

8.1 Community Acquired Pneumonia (CAP)

Pneumonia in children 2 months or older, up to 70% of CAP has a viral cause. However, is it difficult to differentiate clinically between viral and bacterial CAP in children. A chest X-ray may help to differentiate between bacterial and viral CAP. Children who have widespread pulmonary wheeze or crackles but no focal changes on chest X-ray are more likely to have viral pneumonia.

Table 8.1: Classification of the severity of pneumonia

Severity	Clinical features	Treatment
Clinical features of low-severity CAP	Minimal tachypnoea, absence of tachycardia and oxygen saturation 94% or higher on room air	Refer/admit to higher level of care Give oxygen Give Iv antibiotic stat dose
Clinical features of moderate-severity CAP	Increased work of breathing, tachypnoea, tachycardia and oxygen saturation 94% or lower on room air.	Refer/admit to the higher level of care Give stat dose of Iv antibiotic
Clinical features of high-severity	Increase in work of breathing, grunting or nasal flaring, marked tachypnoea and tachycardia, and oxygen saturation 90% or lower on room air.	Check if the patient is able to come back if condition deteriorates. If he can, treat the child at home. Advise to come immediately if the condition changes. Give an appointment for review.

Diagnosis
The above clinical features and physical exam and Chest X-ray

Pharmacological home management
if a viral cause is suspected, treat symptoms with:

- paracetamol or ibuprofen for fever or pain
- fluids to achieve and maintain adequate hydration.

Ask the carer to bring the child back for reassessment if symptoms are not improving after 48 to 72 hours, or earlier if symptoms worsen.

For bacterial amoxicillin 25 mg/kg up to 1 g orally, 8-hourly for 3 days. OR amoxicillin clavulanate In case of **hypersensitivity to penicillin** azithromycin 10 mg/kg up to 500 mg orally, daily for 3 days

- *Antibiotic therapy at at hospital level*
  - o Give intravenous ampicillin (or benzylpenicillin) and gentamicin (First line).

	Medicine	Dose	Frequency	Duration	Codes
	Amoxycillin po	50mg/kg	Every 6 hours	5 days	A V
or	Benzyl penicillin IM/IV	50 000U/kg	Every 6 hours	5 days	A V
plus	Gentamicin IM/IV	7.5mg/kg	Once daily	5 days	B E

In cases of failure of first line treatment.

Medicine	Dose	Frequency	Duration	Codes
Ceftriaxone IM/IV	80mg/kg	Once daily	5 days	B V

Prevention
Discuss preventive strategies with patients at risk of pneumonia, particularly those who have had pneumonia because they are at risk of recurrence. Preventive strategies include:
- Immunisation against influenza and Streptococcus pneumoniae—see Immunisation Chapter
- Smoking cessation—see Smoking cessation for further information
- Exercise and management of obesity
- Medication review to identify medications that have been associated with an increased incidence of pneumonia (eg proton pump inhibitors, benzodiazepines and other sedatives)
- Reducing the risk of aspiration events in patients with recurrent aspiration

8.2 Influenza and common cold

Influenza causes relatively depilating illness and should not be confused with common cold

Etiology
The most frequent cause of common cold is Rhinovirus

Symptoms
- Runny nose
- Nasal congestion
- Cough
- Fever

Diagnosis
Above symptoms

Treatment
- Bed rest until fever subsides
- Analgesics: paracetamol
- Fluids: maintain high fluid intake
- Cough mixture antihistamines, inhaled or oral corticosteroids is not indicated
- Parent education on the use and Side effects of these medications is the key treatment

8.3 Wheezing

Wheezing is a breath sound that is heard during expiration.
Often associated with prolongation of expiratory phase of the breathing cycle. Indicates obstruction to air flow within the thorax.

Differential diagnosis

Extrinsic lower air way compression
- Lung parenchyma e.g. pneumonia, pulmonary edema, bronchogenic cyst.
- Vascular e.g. enlarged left atrium compressing left main stem bronchus.
- Lymphatic e.g. enlarged hilar nodes.
- Chest deformity e. scoliosis.

Intrinsic change in lower airway dimension

- Asthma
- Bronchiolitis
- Bronchitis
- Cystic fibrosis
- Ciliary disease
- Hemangioma
- Polyps
- Tracheobronchomalasia
- Intraluminal lower airway obstruction
- Aspiration of food or milk from gastro-esophageal reflux
- Foreign body inhalation
- Mucus, pus, and blood

Each of the conditions in the list above will require specific investigation, treatment and referral.

Asthma in children

Diagnosis Symptoms

- Wheezing or coughing that occurs with exercise laughing or crying in the absence of an apparent respiratory infection and shows clinical improvement after 2-3 months of controller treatment and worsening after cessation. It can be accompanied by chest tightness and difficulty in berthing

Atopy

- A personal or family history of atopy: Allergic Rhinitis, Allergic Conjunctivitis, Asthma Eczema.

Coexisting medical condition

- Asthma may be aggravated by conditions such as Rhinitis, Obesity, and gastro esophageal reflux.

Medication

- Use of medication such as aspirin, non-steroidal anti-inflammatory and beta blockers should be noted.

Investigation

- Peak flow meter for children > 5 years
- Spirometer For children > 5 years
- CBC with differential (look for eosinophilia)
- Response to Broncho dilator-Salbutamol (MDI) 2 puff or nebulise and check response after 20 minutes

8.4 Management of asthma

- After diagnosing asthma, the following steps should be followed to ensure adequate control is achieved.
- Assess severity
- Implement asthma treatment

8.4.1 Assessment of asthma severity of patients who are not on controller inhaler treatment.

Assessment of asthma severity using the level and frequency of symptoms and PEF in patients presenting for first time.

Severity	Mild Intermittent	Mild Persistent	Moderate Persistent	Severe Persistent
Day:	☐ ≤2x/week	☐ 3-4x/ week	☐ >4x/week	☐ Continuous
Night:	☐ ≤1x/month	☐ 2-4x /month	☐ >4x/month	☐ Frequent
PEF:	☐ ≥80%	☐ ≥80%	☐ 60%-80%	☐ <60%

8.4.2 Assessment of asthma severity of patients who are on controller inhaler treatment

Mild	Moderate	Severe
Well controlled Step 1&2	Well controlled asthma with Step 3	Well controlled asthma with Step 4 & 5

*Please see stepwise treatment of asthma below

8.4.3 Step wise Implementation of asthma treatment

- Set Goals for control of asthma by establishing patient –health care provider partnership
- Preventive /avoidance measures
- Pharmacotherapy
- Provision of action plan
- Manage comorbidities
- Make an appointment and assess levels of control and follow-up
- Establish patient –health care provider partnership through good communication

8.4.3.1 Set goals by establishing patient –health care provider partnership

- Achieve and maintain control of symptoms
- Maintain normal activity
- Avoid side effects
- Prevent asthma exacerbation
- Avoid adverse effects from asthma medications
- Prevent asthma mortality

8.4.3.2 Preventive /avoidance measures

- Avoidance of triggers wherever possible.
- Give triggers check list and discuss on how to avoid triggers.

Pharmacological treatment

- Inhalation is the preferable root of drug administration because of rapid onset, direct delivery of the drug into the lung and less side effect.
- Check for any fear and concern or fears about inhaler
- Address the concerns using motivational interview (5As) and discuss the importance of inhaler and its advantages over oral medication
- Start either rescuers — short-acting Broncho dilators (SABA) or preventers- (ICS, LABA, LTRA, SR theophylline) using a stepwise management (see below)
- Demonstrate inhaler technique
- Provide action plan
- Manage comorbidities
- All children must use spacer to administer inhaled Broncho dilators or perverters

Treatment of asthma with inhalers depends on:

- Severity on presentation (see above)
- Risk of future exacerbation (environmental factors or history of exacerbation
- Current medication,
- Patient profile
- Level of control

How to administer inhaled bronchodilators or preventers

Features	Acute viral rhinosinusitis
• Remove mouth piece cover from inhaler • Shake inhaler hold inhaler upright • Exhale to residual volume • Keep head upright Mouthpiece between teeth and lips • Inhale slowly and press canister • Continue slow and deep inhalation Hold breath for 10 second (count 10)	• Remove mouth piece cover from inhaler • Shake inhaler (5x) hold inhaler upright • Exhale to residual volume inhaler with spacer • Connect • Keep head upright • Mouthpiece between teeth and lips • Inhale slowly and press canister • Continue slow and deep inhalation • Hold breath for 10 second (count 10)

Table 8.2: Initial asthma treatment

Presenting symptoms	Preferred initial treatment	
Infrequent asthma symptoms less than twice a month	Step 1 see below	
Asthma symptoms or need for reliver twice per month	Step 2 see below	
Troublesome asthma symptoms most days, or waking at night due to asthma especially if any risk factors exist	Step 3 see below	This step should be initiated by specialist. Nurses and GPs can start with step 2 and refer if the patient need to be initiated with step 3

Table 8.3: Stepwise Asthma Management

Step 1	Severity	Treatment	Remark
	Intermittent	Salbutamol 2 puffs PRN	Patient can be treated as step 2 if there is a risk of acute exacerbation

Step Up ⬇ ⬆ Step Down

Step 2	Severity	Treatment	Remark
	Persistent	Low dose Beclomethasone BID daily OR Montelukast 4-5mg daily	Nurses and medical officers should refer to specialist if no response at this step. Patient on montelukast should be switched to Beclomethasone if no response after one month.
Salbutamol 2 puffs PRN			

Step Up ⬇ ⬆ Step Down

Step 3	Severity	Treatment	Remark
	Persistent	Double low dose of Beclomethasone daily OR Low-medium dose Beclomethasone+ Montelukast daily OR Low-medium dose Beclomethasone + SR theophylline daily OR Low-medium dose Beclomethasone + salmeterol (LABA) daily	This step should be initiated by specialist only. Salmeterol is not recommended less than 5 years and it shouldn't be given without steroid/ Beclomethasone.
Salbutamol 2 puffs PRN			

Low and high dosages of inhaled corticosteroids for asthma in children

Low	Medium	High	Code
50-100mcg	-	100mcg-200mcg	

Principles of stepwise asthma management

Principles of Stepwise Asthma Management	
• Short acting Broncho-dilators should be given as needed in all steps. • All persistent asthma should be treated with steroids in a stepwise manner since it reduces exacerbation and hospitalisations. • ICS can also be commenced if the patient has a future risk of adverse outcomes. exacerbation, persistent airflow limitation, persistent exposure to allergens) and comorbidities even the severity is mild intermittent. • Start at dose of steroids appropriate to severity of disease. • For mild persistent asthma 400mcg/day in divided dose is an appropriate starting point for many patients. • Inhaled corticosteroids are first line controllers. • The second line long term drugs can be used as add on therapy.	• LABAs are more effective than leukotriene antagonist e.g montelucast. • LABA can be effective with low and medium dose of ICS instead of using a high dose of ICS. • LABA is not recommended for children less than 6 years old. Better to increase the ICS to higher dose. • Once asthma treatment has been commenced. Ongoing treatment decisions are based on the cycle of assessment, adjustment, and review of response. • Review patient's response after 1-3 month or earlier depending on clinical urgency. • Any step-up should be regarded as a therapeutic trial and the response should be reviewed after 1-3 month or earlier depending the clinical urgency.

8.4.3.3 Stepping up asthma treatment

- Is recommended for patients who fail to respond adequately to initial treatment.
- Before considering any step-up in treatment, correct the following common problems;
- Incorrect inhaler technique

- Poor adherence
- Persistent exposure at home/work such as allergens or medications
- Comorbidities
- Incorrect diagnosis
- In the absence adequate control in Step 2 increase steroids up to 800mcg or step up to step 3
- In step 3 you can add LABA with low and medium dose ICS. Subsequently you can increase the ICS from low dose to medium from medium to high dose of inhaled corticosteroids and increase the dose of ICS to 800-1000mcg.

8.4.3.4 Step down

- Review and consider stepping down at intervals of 6 months or more by maintaining the lowest dose of ICS controlling the symptoms.
- Consider stepping down if there have been no symptoms for 6 -12 months
- Prior to stepping down treatment the patient should be given a written asthma action plan and instructions for how and when to resume their previous treatment if their symptom worsens because of stepping down.

Table 8.4 Stepping down in asthma management

Step Down Strategies		
Current step	**Current medication**	**Options for stepping down**
Step 4	Moderate to high dose ICS+LABA	Reduce ICS dose by 50% Then remove LABA and then others after 6 months
Step 3	Low dose ICS+LABA	Reduce ICS by 50%
Step 2	Low dose ICS	Reduce ICS to once daily

8.4.3.5 Comorbidities that need to be addressed

- These are conditions that contribute to poor asthma control and impair quality of life.

Table 8.5 Co-morbidities in asthma

Comorbidity	Diagnosis	Treatment
Obesity	**Check BMI**	**Weight loss**
Gastro Esophageal Reflux disease (GERD)	Reflux disease (GERD) Symptoms such as heart burn, epigastric pain	Proton pump inhibitors
Anxiety and depression	Screening for anxious and depressive symptomatology	Non-pharmacological and pharmacological treatment or refer to specialist
Allergic Rhinitis	Symptoms	Intranasal corticosteroids

8.4.3.6 Assessment and follow-up

- Set up asthma follow-up clinic
- Conduct regular review of asthma control and assess future risk of adverse out comes (exacerbation, persistent airflow limitation, persistent exposure to allergens and medication side effect) ranging from two weeks up to every three or six month depending the clinical urgency
- Manage and assess comorbidities
- Assess lung function test every 3-6 month
- Check for adherence to medications and reinforce
- Assess future risk of exacerbation persistent airflow limitation and side effects

- Identify barriers for adherence
- Check inhaler technique
- Step up or step down depending on asthma control
- Adjust action plan

8.4.4 Definition of good asthma control

Table 8.6 Assessment of asthma control

Characteristic	Controlled	Partly Controlled	Uncontrolled
Day time symptoms	<2/week	<2/week	3 or more of partly controlled
Limitations of activities	None	None	
Nocturnal symptoms	None	None	
Need for reliever	<2/week	<2/week	
Lung function (PEF/FEV1)	<2/week	<80% predicted	
Exacerbation	Normal	1 or more/year	

8.4.5 Referral

- In the time of difficulty to diagnose.
- All patients whose asthma is not controlled with step 2 at the clinic level and primary health care level
- Patients who have recurrent acute exacerbation despite being on appropriate steps
- Difficult to initiate inhaler
- Patients on step 3,4, 5 whose asthma is not controlled.
- Exercise induced asthma
- All Patients at step 5
- Exercise induced asthma (EIB) is an airflow obstruction caused by physical exercise It causes shortness of breath, wheezing, coughing and other symptoms during or after exercise.

Management

- Salbutamol inhaler 2 puffs 20 minutes before exercise
- Severe form of EIB caused by light exercise might need low dose of inhaled corticosteroids daily

Management of acute exacerbation of asthma

- Check respiratory rate
- Check oxygen saturation
- Start oxygen
- Start Salbutamol nebs every 20 minutes
- If no response adds Ipratropium bromide to salbutamol
- Give prednisone 1mg/kg stat
- If still no response
- Start magnesium sulfate 40mg/kg and continue oxygen and salbutamol nebs with ipratropium bromide And refer to high level of care or ICU

Bronchiolitis

Is acute viral illness usually due to respiratory syncytial virus (RS). The commonest acute lower respiratory infection in infants (2 weeks to 9 months).

Symptoms
- Coryza, irritating cough, wheezy breathing-often distressed or and crackles, hyper inflated chest
- Subcostal recession, tachypnea, wheezes and pseudo-hepatomegaly on examination

Diagnosis
- Above symptoms
- Age of the child
- CXR is not indicated routinely unless to rule out other chest infections
- Prevention
- Avoid exposure to children and adults who have colds
- Promote hand washing

Treatment
- With increasing respiratory distress admit to the hospital
- Oxygen by nasal prongs
- Pulse oximeter: to assess oxygenation
- A trial of inhaled bronchodilator with salbutamol or adrenaline with nebuliser or by MDI with spacer
- Fluids
- Antibiotics are not indicated unless secondary bacterial infection.
- There is no evidence to support routine use corticosteroids
- Cough syrup is not indicated. Discuss the reason with the parent
- Consider admission if there are underlying risk factors such as premature babies <6 month or if there is respiratory distress which needs oxygen or pulse oximetry (SpO2) less than 94%.

8.5 Croup

Refers to a symptom complex with harsh brassy cough, usually with inspiratory stridor and with or without respiratory difficulty

Etiology
- Parainfluneza and RSV viruses

Symptoms
- Coryzal prodrome,
- Hoarseness (or husky voice in those old enough to speak), inspiratory stridor,
- A harsh barking 'brassy' cough
- Usually 6 months to 6 years –peak incidence 1-2 years

Assessment of severity
The severity of croup can be categorised as:

Mild	Moderate	Severe
• Mild chest wall retractions • Tachycardia • But no stridor at rest	• Stridor at rest, • Chest wall retractions, • Use of accessory • Respiratory muscles, • Tachycardia	• Stridor at rest, • Increasing fatigue, • Markedly decreased air entry • Marked tachycardia.

Restlessness, decreased level of consciousness, hypotonia, cyanosis and pallor are signs

Treatment

Grade 1 Mild croup

- Manage at home

	Medicine	Dose	Frequency	Duration	Codes
	Prednisolone po	1mg/kg	Daily in the morning	4 days	A E

- Advise to come back if the child shows signs of Grade 2 or 3 croup

Grade 2 Moderate croup

- Admit/refer to the hospital

	Medicine	Dose	Frequency	Duration	Codes
	Prednisolone po	1mg/kg	Daily in the morning	4 days	A E
	Adrenaline nebs	1:1000	When necessary		B V

Grade 3 Severe croup

- Admit to intensive care

	Medicine	Dose	Frequency	Duration	Codes
	Oxygen therapy		As long as needed for good saturation		B V
	Adrenaline nebs	1:1000 0.5ml – 5ml/kg. Repeat the dose if there is no response at 10-15 minutes.			B V
	Dexamethasone IM	0.3mg/kg	Immediately, then repeat after 6 hours if necessary		B V

- May need endotracheal intubation (if going into respiratory failure)

Epiglottitis (*supraglottitis*) is a life-threatening bacterial infection characterised by rapidly progressive inflammation of and around the epiglottis.

Causes

Bacterial	Viral	Fungal
• Haemophilus influenzae Type B (Hib) • H. influenzae types A and F, and non-typeable strains • Haemophilus parinfluenzae • Streptococcus pneumoniae • Staphylococcus aureus (methicillin susceptible and methicillin resistant) • Beta-hemolytic streptococci: Groups A, B, C, F, G • Pasteurella multocida • Moraxella catarrhalis • Klebsiella pneumoniae • Neisseria meningitidis and other Neisseria species • Escherichia coli • Enterobacter cloacae • Pseudomonas aeruginosa* *In healthy children most cases are bacterial	• Herpes simplex virus Type 1 • Varicella zoster virus • Parainfluenza virus Type 3 • Influenza B viruses • Epstein-Barr virus	• Candida albicans • Usually happen with immunocompromised patients

Symptoms
- Anxiety
- Tripod" position
- Sore throat
- Stridor
- Drooling
- Dysphagia
- Respiratory distress

Signs of total or near-total airway obstruction
- Drooling
- Tripod" position
- Cyanosis

Management
- If the patient has the above symptoms
- Give oxygen if in distress
- Give stat dose of Ceftriaxone. Refer for to the hospital for ICU management

Retropharyngeal Abscess
Signs: inability to swallow, fever.

Treatment

Refer for IV antibiotics and drainage:

8.6 Diphtheria

Etiology: caused by Corynebacterium diphtheria
Transmission: Spread by droplet infection, incubation 2-5 days
Presentation characterised by an inflammatory exudate which forms greyish membrane in respiratory tract may cause respiratory obstruction
Management: admit and give antitoxin (antitoxin should be given in hospital with expert guidance because it can cause acute allergic reactions and commence
- benzylpenicillin 1.2 g (child: 50 mg/kg up to 1.2 g) intravenously, 6-hourly for five days

PLUS
- azithromycin 500 mg (child: 10 mg/kg up to 500 mg) intravenously, daily. For five days

Complication: affects myocardium, nervous and adrenal tissues

8.7 Pertussis

Etiology
Bordetella pertussis
Incubation 7 days

Symptoms
Catarrhal stage -symptom and signs of URTI lasts 1-2 weeks
Coughing stage -increasingly severe and paroxysmal cough with spasm of cough followed by a “woop”

associated with vomiting cyanosis during coughing spasms and exhaustion lasts 4-6 weeks and then cough improves over 2-3 weeks
Examination: Chest is clear coughing bouts
Investigation: Microscopy and culture of perinasal swabs FBC-lymphocytosis
Management: erythromycin in the Catarrhal stage. Once coughing stage has started treatment is symptomatic.
Complications: pneumonia, bronchiectasis, convulsions, subconjunctival hemorrhage, and facial petechiae.

Prevention
- Proven contact treat with erythromycin
- Vaccination

Acute sinusitis

Inflammation of the nasal mucosa and paranasal sinuses that lasts less than 4 weeks or chronic (symptoms lasting longer than 12 weeks).

Cause
- ***Viral***
- **Bacterial** (*Streptococcus pneumoniae and Haemophilus influenzae. Moraxella catarrhalis infection is less frequent.)*

Symptoms - characterised by the presence of two or more of the following symptoms:
- nasal blockage (congestion or obstruction)
- nasal discharge (anterior or posterior nasal drip)
- facial pain or pressure
- reduction or loss of sense of smell

Features of acute viral and acute bacterial sinusitis (Table 2.6)

Features	Acute viral rhinosinusitis	Acute bacterial rhinosinusitis
Fever	Often present in the first few days of illness.	Acute bacterial rhinosinusitis high fever (39°C or higher) present at the onset of illness and persisting for 3 to 4 consecutive days.
Symptom onset	Symptoms peak rapidly and decline by the third day of illness.	Severe symptoms can occur at the onset of illness and persist for 3 to 4 consecutive days. Severe symptoms are defined as high fever (39°C or higher) plus purulent nasal discharge or facial pain.
Symptom duration and improvement	Symptoms resolve by 7 days in 75% of patients. In 25% of patients, symptoms last longer than 7 days but reduce in severity.	Symptoms usually resolve or improve within 7 to 14 days, but bacterial infection is more likely if: • symptoms persist for longer than 7 to 10 days without improvement • symptoms worsen after initial improvement.

Treatment for acute viral sinusitis

- Regular oral analgesia (eg paracetamol)
- Saline nasal preparations (sprays, rinses or drops)
- Intranasal corticosteroids moderately improve symptoms of acute rhinosinusitis.
- Antihistamines do not relieve symptoms of acute rhinosinusitis
- Effective communication with the patient or carer about the limited role of antibiotics in acute viral sinusitis is essential.

Treatment for acute bacterial sinusitis

Acute bacterial rhinosinusitis is usually a self-limiting condition.
If antibiotics are prescribed, the rate of symptom improvement is increased at days 3 and 7, but at day 10, there is no difference in improvement oral amoxicillin, or amoxicillin+clavulanate are the antibiotic of choice.

Chronic Sinusitis
inflammation of the nasal mucosa and paranasal sinuses and that lasts longer than 12 weeks).

Symptoms
The same as acute sinusitis

Treatment
Isotonic or hypertonic saline nasal irrigation
If there is inadequate response to at least 1 month of treatment or if there is an obvious physical obstruction, refer for specialist management.
A trial of intranasal corticosteroids can be given before referral.

CHAPTER 9

MALNUTRITION

9.1 Severe acute malnutrition

Severe acute malnutrition is defined in these guidelines as the presence of oedema of both feet or severe wasting (weight-for-height/length <-3SD or mid-upper arm circumference < 115 mm).

Children who are <-3SD weight-for-age may be stunted (short stature) but not severely wasted. Stunted children who are not severely wasted do not require hospital admission unless they have a serious illness.

Diagnosis
The main diagnostic features are:
- Weight-for-length/height < -3SD (wasted) or
- Mid-upper arm circumference < 115 mm or
- Oedema of both feet (kwashiorkor with or without severe wasting).
- Children with severe acute malnutrition should first be assessed with a full clinical examination to confirm whether they have any general danger sign, medical complications and an appetite.
- Children with severe acute malnutrition and loss of appetite or any medical complication or have complicated severe acute malnutrition should be admitted for inpatient care.
- Children who have a good appetite and no medical complications can be managed as outpatients.

Initial assessment
Assess for general danger signs or emergency signs and take a history concerning:
- Recent intake of food and fluids
- Usual diet before the current illness
- Breastfeeding
- Duration and frequency of diarrhoea and vomiting
- Type of diarrhoea (watery/ bloody)
- Loss of appetite
- Family circumstances
- Cough > 2 weeks
- Contact with TB
- Recent contact with measles
- Known or suspected HIV infection/exposure. On examination, look for:
- Shock: lethargic or unconscious; with cold hands, slow capillary refill (> 3 s), or weak (low volume), rapid pulse and low blood pressure.

Signs of dehydration
- Severe palmar pallor
- Bilateral pitting oedema
- Eye signs of Vitamin A deficiency: –dry conjunctiva or cornea, bitot spots
  - o Corneal ulceration
  - o Keratomalacia
- Children with Vitamin A deficiency are likely to be photophobic and will keep their eyes closed. It is important to examine the eyes very gently to prevent corneal rupture.
- Localising signs of infection, including ear and throat infections, skin infection or pneumonia
- Signs of HIV infection
- Fever (temperature ≥37.5 °C) or hypothermia (rectal temperature < 35.5 °C)

- Mouth ulcers
- Skin changes of kwashiorkor:
  - o Hypo- or hyperpigmentation
  - o Desquamation
  - o Ulceration (spreading over limbs, thighs, genitalia, groin and behind the ears)
  - o Exudative lesions (resembling severe burns) often with secondary infection (including candida).
- Conduct an appetite test: –Check if the child has appetite by providing ready-to-use therapeutic food. Laboratory investigations should be conducted for Hb or EVF, especially if there is severe palmar pallor.

When there is corneal ulceration, give Vitamin A, instill chloramphenicol or tetracycline and atropine drops into the eyes.

Organisation of care

- Children with a positive appetite test who are clinically well and alert should be treated as outpatients for uncomplicated severe acute malnutrition.
- Children who have severe oedema +++ or a poor appetite or present with one or more general danger signs or medical conditions requiring admission should be treated as inpatients.
- Separate from infectious children.
- Ensure warmth (25°C–30°C, with no draughts).
- Admit in a special nutrition unit if available, and constantly monitors.
- Facilities and sufficient staff should be available to ensure correct preparation of appropriate therapeutic foods and to feed the child regularly, day and night.
- Accurate weighing machines or MUAC tapes are needed.
- Records of the feeds given and the child's weight or anthropometric measurements should be kept so that progress can be monitored.

9.2 General management

- General treatment involves 10 steps in two phases: initial stabilisation and rehabilitation.

Table: Time frame for the management of a child with complicated severe acute malnutrition.

Step	PHASE		
	STABILISATION		REHABILITATION
	Days 1-2	Days 3-7	Weeks 2-6
1. Hypoglycaemia	→		
2. Hypothermia IV/IM	→		
3. Dehydration	→		
4. Electrolytes	→	→	→
5. Infection	→	→	
6. Micronutrients		no iron	with iron →
7. Cautious feeding	→	→	
8. Catch-up growth			→
9. Sensory stimulation	→	→	→
10. Prepare for follow-up			→

9.2.1 Hypoglycaemia

All severely malnourished children are at risk of hypoglycaemia and, immediately on admission, should be given a feed or 10% glucose or sucrose (see below). Frequent every 2 hours feeding is important.

Diagnosis

Hypoglycaemia is present when the blood glucose is < 3 mmol/liter (< 54 mg/ dl). If blood glucose cannot be measured, it should be assumed that all children with severe acute malnutrition are hypoglycaemic and given treatment.

Treatment

- Give 50 ml of 10% glucose or sucrose solution (one rounded teaspoon of sugar in three tablespoons of water) orally or by nasogastric tube, followed by the first feed as soon as possible.
- Give the first feed of F-75 therapeutic milk, if it is quickly available, and then continue with feeds every 2 hours for 24 hours; then continue feeds every 2 or 3 hours, day and night.
- If the child is unconscious, treat with IV 10% glucose at 5 ml/kg or, if IV access cannot be quickly established, then give 10% glucose or sucrose solution by nasogastric tube. If IV glucose is not available, give one teaspoon of sugar moistened with one or two drops of water sublingually, and repeat every 20 minutes to prevent relapse. Continue with 2 hourly oral or nasogastric feeds to prevent recurrence.
- Start on appropriate IV or IM antibiotics.

Monitoring

If the initial blood glucose was low, repeat the measurement after 30 minutes.

- If blood glucose falls to < 3 mmol/liter (< 54 mg/dl), repeat the 10% glucose or oral sugar solution.
- If the rectal temperature falls to < 35.5 °C, or if the level of consciousness deteriorates, repeat the Dextrostix® measurement and treat accordingly.

Prevention

- Feed every 2 hours, starting immediately or, when dehydrated, rehydrate first. Continue feeding throughout the night.
- Encourage mothers to watch for any deterioration, help feed and keep the child warm.
- Check on abdominal distension.

9.2.2 Hypothermia

Hypothermia is very common in malnourished children and often indicates coexisting hypoglycaemia or serious infection.

Diagnosis

- If the axillary temperature is < 35°C or does not register on a normal thermometer, assume hypothermia. When a low-reading thermometer is available, take the rectal temperature (< 35.5°C) to confirm hypothermia.

Treatment

All children with hypothermia should be treated routinely for hypoglycaemia and infection.

- Feed the child immediately and then every 2 hours unless they have abdominal distension; if dehydrated, rehydrate first.
- Re-warm the child: Make sure the child is clothed (especially the head); cover with a warm blanket and place a heater (not pointing directly at the child) or lamp nearby, or put the child on the mother's bare chest or abdomen (skin-to-skin) and cover them with a warm blanket and/or warm clothing.

Keep the child away from draughts.
- Give appropriate IV or IM antibiotics.

Monitoring
- Take the child's rectal temperature every 2 hours until it rises to > 36.5 °C. Take it every 30 minutes if a heater is being used.
- Ensure that the child is covered at all times, especially at night. Keep the head covered, preferably with a warm bonnet, to reduce heat loss.
- Check for hypoglycaemia whenever hypothermia is found.

Prevention
- Feed immediately and then every 2–3 hours, day and night.
- Place the bed in a warm, draught-free part of the ward, and keep the child covered.
- Use the Kangaroo technique for infants , cover with a blanket and let the mother sleep with child to keep the child warm. Avoid exposing the child to cold (e.g. after bathing or during medical examinations).
- Change wet nappies, clothes and bedding to keep the child and the bed dry. Dry carefully after bathing, but do not bathe if very ill.
- Use a heater or incandescent lamp with caution.
- Do not use a hot water bottle or fluorescent lamp.

9.2.3 Dehydration

Diagnosis

Dehydration tends to be over-diagnosed and its severity overestimated in children with severe acute malnutrition because it is difficult to determine dehydration accurately from clinical signs alone. Assume that all children with watery diarrhoea or reduced urine output have some dehydration. It is important to note that poor circulatory volume or perfusion can co-exist with oedema.

Treatment
- Do not use the IV route for rehydration, except in cases of shock.
- Rehydrate slowly, either orally or by nasogastric tube, using oral rehydration solution for malnourished children (5–10ml/kg per hour up to a maximum of 12 hours).
- Give the ReSoMal rehydration fluid orally or by nasogastric tube, more slowly than you would when rehydrating a well-nourished child: – Give 5 ml/kg every 30 minutes for the first 2 hours.
  - Then give 5–10 ml/kg per hour for the next 4–10 hours on alternate hours, with F-75 formula.
- The exact amount depends on how much the child wants, the volume of stool loss and whether the child is vomiting.
- If not available then give half strength standard WHO oral rehydration solution with added potassium and glucose as per the Rehydration Solution for Malnutrition (ReSoMal) recipe, unless the child has cholera or profuse watery diarrhoea. If rehydration is still required at 10 hours, give starter F-75 (see recipes on pp. 212–3) instead of ReSoMal, at the same times. Use the same volume of starter F-75 as of ReSoMal.
- If in shock or severe dehydration but cannot be rehydrated orally or by nasogastric tube, give IV fluids, either Ringer's lactate solution with 5% dextrose or half-strength Darrow's solution with 5% dextrose.)

Monitoring

During rehydration the pulse rate should fall and urine start to be passed. The return of tears, a moist mouth, less sunken eyes and fontanelle, and improved skin turgor are also signs that rehydration is

proceeding, but many severely malnourished children will not show these changes even when fully rehydrated. Monitor weight gain. Monitor the progress of rehydration every 30 minutes for 2 hours, then every hour for the next 4–10 hours. Be alert for signs of over-hydration, which is very dangerous and may lead to heart failure.

Check for:
- Weight gain to ensure that it is not quick and excessive.
- Increase in respiratory rate.
- Increase in pulse rate.
- Urine frequency (has the child urinated since last checked?).
- Enlarging liver size on palpation.
- Frequency of stools and vomit. If you find signs of over-hydration (early signs are respiratory rate increasing by 5/min and pulse rate by 25/min), stop ReSoMal immediately and reassess after 1 hour.

Prevention

Measures to prevent dehydration due to continuing watery diarrhoea are similar to those for well-nourished children (*see treatment plan A*), except that ReSoMal fluid is used instead of standard ORS.
- If the child is breastfed, continue breastfeeding.
- Initiate re-feeding with starter F-75.
- Give ReSoMal between feeds to replace stool losses. As a guide, give 50–100 ml after each watery stool.

9.2.4 Electrolyte Imbalance

All severely malnourished children have deficiencies of potassium and magnesium, which may take about 2 weeks to correct. Oedema is partly a result of potassium deficiency and sodium retention. Do not treat oedema with a diuretic. Excess body sodium exists even though the plasma sodium may be low. Giving high sodium loads could kill the child.

Treatment
- The extra potassium and magnesium should be added to the feed during its preparation if not premixed.
- Standard therapeutic feeds contain premixed vitamins and minerals.
- When rehydrating, give low sodium rehydration fluid (ReSoMal).
- Prepare food without added salt.

9.2.5 Infection

In severe acute malnutrition, the usual signs of bacterial infection, such as fever, are often absent, yet multiple infections are common. Therefore, assume that all children with severe acute malnutrition have an infection on their arrival in hospital, and treat with antibiotics immediately. Hypoglycaemia and hypothermia are often signs of severe infection.

Treatment
- Give all severely malnourished children a broad-spectrum antibiotic.
- Choice of broad-spectrum antibiotics
  - o If the child has uncomplicated severe acute malnutrition, give oral amoxicillin for 5 days.
  - o If there are complications (hypoglycaemia, hypothermia or the child looks lethargic or sickly) or any other medical complication, give parenteral antibiotics:

	Medicine	Dose	Frequency	Duration	Codes
	Benzylpenicillin IM/IV	50 000 U/kg	Every 6 hours	2 days	A V
or	Ampicillin IV/IM	50mg/kg	8 hourly	2 days	A E
then	Amoxycillin po	25–40 mg/kg	8 hourly	5 days	A V
plus	Gentamicin IM/IV	7.5 mg/kg	once a day	7 days	B V

- ***Note:*** Metronidazole 7.5 mg/kg every 8 hours for 7 days may be given in addition to broad-spectrum antibiotics; however, the efficacy of this treatment has not been established in clinical trials.
- Treat other infections as appropriate.

9.2.6 Micronutrient deficiencies

All severely malnourished children have vitamin and mineral deficiencies. Although anaemia is common, do not give iron initially, but wait until the child has a good appetite and starts gaining weight (usually in the second week), because iron can make infections worse.

Multivitamins including Vitamin A and folic acid, zinc and copper are already present in F-75, F-100 and ready-to-use therapeutic food packets.

9.2.7 Cautious Feeding

Cautious feeding in stabilisation and transition phase to prevent death. Start feeding cautiously as soon as possible with small amounts of F-75, the "starter" formula until the child is stabilised.

- On the first day, give small amount of F-75 every 2 hours (12 feeds in 24 hours.). If the child is hypoglycemic, give ¼ of the 2-hourly amount every half-hour for the first 2 hours or until the child's blood glucose is at least 3mmol/l. feed also during the night.
- After the first day, give feeds every 3 hours.
  - Given the child's starting weight and the frequency of feeding, use a table to look up the amount needed per feed
  - If no oedema/oedema grade + and ++ give F75 130 ml/kg/day of F75
  - This amount of F-75 will give the child 100kcal/kg/day and 1to1.5g protein/kg/day. This amount is appropriate until the child is stabilised.
- If with oedema is +++, give 100 ml/kg/day for the amount of feed to give according to the patient's weight)
  - Feeding the child each child's feeding plan should be recorded on a 24-Hour Food Intake Chart
  - Feed with a cup and a saucer (and spoon, if needed). Encourage the child to finish the feed.
  - Feed a very weak child with a dropper or syringe. Do not use a feeding bottle.
  - never leave the child alone to feed.
  - Encourage breastfeeding.Ensure that the child still gets the required feeds of F-75 even if breastfed.
- Feeding children who have diarrhoea and vomiting
  - If child keeps vomiting, offer half the amount of feed twice as often. For example, if the child is supposed to take 40 ml of F-75 every 2 hours, offer half that amount (20 ml) every hour until vomiting stops.
- Nasogastric tube (NGT) feeding
  - Use NGT feeding if child is very weak, has painful mouth ulcers, does not take 80% of the feeds for 2-3 consecutive feeds, has pneumonia, has cleft lip/ palate or shows disturbed level of consciousness.
  - At each feed, give the F-75 orally first, then give the remaining amount by NGT.

  - Remove the NGT tube when the childt akes 80% of the day's amount orally or two consecutive feeds fully by mouth.
  - Record intake and output on a 24-Hour Food Intake Chart
- Transition Phase
  - Transition prepares patients for the rehabilitation/catch up growth phase
  - During this phase, the dietary treatment changes.
  - The duration of treatment in the transition phase is two-to-three days on average and involves:
    - Recognising readiness for transition by return of appetite (easily finishes 3 hourly feeds of F75), reduced / minimal oedema (+ /++).
    - Beginning giving RUTF slowly and gradually by performing an acceptance test.
    - Transitioning children from F-75 to RUTF, using any of the two approaches

- Transfer from Transition phase back to Stabilisation phase if;
  - Re-occurrence/deteriorating of medical complications
  - Loss of appetite and not taking 80% of the prescribed feeds
  - Increasing /development of oedema
  - Significant re-feeding diarrhoea resulting in weight loss
- Progression from Transition to OutPatient Care (OTP)
  - The criteria for transfer from transition to OTP is based on improvements in the child's condition.

For children 6-59 months referral to outpatient care to continue treatment until full recovery the following is considered:

  - Good appetite (if the patient passes the acceptance test and takes more than 80 percent ofthe daily ration of RUTF)
  - Reduced/minimal/no oedema (++/+/no oedema)
  - Medical complications have been resolved
  - Clinically well and alert

9.2.8 Catch-up growth feeding

Children in the catch-up phase should, in most cases, be managed as outpatients. Signs that a child has reached rehabilitation phase for catch-up growth are:

- return of appetite, no episodes of hypoglycaemia (metabolically stable) and reduced or disappearance of all oedema.

Treatment

- Make a gradual transition from starter F-75 to catch-up formula F-100 or ready-to-use therapeutic food over 2–3 days, as tolerated.
- Replace F-75 with an equal amount of F-100 for 2 days.
  - On the third day if on F-100, increase each successive feed by 10ml until some feed remains uneaten or intake reaches 200ml/kg per day.
- **OR**: Use RUTF: – Start with small but regular meals of RUTF and encourage the child to eat often.
- If the child cannot take at least half of the recommended amount of RU amounts.
- If still breastfeeding, offer breast milk first before every RUTF feed. After the transition phase, refer the child for rehabilitation in outpatient care or to a community feeding programme
- After the transition phase, refer the child for rehabilitation in outpatient care or to a community feeding programme.

9.2.9 Sensory stimulation

Provide:
- Tender loving care
- A cheerful and stimulating environment
- Structured play therapy for 15–30 minutes per day
- Physical activity as soon as the child is well enough
- Support for as much maternal involvement as possible (e.g. Comforting, feeding, bathing, playing).

9.2.10 Discharge and follow-up

Transfer to outpatient care

Children admitted to hospital with complicated severe acute malnutrition can be transferred to outpatient care during the rehabilitation phase. Social factors, such as loss of earnings for the mother and care for other children, should also be taken into account, as should the fact that those without complications can be managed as outpatients or in the community. Carefully assess the child and the available community support.

The child will require continuing care as an outpatient to complete rehabilitation and prevent relapse. The decision to transfer children to outpatient care should not be based on achievement of specific anthropometric or weight-for-height/length outcomes.

Children should be discharged from hospital to outpatient or a nutritional programme when:
- They have completed parenteral antibiotic treatment, and are clinically well and alert, medical complications are resolved, their appetite has fully recovered, and they are eating well and oedema has reduced or resolved.

Discharge from nutritional treatment

Children with severe acute malnutrition should be discharged from the nutritional treatment programme only when their:
- Weight-for-height/length is at least ≥ -2 Z score and they have had no oedema for at least 2 weeks, or
- Mid-upper-arm circumference is ≥ 125 mm and they have had no oedema for at least 2 weeks.

CHAPTER 10

HAEMATOLOGICAL CONDITIONS

10.1 Anaemia

Anaemia is defined as the reduction of haemoglobin for age and sex of the individual (i.e., <13 g/dL in adult males, <12 g/dL in adult females and in children indicated below:

Lower limits of normal haemoglobin

Age	Hb (g/dL)
Birth	13.5
6 weeks	9.5
3 months	10.0
6–12 months	10.5
12 – 18 months	10.5
18 months – 4 years	11.0
4 – 7 years	11.0
7 – 12 years	11.5
12 years and older	12)F); 13 (M)

It is clinically recognised by pallor, tiredness and shortness of breath. It is commonly caused by nutritional deficiency of iron, folate or vitamin B12 deficiency, chronic systemic disease or chronic blood loss. The underlying cause should at all times be evaluated.

10.1.1 Iron deficiency anemia

Results from iron deficiency caused by chronic blood loss or poor nutritional intake. The typical blood picture, with FBC and peripheral blood smear, is hypochromia and microcytosis (low MCV and low MCH) and low serum ferritin.

Treatment

	Medicine	Dose	Frequency	Duration	Codes
	Ferrous sulphate po	200mg	Twice daily	3 months	A E
In children	Ferrous sulphate po	200mg	Twice daily	3 months	A E

***NB:* sepsis must be excluded prior to iron treatment. Treat for intestinal helminths in children**

	Medicine	Dose	Frequency	Duration	Codes
For children 1-2 years	Mebendazole po	100mg	Twice daily	3 days	A E
For children >2 years	Mebendazole po	500mg	Single dose		A E

Caution

- Iron is extremely toxic in overdose, particularly in children
- All medication should be stored out of reach of children

Prophylaxis

All preterm babies, day15 to 1 year:

	Medicine	Dose	Frequency	Duration	Codes
	Elemental iron po	2mg/kg	Once daily	3 months	A E
For formula-fed babies	Multivitamin drops	0.3ml	Once daily	3 months	A N
For breastfed babies	Multivitamin drops	0.6ml	Once daily	3 months	A N

Refer

- o Patients with poor response to the above treatment
- o Gastroscopy and or colonoscopy should be considered in adult males and postmenopausal women with poor response to the above treatment
- o Gynaecological evaluation should be considered in women with heavy menses

10.1.2 Megaloblastic anaemia

It is caused by a deficiency of folate and vitamin B12.
The typical blood picture is that of macrocytosis (elevated MCV) and pancytopenia can result in severe cases. Several medicines may cause a macrocytic anaemia in the absence of folate or vitamin B12 deficiency (e.g. zidovudine).

Treatment

	Medicine	Dose	Frequency	Duration	Codes
Folate deficiency	Folic acid po	5mg	Once daily	3 months	A N
Vit. B12 deficiency	Vit. B12 IM	1mg	Once daily for 5 days, then once a week for 3 weeks, once every second month in pernicious anaema		B N
For breastfed babies	Multivitamin drops	0.6ml	Once daily	3 months	A N

Folate and iron supplementation is recommended along with Vitamin B12 injection until the haemoglobin has normalised (usually 1 to 2 months).

Nonpharmacological management
Advise patient to eat a balanced diet (i.e., plenty of leafy foods, beans, liver, meat, eggs, fish).

10.2 Haemostatic and bleeding disorders

A bleeding disorder that may result from a coagulation defect, a vessel defect and a platelet defect.
May present from birth or acquired later in life.

Common causes

- Liver disease
- Vitamin K deficiency, especially in newborns
- Drug-induced—herbal preparations, prednisolone, NSAIDs (e.g., aspirin, ibuprofen)
- Bone marrow malignancy (e.g., leukemia)
- Haemophilia
- Severe septicemia resulting in DIC

Nonpharmacological management

- Apply pressure dressing to minimise bleeding where possible.

Pharmacological management

	Medicine	Dose	Frequency	Duration	Codes
In bleeding newborns	Phytomenadione/ Vitamin K IM/IV	1mg for term babies and 0.5mg for preterm babies irrespective A E of history of Vit K inj. Transfuse with fresh whole blood if patient is severely anaemic or in shock.			A E
In older children	Phytomenadione/ Vitamin K IM/IV	3-5mg in cases of liver damage plus fresh frozen plasma or fresh whole blood in severe anaemia or shock.			A E
In adults	Phytomenadione/ Vitamin K mg	10mg in cases of liver damage plus fresh frozen plasma or fresh whole blood in severe anaemia or shock.			A E

Stop any medications thought to be responsible for bleeding or which may aggravate bleeding (see "Common causes" above).

Inherited Bleeding Disorders

- Include Haemophilia A, Haemophilia B and von Willebrand's disease
- These are caused by lack of clotting factors VIII, IX and von Willebrand factor, respectively
- Complications include haemarthrosis which leads to chronic arthropathy, intracranial haemorrhage, soft tissue and muscle haematomas
- Such patients require management and follow up at a hospital level of care
- Avoid taking blood from femoral veins, avoid using central lines, do not aspirate joints, avoid IM injections, and avoid aspirin and NSAIDs.

Treatment

- Replace the appropriate factor (Factor VIII/Factor IX / Cryoprecipitate or FFPs) (V/B), as required, for minor and major bleeding.

Acquired bleeding disorders

Disseminated Intravascular Coagulation (DIC)

- DIC is characterised by systemic activation of blood coagulation with fibrin generation and deposition, leading to microvascular thrombi, resulting in organ or multi-organ dysfunction.
- The consumption of platelets and clotting factors can lead to significant bleeding.
- DIC is a complication of an underlying disorder

Management

- Identify the underlying cause
- Replace haemostatic factors with cryoprecipitate (1 unit/10 kg) (V/B) or IV fresh frozen plasma, FFP (V/B) (15 ml/kg) if bleeding
- Repeat the above replacement every 8 to 12 hours, if the patient continues to bleed.
- Monitor PT/INR, APTT, platelet count and fibrinogen levels
- Platelet transfusion should be given if patient is bleeding and the platelet count is below 20 x 10^9.

Refer

- After stabilisation, refer all patients to specialist for further evaluation.
- Refer any patients requiring surgery.

10.3 Coagulation disorders

Venous thromboembolic disease (VTE) comprises deep vein thrombosis (DVT) and pulmonary thromboembolism (PE).

10.3.1 Deep venous thrombosis

- Characterised by lower (or upper) extremity swelling, tenderness and warmth to touch of the involved limb.
- Diagnosis is primarily clinical and confirmed by Doppler ultrasound or other imaging

Pulmonary thromboembolism

- Characterised by sudden onset of shortness of breath, pleuritic chest pain, cough, haemoptysis.
- Cardiovascular collapse with hypotension and syncope may result with massive PE.
- Tachypnoea, tachycardia, prominent P2 along with cyanosis and fever may be present.
- Patients need to be managed at High Care Unit or Intensive Care.

Treatment for DVT

	Medicine	Dose	Frequency	Duration	Codes
	Warfarin po	5mg	Once daily	3 months then review	B E
			Monitor INR every 48 hours until therapeutic range is achieved (INR of 2 – 3) Overlap warfarin with heparin at initiation of therapy (for at least 5 days).		
Use with	Unfractionated heparin sc	333 units/kg at once, then 250 units/kg every 12 hours for 5 days.			B V
or	Enoxaparin sc	1mg/kg	Twice daily	5 days	B V

Continue warfarin for 3 months, if the precipitating cause has resolved. Specialist review is recommended for unprovoked VTE.

Treatment for Pulmonary Embolism

	Medicine	Dose	Frequency	Duration	Codes
	Unfractionated heparin iv		80 units/kg at once, then 18 units/kg/hr target APTT 2-3 times above baseline		B V
or	Enoxaparin sc	1mg/kg	Twice daily		B V
plus	Warfarin po	5mg	Once daily	Review	B E

Warfarin overdose

If INR is between 4.5 –7.0 and no hemorrhage, withhold warfarin for 1-2 days and review with repeat INR.

	Medicine	Dose	Frequency	Duration	Codes
Where bleeding risk is high	Vitamin K po	1-2.5mg	Daily	Review	A V

If INR is above 7.0 with no hemorrhage,

	Medicine	Dose	Frequency	Duration	Codes
Withhold Warfarin, monitor INR daily	Vitamin K po	5mg	Daily	Review	A V
or	Vitamin K iv	1mg	Slowly daily	Review	A V

NB: In patients with metallic cardiac valves use vitamin K with caution.

10.3.2 Haemophilia

It is a rare inherited genetic disorder in which the ability of the ability of the blood to form clots is severly impared. Haemophiliacs therefore bleed for longer after injury, easily bruise and are at a high risk of haemathrosis and intracranial bleeding.

Haemophilia A:
Also known as the classic Haemophilia or Factor VIII deficiency. It is the most common type.

Haemophilia B:
This is due to low levels of Factor IX.

10.4 Sickle cell disease

- Sickle cell disease is an inherited disorder characterised by the presence of a mutated form of hemoglobin, hemoglobin S (HbS).
- Red blood cells containing homozygous HbS (HbSS) are prone to repeated sickling when exposed to low oxygen conditions and ultimately assume the sickled shape.
- Individuals with sickle cell trait have < 50% HbS and are usually asymptomatic.

Characteristic features of Sickle cell disease
- Hemolytic anaemia
- Painful vaso-occlussive crises
- Multiple organ damage from microinfarcts affecting the heart, spleen, bones and the central nervous system

Symptoms and signs
- Joint and bone pain, especially during cold wet seasons
- Periodic jaundice
- Abdominal pain, especially in the splenic area
- Spontaneous sustained erection without sexual arousal in male patients (priapism) may occur
- Jaundice
- Pallor
- Hepatomegaly
- Splenomegaly
- There may be old or recent scarification marks suggesting the long history of the illness.

Diagnosis
- FBC
- Sickling test

Confirmatory test
- Haemoglobin electrophoresis

Other ancillary laboratory investigations useful in detection and monitoring of the disease include:
- FBC – macrocytosis may indicate increased reticulocytosis or compliance with hydroxyurea therapy
- Reticulocyte count – usually ranges from 5 – 15 % in sickle cell disease
- Peripheral blood film – may show irreversibly sickled red cells, polychromasia, occasional nucleated red cells, and schistocytes, as well as Howel-Jolly bodies. Target cells may be seen as well.
- Biochemical changes include – high LDH, low haptoglobulin, high total and indirect bilirubin and high AST.

Pharmacological management
The patient may present in crisis, in the steady state, or with complications.

Crisis—
- Make a prompt determination of the precipitating cause (e.g., infection, malaria), and begin treatment.
- Hydration: encourage oral fluids first. Give IV fluids if patient is unable to drink well, has severe pain, abdominal symptoms or is not settling.

Body weight (Kg)	Fluids (ml/kg/day)
< 10	150ml/kg/day
11–20	75 ml/kg/day for every kg above 10 kg ADDED to 1500ml for the first 10kg of weight
>20	30ml/kg for every kg above 20 kg ADDED to 2250ml for the first 20 kg of weight

Divide the total daily volume by 24 hours to obtain the hourly fluid rate.
- Give IV fluid and electrolyte therapy (usually glucose in Sodium Chloride):

	Medicine	Dose	Frequency	Duration	Codes
Children	4.3% glucose in 0.18% Sodium Chloride IV	According to weight		Review	A V

For analgesia
- Give pain relievers such as paracetamol (A) PO or suppository, every 6–8 hours or ibuprofen (A) PO every 8 hours.

Pain Reliever Dosage for Sickle Cell Disease Patients in Crisis

Age of Patient	Paracetamol (A)	Ibuprofen (A)
Children	60–120mg (2.5 – 5mL syrup)	50 –100mg (from 9 months)
3 months to 1 year	120 – 250mg (5 – 10mL syrup)	100 – 200mg
6 – 12 years	250 – 500mg	200 – 400mg

In severe pain

	Medicine	Dose	Frequency	Duration	Codes
Children	Pethidine IM	0.5–2mg/kg	Every four hours as required		B E

Blood Transfusion
- Blood transfusion when needed, but not routinely. (Transfusion will be necessary if haemoglobin level is <5 g/dL.)
- Packed red blood cells at 15 ml/kg

Infection

	Medicine	Dose	Frequency	Duration	Codes
	Ceftriaxone IV/IM	25–100mg	Once daily	3 days	B E
Prophylaxis in children	Phenoxymethylpenicillin po	<5 years = 125mg >5 years = 250mg	Twice daily	For life	A V

Prophylaxis against infection is given to all children, because functional asplenia is present by 1 – 2 years of age. Routine vaccination during infancy.

Catch up conjugate pneumococcal vaccine if < 12 months of age; 3 dose series. If > 12 months of age and older: 2 doses given 8 weeks apart.
Pneumococcal polysaccharide vaccine at 2 years (at least 8 weeks after conjugate vaccine) Repeat vaccination as a booster at 5 years after initial dose.
Annual influenza vaccination is recommended.

Supportive Care and Prevention of Complications

- Advise patient to maintain a good nutritional state.
- Advise patient to seek prompt treatment of infections.
- Encourage drinking plenty of fluids.
- Advise patients to avoid precipitating causes of crises when possible
- Educate patient to inform health workers about their condition.
- Encourage periodic check-ups at the sickle cell clinic.

	Medicine	Dose	Frequency	Duration	Codes
Supplements	Folic acid po	5mg (<1 year give 2.5mg)	Daily	For life	A E

Prevention

- Advise patient to avoid precipitating causes of crisis, if possible (e.g., malaria, pneumonia, exposure to cold weather, other infections).
- Educate patient to tell doctor he has sickle cell disease SC, SS, or other form.
- Encourage patient to get genetic counselling.

Refer all patients with complications such as bleeding into the eye, aseptic necrosis of the hip, priapism, haematuria, stroke, and osteomyelitis.

Hydroxyurea may be initiated in patients who meet specific criteria at a specialist level of care.

Indications for hydroxyurea include the following:

- Frequent painful episodes (six or more per year)
- History of acute chest syndrome
- History of other severe vaso-occlusive events
- Severe symptomatic anemia
- Severe unremitting chronic pain that cannot be controlled with conservative measures
- History of stroke or a high risk for stroke

	Medicine	Dose	Frequency	Duration	Codes
	Hydroxyurea po	Start: 15 mg/kg/day as single dose; monitor patient's blood count every two weeks. Titrate by 5 mg/kg/day every 12weeks			S E

CHAPTER 11

FEVER

Special attention should be paid to children presenting with fever. The main aim is to differentiate serious, treatable infections from mild self-resolving febrile illness.

History

- Duration of fever
- Residence in or recent travel to an area with malaria transmission
- Recent contact with a person with an infectious disease
- Vaccination history
- Skin rash
- Stiff neck or neck pain
- Headache
- Convulsions or seizures
- Pain on passing urine
- Ear pain.

Examination for details see Tables A-C.

- *General:* drowsiness or altered consciousness, pallor or cyanosis, or lymphadenopathy
- **Head and neck:** bulging fontanelle, stiff neck, discharge from ear or red, immobile ear-drum on otoscopy, swelling or tenderness in mastoid region
- *Chest:* fast breathing (pneumonia, septicaemia or malaria)
- Abdomen: enlarged spleen (malaria) or enlarged liver
- *Limbs:* difficulty in moving joint or limb (abscess, septic arthritis, osteomyelitis, rheumatic fever)
- Skin rash
- Pustules, or signs of infection: red, hot, swollen, tender (staphylococcal infection)
- Haemorrhagic rash: purpura, petechiae (meningococcal infection, dengue)
- Maculopapular rash (measles, other viral infections)

Laboratory investigations

- Oxygen saturation, blood smear, urine microscopy and culture, full blood count, lumbar puncture if signs suggest meningitis and blood culture.

Differential diagnosis

The four major categories of fever in children are:

- Due to infection, with non-localised signs (Table A)
- Due to infection, with localised signs (Table B)
- With rash (Table C)
- Lasting longer than 7 days.

Table 19A: Differential Diagnosis of fever without localising signs

Diagnosis	Clinical Observations
Septicaemia	• Seriously ill with no apparent cause • Purpura, petechiae • Shock • Hypothermia in a young infant or severely malnourished child
Urinary tract infection	• Abdominal pain • Loin or suprapubic tenderness • Crying on passing urine • Passing urine more frequently than usual • Incontinence in previously continent child • White blood cells and/or bacteria in urine on • Microscopy, or positive dipstick
Typhoid	• Seriously ill with no apparent cause • Abdominal tenderness • Shock - Confusion
Malaria (in endemicarea)	• Positive blood film or rapid diagnostic test for • Malaria parasites • Anaemia - Enlarged spleen
Fever associated with HIV infection	• – Signs of HIV infection *(see Chapter on HIV infection)*

Table 20B: Differential diagnosis of fever with localised signs

Diagnosis	Clinical Observations
Meningitis	• Multiple or complicated convulsions • Altered level of consciousness • Lumbar puncture positive • Stiff neck • Bulging fontanelle in infancy • Meningococcal rash (petechial or purpuric)
Otitis media	• Red immobile ear-drum on otoscopy • Pus draining from ear - Ear pain
Mastoiditis	• Tender swelling behind the ear
Osteomyelitis	• Local tenderness • Refusal to move the affected limb • Refusal to bear weight on leg
Septic arthritis	• Joint hot, tender, swollen
Acute rheumatic fever	• Migratory joint pains • Heart murmur(s)
Skin and soft tissue infection	• Cellulitis • Skin boils • Pustules • Pyomyositis (purulent infection of muscles)

Table 20B: Differential diagnosis of fever with localised signs (continued)

Diagnosis	Clinical Observations
Pneumonia	• Cough with fast breathing • Lower chest wall in drawing • Grunting • Nasal flaring • Coarse crackles, consolidation, effusion
Viral upper respiratory tract infection	• Symptoms of cough or cold • No systemic upset
Retropharyngeal abscess	• Sore throat in older children • Difficulty in swallowing, drooling of saliva • Tender cervical nodes
Sinusitis	• Facial tenderness on percussion over affected sinus • Foul nasal discharge
Hepatitis	• Severe anorexia • Abdominal pain • Jaundice with dark urine

Table 21C: Differential diagnosis of fever with rash

Diagnosis	Clinical Observations
Measles	• Typical rash • Cough, runny nose, red eyes • Mouth ulcers • Corneal clouding • Recent exposure to a measles case • No documented measles vaccination
Viral infections	• Mild systemic upset • Cough or cold • Mild systemic upset • Transient non-specific rash

Treatment is mostly supportive.

Fever lasting longer than 7 days

Table 22 Differential diagnoses of fever lasting longer than 7 days

Dagnosis	In Favour
Abscess	• Fever with no obvious focus of infection (deep abscess) • Tender or fluctuant mass • Local tenderness or pain • Specific signs depend on site, e.g. subphrenic, psoas, retroperitoneal, lung, renal
Salmonella infection (non-typhoidal)	• Child with sickle-cell disease • Osteomyelitis or arthritis in infant

Table 22: Differential diagnoses of fever lasting longer than 7 days (continued)

Diagnosis	Clinical Observations
Infective endocarditis	• Weight loss • Enlarged spleen • Anaemia • Heart murmur or underlying heart disease • Petechiae • Splinter haemorrhages in nail beds • Microscopic haematuria • Finger clubbing
Rheumatic fever	• Heart murmur, which may change over time • Arthritis or arthralgia • Cardiac failure • Persistent, fast pulse rate • Pericardial friction rub • Chorea • Recent known streptococcal infection
Miliary TB	• Weight loss • Anorexia, night sweats • Enlarged liver and/or spleen • Cough • Tuberculin test negative • Family history of TB • Fine miliary pattern on chest X-ray

Symptomatic relief of fever, use paracetamol 15mg/kg p.o. Use Paracetamol suppository or IV paracetamol if the child is unable to tolerate oral intake.

CHAPTER 12

SEIZURES / CONVULSIONS

A sudden uncontrolled electrical disturbance in the brain which can cause change in movement or feeling, behaviour and level of consciousness.

Febrile seizure: a seizure which is associated with fever in a child 6 to 60 months of age.
- Simple – generalised, lasts < 15 minutes, does not recur in 24 hour period.
- Complex – focal, lasts > 15minutes, recurs in a 24 hour period.

Epilepsy: 2 or more unprovoked seizures (recurrent).

Status epilepticus: seizures that continue for more than 30 minute or recur without regaining consciousness.

Table 23: Etiologies /causes

Past neonatal conditions	Infections	Poisoning
• Hypoxic –ischemic damage • Congenital infection • Trauma • Cerebral haemorrhage or thrombosis • Cerebral malformations	• Meningitis • Encephalitis • Brain abscess • Febrile convulsions	• Accidental ingestion of medicines • Environmental toxins
Metabolic conditions	**Systemic disorders**	**Cerebral causes**
• Hypoglycemia • Hypocalcemia • Hypomagnesemia • Hyponatremia • Hypernatremia • Inborn errors of metabolism	• Vasculitis • Hypertensive encephalopathy • Uremia(renal failure) • Hyperammonemia (liver failure)h	• Trauma • Genetic/familial(syndromic) • Thrombosis • Hemorrhage • Tumor • Idiopathic

Investigations

Basic investigations
- Blood glucose
- RDT
- FBC
- Electrolytes(Na, Ca, Mg)
- Blood culture in febrile child
- Lumbar puncture if meningitis is suspected and for the first febrile seizure in child < 2 year old.
- CT- scan of the brain, if persistently reduced coma scale (GSC < 12/15) without known cause, raised ICP or focal intracranial pathology is suspected.
- EEG: fro-recurrent or syndromic seizures where diagnosis can't be made on clinical grounds alone.
- NB- non febrile seizures include LFT, RFT ,VDRL/RPR, toxicology screening.

Always consider hypoglycemia as a primary or aggravating cause of any seizure

Acute management of seizures

Time (min) Intervention
- ***0–5 Stabilse the patient***
  - o Assess airway, breathing, circulation, and vital signs
  - o Administer oxygen
  - o Obtain intravenous or intraosseous access
  - o Consider hypoglycaemia, thiamine deficiency, intoxication (dextrose, thiamine, naloxone may be given immediately if suspected)

- o Obtain laboratory studies: Consider glucose, electrolytes, calcium, magnesium, blood gas, CBC, BUN, creatinine, and LFTs, toxicology screen, anticonvulsant levels, blood culture (if infection is suspected)
- o Initial screening history and physical examination

- ***5–15 Begin pharmacotherapy***

	Medicine	Dose	Frequency	Duration	Codes
	Lorazepam IV	0.05-0.1mg/kg up to 4-6mg	repeat in 5-10mins		B E
or	Diazepam IV	0.2-0.5mg/kg (0.5mg/kg rectally)	repeat in 5-10mins		A E
	if seizure persists, load with Fosphenytoin IV/IM	15–20 mg PE/kg IV/IM at 3 mg PE/kg/min. via peripheral IV live (max. 150 mg PE/min). If given IM, may require multiple dosing sites			C N
plus	Phenytoin IV	15-20 mg/kg	at rate not to exceed 1 mg/kg/min via central line		B V
or	Phenobarbital IV	15–20 mg/kg IV at rate not to exceed 1 mg/kg/min		7 days	B E

- ***25–40 If seizure persists:***

	Medicine	Dose	Frequency	Duration	Codes
	Levetiracetam IV	20-30mg/kg			B E
plus	Sodium valproate IV	20mg/kg			B E

- o May give phenobarbital at this time if still convulsing at 5 minutes and
- o (fos) phenytoin previously used
- o Additional phenytoin or fosphenytoin 5 mg/kg over 12 hours. for goal serum level of 10 mg/L
- o Additional phenobarbital 5mg/kg/dose every 15–30 min (maximum total dose of
- o 30 mg/kg; be prepared to support respirations)

- ***If seizure persists,‡ consider pentobarbital, midazolam, or general anaesthesia in*** Intensive Care Unit. Avoid paralytics.

Long Term Treatment

Table 24: Maintenance therapy

Past neonatal conditions	1st line	2nd line
Generalised Tonic and/or Clonic	Valproate OR Phenobarbital (< 6 months old)	Lamotrigine (Specialist advice)
Partial	Carbamazepine	Lamotrigine
Infantile spasms	***Refer*** all	
Absence	Valproate	Lamotrigine
Myoclonic	Refer all for specialist investigation and initiation of therapy	

Anticonvulsants

- **Valporate:** Oral 5 mg/kg/dose, 8-12 hourly
- o Increase to 15-20mg/kg/dose: 8-12 hourly -Maximum total daily dose: 40mg/kg/day

- Exclude liver dysfunction prior to initiating therapy (at least ALT), in children under 2 years or if clinical suspicion of liver dysfunction.
- Monitor at least clinical for hepatotoxicity.

- **Carbamazepine:** oral, 2 mg/kg/dose (starting dose)
  - Increase slowly at 2 weekly intervals to 5-10 mg/kg/dose 8-12 hourly -Usual maintenance total daily dose: 10-20 mg/kg
  - Maximum total daily dose: 20 mg/kg/day
  - Dosage intervals: Syrup 8 hourly, tablets 12 hourly.
  - Exacerbates myoclonic seizures and absence seizures.
- **Lamotrigine:** oral, 3-5 mg/kg/dose starting daily dose (specialist initiated)
  - Increase slowly at 2 weekly intervals to 1-5 mg/kg/dose 12-24 hourly
  - Maximum dose when given with valproate: 5 mg/kg/day
  - Lamotrigine is given as add-on therapy for different seizure types and in drug-resistant paediatric epileptic syndromes, such as *Lennox Gastaut Syndrome*.
  - Double the dose of lamotrigine when using carbamazepine or Phenobarbitone and halve the dose when using valproate.
- **Phenobarbitone:** oral, 3-5 mg/kg/dose as single dose at night.
  - May be used in children under six months of age.
  - Is not recommended as maintenance therapy for children older than 2 years due to undesirable side effects such as sedation, behaviour disturbances, hyperkinesias and dependence, except in situations where there is poor adherence to other drugs.
  - Exacerbates absence seizures.

CHAPTER 13

BACTERIAL MENINGITIS

(Infants>12 months)

Bacterial meningitis is a serious illness that is responsible for considerable morbidity and mortality. No single clinical feature emerges as sufficiently distinctive to make a robust diagnosis, but a history of fever and seizures with the presence of meningeal signs and altered consciousness are common features of meningitis. The possibility of viral encephalitis or tuberculous meningitis must be considered as differential diagnoses in children with meningeal signs.

Diagnosis

- **Look for a history of:** convulsions, vomiting, inability to drink or breastfeed, a headache or pain in the back of neck, irritability or a recent head injury.
- **On examination, look for:** altered level of consciousness, neck stiffness, repeated convulsions, bulging fontanelle in infants, non-blanching petechial rash or purpura, lethargy, irritability, evidence of head trauma suggesting possible recent skull fracture.
- Also look for any of the following signs of raised intracranial pressure:
- Decreased consciousness level, unequal pupils, rigid posture or posturing, focal paralysis in any of the limbs and irregular breathing.

Laboratory investigations

- Confirm the diagnosis with a lumbar puncture and examination of the CSF. If the CSF is cloudy, assume meningitis and start treatment while waiting for laboratory confirmation.
- Microscopy should indicate the presence of meningitis in the majority of cases with a white cell (polymorph) count < 100/mm^3. Confirmation can be obtained from CSF glucose (low: < 1.5 mmol/liter or a ratio of CSF to serum glucose of ≤ 0.4), CSF protein (high: > 0.4 g/liter) and Gram staining and culture of CSF, where possible.
- Blood culture if available.

Contraindications to Lumbar puncture

- Signs of raised intracranial pressure (unequal pupils, rigid posture or paralysis in any of the limbs or trunk, irregular breathing).
- Skin infection in the area through which the needle will have to pass.

Precaution:

If contraindications are present, the potential value of the information from a lumbar puncture should be carefully weighed against the risk of the procedure. If in doubt, it might be better to start treatment for suspected meningitis and delay performing a lumbar puncture.

Treatment

- Start treatment with antibiotics immediately before the results of laboratory CSF examination if meningitis is clinically suspected or the CSF is obviously cloudy. If the child has signs of meningitis and a lumbar puncture is not possible, treat immediately.

Antibiotic treatment

	Medicine	Dose	Frequency	Duration	Codes
	Ceftriaxone IM/IV	50 mg/kg per dose IM or IV every 12 hrs; or 100 mg/kg once daily for 10 days administered by deep IM injection or as a slow IV injection over 30–60 min.			B V
or	Cefotaxime IV	50 mg/kg per dose IM or IV	Every 6 hours	10 days	B E

- Give first line antibiotic treatment as soon as possible.
- Review therapy when CSF results are available.

- If the diagnosis is confirmed, continue with parenteral antibiotics to complete treatment as above.
- Once the child has improved, continue with daily injections of third-generation cephalosporins to complete treatment.

If poor response

- Consider the presence of common complications, such as subdural effusions (persistent fever plus focal neurological signs or reduced level of consciousness) or a cerebral abscess. If these are suspected, refer the child to a hospital with specialised facilities for further management.
- Look for other sites of infection that may be the cause of fever, such as cellulitis at injection sites, arthritis or osteomyelitis. Repeat the lumbar puncture after 3–5 days if fever is still present and the child's overall condition is not improving, and look for evidence of improvement (e.g. fall in leukocyte count and rise in glucose level).

Steroid treatment

Steroids offer some benefit in certain cases of bacterial meningitis (H. influenza, tuberculous and pneumococcal) by reducing the degree of inflammation and improving outcome. The recommended dexamethasone dose in bacterial meningitis is 0.15 mg/kg every 6 h for 2–4 days. Steroids should be given within 10–20 min before or during administration of antibiotics. There is insufficient evidence to recommend routine use of steroids in all children with bacterial meningitis in developing countries, except in tuberculous meningitis.

Do not use steroids in:
Newborns, suspected cerebral malaria or suspected viral encephalitis.

CHAPTER 14

DIABETES MELLITUS

A syndrome of abnormal carbohydrate metabolism, associated with a relative or absolute impairment of insulin secretion with varying degrees of peripheral resistance to the action of insulin.

Type 1 diabetes mellitus

Most diabetic children have type 1 diabetes, and:

- have auto-immune destruction of the pancreatic beta cells as the underlying cause,
- have an absolute requirement for insulin therapy,
- will develop diabetic ketoacidosis (DKA) if not given insulin.

Diagnostic criteria

- Classical features of diabetes (polydipsia, polyphagia, polyuria, weight loss or failure to gain weight, weakness or tiredness, glycosuria, recurrent protracted infections, pruritis vulvae in a girl) with a random serum glucose concentration ≥11.1 mmol/L; or
- Fasting plasma glucose ≥7.0 mmol/L (fasting defined as no caloric intake for at least 8 hours);
- An oral glucose tolerance test is generally not needed.

General and supportive measures

- Refer to a unit that is able to manage type 1 diabetic patients.
- Educate the child and caregiver about all aspects of the disease.
- Medical alert bracelet should be worn at all times.
- Follow up by medical practitioner or at clinic/hospital at least every 1-3 months.
- Monitor thyroid function annually.
- Screen for coeliac disease at diagnosis, and 3 years post diagnosis.
- Annual screening for dyslipidemia, microalbuminuria, retinopathy and peripheral neuropathy 5 years after diagnosis in non-pubertal children and 2 years after diagnosis in pubertal children.

Diet: healthy lifelong eating habits

- ***Refer*** a newly diagnosed patient and family to a dietician.
- Principles of the prudent diet:
  - o Encourage children to reduce intake of fats and salt and to increase dietary fibre content
  - o Provide all diabetics with a meal plan, e.g. "constant carbohydrate meal plan" or "carbohydrates counting meal plan". There is no one 'diabetic' diet. Individualise the diet giving consideration to usual eating habits and other lifestyle changes required.

Six main nutrition factors contribute to better glucose control, i.e. lower HbA1c levels. These are:

- Following a meal plan. Keep day-to-day intake consistent.
- Avoiding extra snacks that are not part of the meal plan.
- Avoiding over-treatment of low blood glucose levels (hypoglycaemia).
- Prompt correction of high blood glucose levels.
- Adjusting insulin levels for meals in patients using the "carbohydrates counting meal plan".
- Consistency of night snacks.

Constant carbohydrate meal plan

- Consistency is the key. The amount of insulin, usually two or three doses per day, is kept relatively constant from day-to-day. Carbohydrates should be manipulated to match the relatively constant insulin dose. If able to count carbohydrates, give 1 unit of insulin per 15g of carbohydrate.
- The amount of carbohydrate (types can vary) is kept about the same for each meal and each snack from one day to the next.

- As part of the educational process, the family must get used to reading food labels to know grams (g) of carbohydrates being eaten. The dietician may suggest a range of carbohydrates for each meal.
- Examples of carbohydrate content of some foods

Table 25: The following foods have 15g of carbohydrate per serving: 1 cup = 250 mL

Food	Serving Size
Beans (cooked, canned)	½ cup
Bread (white, brown)	1 slice
Pap (cooked)	¼ cup
Soft maize porridge (cooked)	½ cup
Pasta (cooked)	½ cup
Potato (mashed)	½ cup
Rice (cooked)	⅓ cup
Apple (small)	1
Milk	1 cup
Fruit juice	½ cup
Grapes	½ cup (12 medium grapes)
Orange (small)	1
Banana (small)	1
Yoghurt (low fat, unsweetened)	1 cup
Pizza (thin-crust, medium size)	1/8 of medium pizza
Potato slap chips (not crisps)	8–12

- Tailor the advice to the patients' lifestyle, economic circumstances and usual diet and, where possible, avoid drastic changes.
- Do not forbid any particular food as this may lead to disturbed attitudes to food, e.g. carbohydrates are not forbidden but can be taken before exercise, incorporated into a main meal or used as a source of energy during illness when children have a poor appetite.
- Diet should provide adequate nutrition for growth and development.
- Dietary composition – it is recommended that:
  - approximately 35% of dietary energy should be derived from mono- and polyunsaturated fat,
  - 15% from protein,
  - 50% from carbohydrates. Carbohydrates should always provide at least 40% of the total calories.
- Timing of meals and snacks
  - Children receiving twice daily injections of combined short and intermediate acting insulin regimens need three main meals and three snacks (mid-morning, mid-afternoon and prior to bed time).
  - Eat meals and snacks at the same time each day. The timing of insulin injections may need to be adjusted according to the patient's own circumstances.
  - Pre-school aged children may have unpredictable eating habits and may require frequent small meals.

Exercise

- Regular exercise helps in increasing insulin sensitivity; maintains proper weight, blood pressure, blood glucose and blood lipid levels.
- Exercise must be regular, i.e. daily. The same amount of exercise should ideally be done at the same time of the day.
- Some form of carbohydrate is necessary before and after intense exercise to reduce the risk of hypoglycemia. Blood glucose monitoring may be necessary before and after intense exercise.

Blood glucose testing, record keeping and review of records

- Glucometers with compatible strips and bloodletting devices.
- Encourage children to perform their own finger-prick blood glucose testing.
- Finger prick should be performed at the side of the fingertips.
- Encourage the child to monitor his/her blood glucose prior to each main meal and at bedtime. A daily record of all tests performed should be recorded in a logbook. **Review logbook frequently to ensure optimal insulin adjustments.**
- More frequent blood glucose testing is indicated if the child is unwell, partaking in unusual amounts of physical activity or feels hypoglycemic.
- For a basal-bolus regimen, testing can be done up to 6 times a day (180 strips/month) and for other regimens, two to four times daily (60 - 120 strips/month). If control is poor, more frequent testing is recommended with appropriate adjustment to therapy.

Glycaemic targets

- Glycaemic targets for young children should not be as strict as for adults. Balance the ability of the family to avoid recurrent hypoglycaemia. A paediatrician should assist in setting practical goals. See table *"Monitoring, control and adjustments"*.
- Severe hypoglycaemia is the presence of recurrent and unpredictable hypoglycaemic episodes, requiring third party assistance. It leads to anxiety about repeated episodes and results in a poorer quality of life.
- Ideally 80% of the pre-meal blood glucose values should fall within the target range during home monitoring, but targets may need to be altered based on the age of the child and the ability of the family.
- Infants, toddlers, and preschoolers are unable to recognise or communicate signs and symptoms of low blood glucose. They also have unpredictable eating habits.
- Some school-age children and young adolescents have more predictable eating habits, but may be lacking in judgement. They are able to recognise or communicate signs and symptoms of low blood glucose.
- Most adolescents and young adults are able to recognise and treat low blood glucose reactions. They have predictable eating habits and are able to plan ahead.

Table 26: Acceptable target range before meals

Infants and toddlers	6– 12 mmol/L
School-age children and some young adolescents	4– 10 mmol/L
Most adolescents and young adults	4– 8 mmol/L

Acceptable target range before meals:

- Monitor HbA1c levels 3 monthly. The aim is to maintain HbA1C as close as possible to the recommended range, i.e. 6.5 - 7.5%. Aim for a lower HbA1C in patients who are adherent with regard to home glucose monitoring.
- In situations with polyuria, polydipsia and enuresis, adjust the doses of the insulin upwards. Dose adjustments should usually not be greater than 10% of the daily dose at any one time.
- Identify and address the specific reasons for hypoglycaemia, e.g. skipping meals or snacks. In specific situations where the lifestyle cannot be modified or there are recurrent episodes of severe hypoglycaemia, consider referral to a tertiary center.
- Consider hypoglycaemia unawareness in situations where there are consistently low readings and the patient does not report symptoms.
- Hypoglycaemia unawareness is dangerous. The insulin dose may need to be adjusted downwards if more than 30% of the readings during a single week are below the target values indicated.

Blood or Urine ketone testing

- Hyperglycaemia and a capillary beta-hydroxybutarate level > 3 mmol/L indicates that DKA is present. At levels of 0.6-0.3 mmol/L a mild DKA may still be diagnosed.
- If capillary beta-hydroxybutarate strips are not available, significant ketonuria (+++) and hyperglycaemia may also indicate that a DKA is present.
- Test capillary blood or urine for ketones in the following circumstances:
  - If vomiting occurs,
  - Any time the blood glucose > 15 mmol/l, especially if the child is unwell and particularly if the blood glucose has been high for more than 24 hours,
  - If unusual drowsiness is present,
  - In the presence of high temperature, vomiting or diarrhoea, even when the glucose is < 15 mmol/l,
  - If abdominal pains occur,
  - If the breathing is deep and rapid or smells of acetone.

Medicine treatment

Insulin therapy

Principles of insulin therapy:

- To provide sufficient insulin throughout the 24-hour period to cover basal requirements.
- To deliver boluses of insulin in an attempt to match the glycaemic effect of meals.
- The most suitable areas for insulin injection are:
  - The upper, outer area of the arms;
  - The front and side of the thigh;
  - The upper, outer surface of the buttocks; and
  - The abdomen, except the area close to the navel.
- Establish a pattern for injecting, i.e. horizontally or vertically. Vary the site of injection according to this pattern. When the area has been fully covered move to another area.
- Patients doing strenuous exercise should not inject into their legs.

Insulin injection technique

- Insulin injection by syringe is usually given into deep subcutaneous tissue through a two-finger pinch of skin at an angle of 45–90 degrees.
- The subcutaneous fat layer should be thicker than the needle length.

- There is significant risk of accidental intramuscular injections with more rapid absorption, especially in lean individuals. This can be minimised by using a two-finger pinch technique, an injection angle of 90 degrees and use of 5 mm needles rather than longer needles in all ages.
- Withdraw the needle and release the skin fold on the count of ten.
- Disinfection of the skin is not necessary prior to insulin injections, however injections should be given through clean, healthy skin.
- Needles should not be used for more than 6 injections.
- Prefilled insulin syringes are recommended for children. Pen devices delivering less than 1 unit should be available for selected patients.
- Thoroughly mix all insulin suspensions before injection by rolling or inverting the vial ten times so that the cloudy suspension mixes thoroughly and uniformly.

Choice of insulin regimen

- No insulin injection regimen satisfactorily mimics normal physiology.
- The choice of insulin regimen should be individualised and will depend on age, duration of diabetes, lifestyle (dietary patterns, exercise schedules, school, work commitments, etc.), targets of glycaemic control, and particularly, individual patient/family preferences.
- The choice of an insulin regimen is determined by the patient's circumstances. Depending on the patient's scope to undertake insulin therapy, a number of alternatives will allow insulin therapy to be tailored to their lifestyle. Discussion with parents should provide the basis for such important decisions.
- It is not possible to prescribe a single best regimen for preschool and primary school children. Individualise the choice of regimen according to family circumstances.
- Multiple daily injections provide for the best glycaemic control in young people with type 1 diabetes. If manageable, this should be the regimen of choice. Initially, a twice daily injection regimen may be more manageable.

Questions to be considered when choosing a regimen

- What is the patient's eating pattern?
- What is the typical pattern of meals?
- What type of food do they typically eat at each meal, and how much?
- Is their eating pattern relatively constant, or does it vary?
- Can and will they change their eating habits?
- All chosen insulin regimens should be supported by comprehensive education appropriate for the age, maturity and individual needs of the child and family.

Selecting an insulin regimen

Total daily insulin dose

- This is individualised and varies according to age, puberty development, stress and individual variability. Usual range is 0.5–1 units/kg/day, but may be higher or lower.
- The aim is to select a regimen that allows the achievement of glycaemic control without disabling hypoglycaemia. This also requires a comprehensive support programme for the child and family enabling the implementation of an appropriate diet and other care strategies. These include home blood glucose monitoring and the ability to recognise and manage hypoglycaemic episodes. Where glycaemic control is not achieved despite an adequate support programme consider referral to a tertiary center.

Insulin regimens

Consult with a paediatric endocrinologist or paediatrician with experience in diabetes care. Repeated consultations are indicated when glycaemic control targets are not achieved.

Basal-bolus regimen

- Short acting insulin 15–30 minutes before a meal or rapid acting insulin with main meals e.g. breakfast, lunch and main evening meal; intermediate acting insulin before bed.
- Normally, 30–40% of the total daily dose of insulin is given at bedtime as intermediate acting insulin. The remaining insulin is given prior to breakfast, lunch and evening meal in the form of short acting insulin.

Basal-bolus regimen

Short acting insulin is indicated in the child (especially < 5 years of age) with erratic eating habits despite adequate education.

Table 27: Insulin dosage regimen

Breakfast	Short acting insulin	20% of total daily dose (if able to count carbohydrates: give 1 unit per 15 g)
Lunch	Short acting insulin	20% of total daily dose
Supper	Short acting insulin	20% of total daily dose
At night (± 21h00)	Intermediate acting (ideally this ought to be a basal insulin acting over 24 hours)	40% of total daily dose

OR

Breakfast	Short acting insulin (30% of morning dose) + intermediate acting (70% of morning dose)	⅔ of total daily dose
Lunch	Short acting insulin (1/3 of evening dose)	⅓ of total daily dose
At night (± 21h00)	Intermediate acting (2/3 of evening dose)	⅓ of total daily dose

OR

Three injections daily

- A mixture of short and intermediate acting (premixed 70:30) insulin before breakfast; short acting insulin alone before an afternoon snack or main evening meal; intermediate acting insulin before bed; or variations of this regimen may be used at times.
- This requires that the caregiver is aware of three different insulin preparations and can differentiate between them.
- Three injections daily.

OR

- Two Injections daily.
- A mixture (premixed combination) of short and intermediate acting insulins (before breakfast and the main evening meal).
- The total daily dose is divided so that ⅔ is given in the morning and ⅓ in the evening.
- The morning or evening dose is then again split between the intermediate-acting and the short-acting insulin in a 70:30 ratio which is pre-mixed.
- The regimen is less flexible but easier to give administration instructions.

Two injections daily: Distribution of insulin dosages

Table 28: Insulin dosage regimen

Breakfast	Intermediate acting (70% of morning dose) + short acting insulin (30 % of morning dose)	⅔ of total daily dose in units
Supper	Intermediate acting (70% of evening dose) + short acting insulin (30% of evening dose)	⅓ of total daily dose in units

- None of these regimens can be optimised without frequent assessment of blood glucose monitoring.
- Achieving a balance between food intake, insulin levels and energy expenditure is an essential pre-requisite for achieving glycaemic control.
- Adjustment of insulin dosage for 3 injection regimen and 2 injection regimen
- The insulin dose should not be changed after a single abnormal blood glucose reading.
- Adjust the dose only once a pattern has been established. The dose to be adjusted depends on the time of abnormal glucose readings, as indicated in the table below:

Table 29: Insulin dosage regimen

	Timing of the unsatisfactory blood glucose level			
	Before breakfast	**Before Lunch**	**Before supper**	**At ± 21h00**
Insulin dose to be increased if glucose too high Insulin dosage to be reduced if glucose too low	Supper (in case of premixed insulin) or 21h00 dose: intermediate acting insulin	Breakfast dose: short acting insulin	Breakfast dose: intermediate acting insulin	Supper dose: short acting insulin
	**Timing of the unsatisfactory blood glucose level			
Basal-bolus regimen				
Insulin dose to be increased if glucose too high Insulin dose to be decreased if glucose too low	21h00 dose: intermediate acting insulin	Breakfast dose: rapid (or short acting) insulin	Lunch dose: rapid (or short acting) insulin	Supper dose: rapid (or short acting) insulin

14.1 DKA In Paediatric

DKA occurs with relative or absolute insulin deficiency, either caused by non-adherence to insulin regimen or by excessive secretion of counter regulatory hormones during stress, e.g. infection, trauma and surgery.

Diagnostic criteria

- Heavy glycosuria (2+ or more)
- Hyperglycaemia i.e. blood glucose > 11 mmol/l, ketonuria, or / and pH < 7.3
- Bicarbonate < 15 mmol/l and patients who are clinically dehydrated
- May be vomiting
- May be drowsy

Note: in rare cases blood glucose is not elevated.

General and supportive measures

- Admit all children to an ICU or ward
- Seek specialist advice in the early management

The objective of managing DKA would be to restore volume loss, electrolytes imbalance, to enhance clearance of glucose from the blood and to reduce the risk of cerebral oedema.

Fluid management in DKA

Fluid for resuscitation in shock; 0.9% sodium chloride IV, 10-20 ml/kg over 10-30 minutes. Repeat three times if shock persists.

Table 30: Fluid requirements after resuscitation

Calculation of fluid requirement during the subsequent phase of rehydration	
Fluid requirement = deficit + maintenance	
Calculate deficit = estimated % dehydration x body weight (kg and equivalent in ml)	
Calculate maintance (ml): ≤ 1 year: All children older than 1 year – the sum of the following: - First 10kg body weight: - Second 10kg body weight: - Additional weight > 20kg body weight:	 120ml/kg/24hrs 100ml/kg/24hrs 50ml/kg/24hrs 20ml/kg/24hrs
Add deficit to 48hr maintenance and replace this volume evenly over 48hours, initially with sodium chloride 0.9%. when blood glucose falls to 12-15 mmol/l change the infusion to a dextrose- containing maintenance fluid, e.g. dextrose 5% in sodium chloride 0.45%.	
Assess hydration status every 4-6 hours	

NB: 0.9% sodium chloride is preferred for resuscitation and the initial phase of rehydration. However, to prevent the occurrence of hyperchloraemic acidosis, switch to sodium chloride 0.45% or dextrose 5% after blood glucose has fallen below 12mmol/l or less.
NB: One of the danger signs of cerebral oedema is a drop in serum sodium levels.

Management of electrolytes imbalance

Potassium

- Commence potassium replacement if serum levels are <5.5mmol/l, unless patient has anuria. Only start potassium replacement once patient has been confirmed to have passed urine.
- Two bag system-alternative fluid and electrolyte treatment under close supervision

Under close supervision

Management of electrolyte imbalance

BAG 1 (no dextrose) Sodium chloride 0.45 % L plus KCl 15% 20 ml	BAG 2 (dextrose 10%) Dextrose 10% 1L PLUS SODIUM CHLORIDE 5% 90 ml plus KCL 15% 20 ml
NB: if blood glucose > 15 mmol/l run bag 1 at calculated rate. If blood glucose is between10-15mmol/l run both bags at a ratio of 1:1 at a calculated fluid rate. If blood glucose < 10 mmol/l run bag 2 only at calculated fluid rate.	

Insulin Therapy

Insulin

Insulin short acting, 0.1 unit/kg/hour as a continuous IV infusion.

- Add insulin, 50 units (0.5 mL) to 50 mL sodium chloride 0.9% in a syringe pump to get a solution of 1 unit/mL.
- Attach this using a Y-connector to the IV fluids already being administered.
- Do not add insulin directly to the fluid bags.
- The solution should be administered at a rate of 0.1 mL/kg/hour (0.1 unit/kg/hour).
- *If the rate of blood glucose fall exceeds 5 mmol/ L/hour or the blood glucose falls to 14 mmol/L:*
  - Add a dextrose-containing fluid.
  - Do not stop the insulin infusion while dextrose is being infused.
- *If the blood glucose falls below 4 mmol/L:*
  - Give a bolus of 2 mL/kg of dextrose 10% and increase the concentration of dextrose in the infusion.
- Continue with IV insulin until:
  - Base deficit is < 5 or bicarbonate is 15 mmol/L,
  - There is no ketonuria,
  - Blood glucose is 10 mmol/L.

Alternative to insulin infusion

- Where there are no facilities for insulin infusion, e.g. no syringe pumps, staff constraints, etc.
- Insulin short-acting, IV, 0.1 unit/kg, hourly.

Changing from intravenous to subcutaneous insulin

Continue with intravenous fluids until the child is drinking well and able to tolerate snacks. When oral fluids are tolerated, reduce intravenous fluids. Subcutaneous insulin can be started once the child is well hydrated and able to tolerate a normal diet.

The most convenient time to change to subcutaneous insulin is just before a meal. Administer the first dose of subcutaneous insulin 30 minutes before the meal and continue with the insulin infusion for 90 minutes after subcutaneous injection to prevent rebound hyperglycemia.

In newly diagnosed diabetics, Basal-Bolus regimen is started as described in Type 1 Diabetes Mellitus – Insulin Regimens, in a low range dose:

- Prepubertal children: 0.7 units/kg.
- Pubertal children: 1 unit/kg.

In established diabetics, give maintenance insulin.

Give supplemental subcutaneous short acting insulin before meals if the blood glucose > 11 mmol/L:

Blood glucose mol/L	Short-acting Insulin units/kg/dose
11-12	0.06
13-16	0.09
16	0.12

Referral

- No improvement
- Deterioration of condition, i.e.:
- Ph <7.1,
- Hyperventilation, shock,
- Depressed level of consciousness,
- Persistent vomiting,
- Age < 5 years.
- Rising blood glucose

Hypoglycaemia In Paediatric Diabetic Patient

Presenting symptoms

- *Autonomic symptoms*(hunger, nausea, anxiety, pallor, palpitation, sweating and trembling).
- *Neuroglycopaenic symptoms* (impaired thinking, change in mood, irritability, dizziness, headache, tiredness, confusion and later convulsions and coma.

NB: Nightmares and headaches maybe be suggestive of nocturnal hypoglycaemia (blood glucose levels fall to their lowest levels between 2 am and 4 am.

Diagnostic criteria

Blood glucose below 3.5-4 mmol/l with symptoms in a known diabetic patient.

Medicine treatment

Table of severity of hypoglycaemia

Severity	Grade	Symptoms
Mild	1	Child aware, respond to and treat hypoglycaemia.
Moderate	2	Child cannot respond to hypoglycaemia and needs help but respond to oral treatment. Any child < 6 years
Severe	4	Child is semi-conscious/ unconscious with or without convulsions requiring intravenous glucose.

Medicine treatment

Mild or moderate hypoglycemia: Immediate oral rapidly absorbed simple carbohydrate, e.g.:

	Medicine	Dose	Frequency	Duration	Codes
	Glucagon IM/SC	5–15 g or 1-3 level teaspoons of sugar (depending on child's age) in a small amount of water. A Wait 10–15 minutes. If blood glucose has not risen to 6-8 mmol/L, repeat above.			A V

As symptoms improve, the next meal or oral complex carbohydrate should be ingested, e.g. fruit, bread, cereal, milk, etc.

Severe hypoglycemia

Outside hospital

	Medicine	Dose	Frequency	Duration	Codes
	Glucagon IM/SC	0.1-0.2 mg/10kg body weight If < 12years of age: 0.5mg If > 12years of age: 1.0mg			A E

- If glucagon is not available:
- A teaspoon of sugar moistened with water placed under the tongue, every 20minutes until patient awakes.

In hospital

- If there is unsatisfactory response or inability to take oral carbohydrates and signs of disorientation, stupor, convulsion, coma:

	Medicine	Dose	Frequency	Duration	Codes
	Dextrose 10% IV	2–5 mL/kg. Dilute dextrose 50% solution to 10% strength before use A V Dextrose 50% 1 mL + water for injection 4 mL = 5 mL 10% dextrose solution			A V
If IV dextrose cannot be given:					
	Glucagon IM/SC	0.1-0.2 mg/10kg body weight If < 12years of age: 0.5mg If > 12years of age: 1.0mg			A E

- Monitor blood glucose every 15 minutes until stable, then repeat 1–2 hourly. Keep blood glucose between 6 and 8 mmol/L.

Referral

- Recurrent episodes of hypoglycaemia

CHAPTER 15

RENAL CONDITIONS

15.1 Renal conditions

15.1.1 Urinary Tract Infection (UTI)- Bacterial Infection Of The Urinary Tract

- Uncomplicated UTI- is an infection which is limited to the lower urinary tract and there are no associated urological anomalies.
- It presents with dysuria, frequency, urgency, cloudy urine and lower abdominal discomfort.
- Complicated UTI - is an infection of the urinary tract involving the renal parenchyma (acute pyelonephritis) or which is associated with underlying congenital anomalies of the kidneys and urinary tract. It is accompanied by fever and other systemic features as described below. It may result in significant morbidity, including septic shock and acute renal failure, renal scarring, hypertension and end stage renal disease.

- ***NB:*** It is also difficult to distinguish cystitis from pyelonephrtitis on clinical grounds particularly in young children less than 2 years of age.

Diagnostic criteria

Clinical

- Signs and symptoms are related to the age of the child and are often non-specific
- Uncomplicated UTI may cause very few signs and symptoms. Complicated infections may present with a wide range of signs and symptoms.
- Neonates may present with:
  - o Fever
  - o Hypothermia
  - o Poor feeding
  - o Vomiting
  - o Prolonged jaundice
  - o Failure to thrive
  - o Renal failure
- Infants and children may present with
  - o Persistent fever
  - o Frequency
  - o Failure to thrive
  - o Dysuria
  - o Abdominal pain
  - o Enuresis or urgency

Examine the urine in any child with fever of unknown origin

Laboratory evaluation

- Obtain urine sample for Urine Dipstix and/or microscopy examination and culture. Urine specimen is collected aseptically.
  - o By catheterisation or suprapubic aspiration in acutely ill children <2 years

    Or
  - o By mid- stream clean catch method in older children Urine collected in sterile bag not to be used for culture.

Criteria

- positive leukocyte esterase or nitrite by dipstick
- Pyuria $^{3}5$ wbc /hpf or bacteriuria, presence of any bacteria per hpf in centrifuged sample of urine.
- A culture of 104 col/ml urine of a single colony from a catheter specimen or 10^{5} col/min in mid-stream clean catch sample.
- Ultrasound for all children with first UTI.
- MCUG (micturating cystourethrogaphy) in children who have abnormalities of the kidneys, ureter or bladder demonstrated by ultrasound.

General supportive measures

- Ensure adequate nutrition and hydration
- For recurring infections – avoid irritant soaps bubble bath, treat pin worm, perianal hygiene etc.

Antibiotic treatment

- Oral treatment- children > 3month old who are not acutely ill and not vomiting. Parenteral treatment- All acutely ill infants and children.

	Medicine	Dose	Frequency	Duration	Codes
	Amoxicillin /clavulanate po	30mg/kg/dose of amoxicillin component	8 hourly	7 days	A E
or	Amoxicillin/clavulanate IV	25mg/kg	8 hourly	7 days	B E
plus	Gentamycin	5mg/kg	once daily if there is no improvement after 48 hours on amoxicillin/clavulanate		B V
plus	Ceftriaxone IV (use Cefotaxime if < 2 months)	50-80mg/kg	12 hourly	7 days	B V

Asymptomatic bacteremia does not require treatment.

15.1.2 Post Streptococcal Glomerulonephritis

A disorder of the kidneys caused by an immunological response to the kidney to nephritogenic strains of streptococci. It develops one to three weeks after a streptococcal throat or skin infection. Immune complexes are deposited in the glomerular basement membrane and/or mesangium of the glomeruli.

Diagnostic criteria

Clinical

- Occurs predominantly in children 3 to 12 years of age
- Presents 1-3 weeks after streptococcal pharynigitis or skin infection (impetigo)
- Characteristic features include
  - o Facial or generalised oedema
  - o Hematuria (smoky or tea colored urine)
  - o Oliguria and hypertension
- Laboratory investigations
  - o Urine analysis - RBC 1+ to 3+ , protein 1+ to 2+, dysmorphic RBC or granular cast
  - o Blood test- ASO, Anti-DNAseB , C3 & C4 , serum electrolytes, urea creatinine and FBC
- General and supportive measures
  - o Bed rest
  - o Monitor fluid balance- weight daily, record input and out put
  - o Restrict salt intake, restrict protein intake to 0.5g/kg/day
  - o Hypertension – see hypertension treatment

Pharmacological Management

	Medicine	Dose	Frequency	Duration	Codes
	Phenoxymethylpenicillin po	125-250mg	Every 6 hours	10 days	A V
	Amoxicillin po	125-250mg	Every 6 hours	10 days	A V
or	Erythromycin po (In cases of penicillin allergy)	125-250mg	Every 6 hours	10 days	A V

15.1.3 Nephrotic Syndrome(NS)

A clinical syndrome associated with massive proteinuria due to increased permeability of the glomerular basement membrane. Most children have primary (idiopathic) nephrotic syndrome associated with minimal change nephrotic syndrome (MCNS) or focal segmental glomerulosclerosis (FSGS).

- Main causes of secondary NS include infections (HIV,Hepatitis B & C) , systemic lupus erythematosis (SLE) and reflux nephropathy.
- Main complications
  - o Increased risk of infections (s. Pneumonia, E.coli, chicken pox, measles)
  - o Hypercoagulable state leading to increased risk of arterial & venous thrombosis.

Diagnostic criteria

Clinical

- Massive proteinuria
- Hypo albuminaemia
- Oedema
- Hyperlipidaemia (hypercholesterolemia)
- Usually normal blood pressure
- Transient microscopic hematuria
- Usually normal renal function

Investigations

- Urine strips ≥3+ proteinuria ; may have trace to 1+hematuria
- Spot randome urine sample protein : creatinine ratio > 0.2g/mmol
- Urine microscopy: hyaline and lipid csats
- Serum albumin < 25gm/l
- Serum cholesterol: increased

Serum urea, creatinine and electrolytes are normal

- Exclude secondary causes – ASO & anti dnaseb, hepatitis B antigen, hepatitis C antibody, HIV and CMV antibody, RPR, ANA.
- S- complement

General and supportive measures

- Monitor fluid balance
- Monitor urine output and daily weight
- Assess hydration status
- Suspect hypovolemia in the presence of hypotension, small pulse volume and cold extremities.

Continued weight gain or anuria is an indication for referral

Dietary measures

- Restrict salt intake
- Don't restrict oral fluid intake
- Limit intake of saturated fat
- Normal protein intake for all either normal renal function.
- Normal energy intake

Treatment

- Specific treatment of causative conditions
- Edema management

	Medicine	Dose	Frequency	Duration	Codes
	Furosemide po and potassium chloride po	1 to 2mg/kg 150-300mg	twice daily once daily	review review	A E A E
	25%albumin IV	(0.5 to 1g/kg albumin) as slow infusion			B E

- Children with non-remitting NS should receive:

	Medicine	Dose	Frequency	Duration	Codes
	Multivitamin, folic acid & calcium supplement po		once daily	review	A E
	Enalapril po	0.1mg/kg	once daily	review	B E
	Phenoxymethylpenicillin po	125-250mg	12 hourly	10 days	A V
	Prednisolone po	02mg/kg/day (60mg/kg m^2/day for 4 to 6 weeks max dose 60mg daily. After the initial 6-wk course, the prednisolone dose should be tapered to 40 mg/m^2/day given every other day as a single daily dose for at least 4 wk. The alternate-day dose is then slowly tapered and discontinued over the next 1-2 mo. Patients who fail to go to remission after 8 weeks of steroid treatment are considered steroid resistant and should be referred for kidney biopsy.			A V

NB: Only give corticosteroids after consultation with a specialist

- A rapid response to steroids is indicative of MCNS.
- Second line drugs – cyclophosphamide

15.1.4 Acute renal failure

A condition characterised by a rapid decline in glomerular filtration rate and retention of fluid and nitrogenous waste products. It is classified as prerenal, renal and post renal.

Common causes

PRERENAL
• Dehydration • Hemorrhage • Sepsis • Hypoalbuminemia • Cardiac failure

INTRINSIC RENAL

- Glomerulonephritis
  - Postinfectious/poststreptococcal
  - Lupus erythematosus
  - Henoch-Schonlein purpura
  - Membranoproliferative
  - Anti-glomerular basement membrane
- Hemolytic-uremic syndrome
- Acute tubular necrosis
- Cortical necrosis
- Renal vein thrombosis
- Rhabdomyolysis
- Acute interstitial nephritis
- Tumor infiltration
- Tumor lysis syndrome

POSTRENAL

- Posterior urethral valves
- Ureteropelvic junction obstruction
- Ureterovesicular junction obstruction
- Ureterocele
- Tumor
- Urolithiasis
- Hemorrhagic cystitis
- Neurogenic bladder

Laboratory findings

- **Blood:** Anemia (dilutional or haemolytic), leukopenia, thrombocytopenia, metabolic acidosis, hypocalcemia
- Hyponatremia, elevated serum potassium, BUN, creatinine and uric acid, serum c3 level may be depressed.
- Clotting profile
- **Urine:** Hematuria, proteinuria or granular casts may suggest intrinsic acute renal failure
- Urine specific gravity, osmolality, fractional excretion of sodium
- **Radiology:** Ultrasound of kidneys and bladder, chest X-ray
- ECG

General supportive measures

- Treat underlying cause
- Monitor
  - o fluid intake and output,
  - o blood pressure
  - o daily weight
- Nutritional support- high energy diet
- Restrict sodium and potassium intake

***Referral* for dialysis**

Indications for dialysis in ARF include the following:

- Volume overload with evidence of hypertension and/or pulmonary edema refractory to diuretic therapy
- Persistent hyperkalemia
- Severe metabolic acidosis unresponsive to medical management
- Neurologic symptoms (altered mental status, seizures)
- Blood urea nitrogen >100-150 mg/dL (or lower if rapidly rising)
- **Calcium:** phosphorus imbalance, with hypocalcemic tetany

15.2 Enuresis Enuresis is defined as the repeated voiding of urine into clothes or bed at least twice a week for at least 3 consecutive months in a child who is at least 5 yrs. of age. The behavior is not due exclusively to the direct physiologic effects of a substance (e.g., a diuretic) or a general medical condition (e.g., diabetes, spina bifida, a seizure disorder). *Diurnal enuresis* defines wetting while awake and *nocturnal enuresis* refers to voiding during sleep. *Primary enuresis* occurs in children who have never been consistently dry through the night, whereas *secondary enuresis* refers to the resumption of wetting after at least 6 months of dryness. *Monosymptomatic enuresis* has no associated daytime symptoms (urgency, frequency, daytime enuresis), and *nonmonosymptomatic enuresis,* which is more common, often has at least one subtle daytime symptom. Monosymptomatic enuresis is rarely associated with significant organic underlying abnormalities.

Diagnostic criteria

Clinical- structured interview & exclude underlying systemic disease.
Investigations- urine dipstick, urine PH, SG, microscopy, ultrasound to exclude any structural abnormality.

General and supportive measures

- Limit fluids to 8 oz. at supper 3 to 3.5 hours before bedtime; no fluids thereafter
- Empty the bladder before sleeping.
- Make a bedtime "resolution" to stay dry.
- Discuss mode of action of drugs or moisture alarm and drug side effects; dispense drug or alarm.
- Advise that medication or alarm is the "coach" and the child is the "player."
- Advise that positive internal and external biofeedback signals help hasten central nervous system control of the bladder.
- Keep a calendar of dry and wet nights.
- Encourage the child's participation in cleaning up personal clothing and bedclothes.
- Schedule follow-up visits or phone calls at least every 2 wk., with positive reinforcement for dry nights and efforts.
- Continue use of alarm until 28 consecutive dry nights are achieved, then stop; use medications as directed.
- If bedwetting returns on tapering or discontinuation of medication or alarm, restart nightly medication or alarm.
- If the child is not dry every night, despite motivation and efforts, substitute or add another drug or alarm and rule out undisclosed diurnal voiding problems.

Pharmacological Management

- If general measures fail after 6 months - Consider desmopressin (Specialist)

CHAPTER 16

RHEUMATOLOGY

16.1 Juvenile Idiopathic Arthritis (JIA)

Juvenile Idiopathic Arthritis (JIA) is defined as arthritis of unknown origin for at least 6 weeks with onset before the age of 16 years. Other causes of arthritis must be excluded e.g. infections, malignancy, trauma, other autoimmune disease. Different clinical subgroups are recognised according to the pattern of onset that manifests within the first 6 months.

Diagnostic criteria

Systemic onset

- Arthritis in one or more joints.
- Plus 2 weeks of daily (quotidian) fever.
- With one of the following:
  - Erythematous macular rash, or
  - Serositis, i.e. Pericarditis and pleuritis, or
  - Hepatosplenomegaly, or
  - Generalised lymphadenopathy.

16.2 Oligoarthritis

Always consider TB if only one joint is involved.

- Arthritis affecting one to four joints for the first 6 months of disease.
- Two categories are recognised:
  - Persistent oligoarthritis: affects ≤ 4 joints throughout disease course.
  - Extended oligoarthritis: affects > 4 joints after the first 6 months.
- Occurs more commonly in girls than in boys.
- Has early onset before 6 years of age.
- Usually asymmetric arthritis that affects mainly large joints.
- High risk of developing chronic iridocyclitis.
- 65–85% of patients are anti-nuclear antibody (ANA) positive.

Polyarthritis (Rheumatoid factor negative)

- Arthritis affecting ≥ 5 joints in first 6 months of disease.
- Negative rheumatoid factor polyarthritis includes 2 subsets:
  - One that is similar to adult onset RF negative rheumatoid arthritis characterised by a symmetric synovitis of large and small joints, onset at school age and absence of ANA expression;
  - Another that resembles oligoarthritis apart from the number of joints affected in the first 6 months of the disease.

Polyarthritis (Rheumatoid Factor Positive)

- Arthritis affecting ≥ 5 joints in first 6 months.
- Positive rheumatoid factor on 2 separate occasions at least three months apart.
- Involves large and small joints.

Enthesitis related arthritis

- Arthritis and enthesitis or,
- Arthritis or enthesitis and 2 of the following:
  - Sacroiliac joint involvement,
  - HLA-B27 positive,

- One 1st or 2nd degree relative with HLA-B27 associated disease,
- Arthritis in a boy after the age of 8 years,
- Anterior uveitis associated with pain, redness or photophobia.

Psoriatic Arthritis

- Arthritis plus psoriasis in a child, or
- Arthritis and 2 of the following:
  - Dactylitis,
  - Nail pitting,
  - Psoriasis in a first degree relative.

Undifferentiated arthritis

- Arthritis not meeting criteria for one of the above categories or fitting more than one of the above groups.

Differential diagnosis

JIA is a clinical diagnosis and depends on the persistence of arthritis or typical systemic manifestations and by exclusion of other diseases:

- Pyogenic and tuberculous joint infection and osteomyelitis.
- Arthritis associated with other acute infectious illnesses.
- Acute leukemia and other malignancies.
- Acute rheumatic fever.
- Autoimmune disorders, SLE or mixed connective tissue disease.
- Reiter syndrome, i.e. arthritis, urethritis and conjunctivitis.
- Arthritis associated with inflammatory bowel disease.

Investigations

Investigations must be tailored for each case, in consultation with a specialist, consider the following investigations:

- Full blood count with differential and platelet count.
- C-reactive protein and erythrocyte sedimentation rate.
- ALT for liver function screen before starting methotrexate.
- Serum urea, creatinine and electrolytes.
- Muscle enzymes, albumin, calcium, phosphate and alkaline phosphatase.
- Auto-antibodies and rheumatoid factor.
- X–ray or ultrasound of affected joints.
- Arthroscopy and synovial biopsies in cases of possible TB arthritis.
- Eye screen for uveitis.

General and supportive measures

- Occupational and physiotherapy programmes may provide the following:
  - Exercises to increase range of movements of joints and to maintain muscle strength;
  - Hot water baths, swimming pool exercises;
  - Splints, e.g. Nocturnal splints, for pain relief and prevention of contractures;
  - Shoe inserts/raises;
  - Aids for activities of daily living.
- Orthodontic treatment if temporomandibular joints are involved.
- All children should have slit lamp examination initially, with follow up thereafter at the discretion of the ophthalmologist.

Medicine treatment

- There is no cure for JIA.
- Goal of treatment is to eliminate active disease, to normalise joint function, to preserve normal growth, to prevent long-term joint damage and disease complications. Outcome is improved with early aggressive therapy. Treatment should be decided in consultation with a specialist.

Oligoarthritis

- NSAID, e.g.:

	Medicine	Dose	Frequency	Duration	Codes
	Ibuprofen po	10 mg/kg	6-8 hourly	1-2 months	A E
	NSAIDs as monotherapy are given for 1-2 months in patients with low disease activity and without joint contractures.				
	If no improvement: ADD Intra-articular steroids.				
	Methylprednisolone acetate po	1 mg/kg with lignocaine 1%, 0.5 mL.	at once		C E

  - o Intra-articular corticosteroid injection should be administered to all active joints by rheumatologist or orthopedic specialist
- If no response: repeat in 3 months.
  - o Young children may require light sedation with midazolam and ketamine.
  - o Large joints, if possible, should be aspirated at same time.
  - o Can be repeated after 3 months if there was an initial response, but the disease is not yet in remission.
  - o Intra-articular steroids can also be used as initial therapy.
- If disease activity still present after 3 months:
- **ADD**

	Medicine	Dose	Frequency	Duration	Codes
	Methotrexate po	10-15 mg/m^2/week as a single dose on an empty stomach. Specialist initiated. Increase dose at monthly intervals up to 1 mg/kg/week until there is satisfactory response, continue maintenance at the same dose. Maximum dose: 25 mg/week.			S E
Plus	Folic acid po	5 mg weekly, (on the day after methotrexate) for the duration of the treatment.			A E

  - o Adverse effects of methotrexate include nausea, mood changes, raised liver enzymes, bone marrow toxicity and protein/haematuria.
  - o *Monitor:* Pre-treatment FBC, liver transaminases and creatinine; then FBC and either ALT or AST 3 monthly. Serum Creatinine 6 monthly.
- If no remission in 6 months, refer to a rheumatologist.
- ***Note:* Screen all patients early for uveitis (highest risk if ANA positive).**

Polyarthritis – early

	Medicine	Dose	Frequency	Duration	Codes
	Start NSAID as soon as possible. ibuprofen po	10 mg/kg	6-8 hourly	review	A E
If no significant improvement in 1 month, or if severe, at onset, start disease modifying drugs (DMARDs)					
	Methotrexate po	10–15 mg/m^2/week as a single dose on an empty stomach. (Specialist initiated) Maximum dose: 25 mg/week.			S V
Plus	Folic acid po	5 mg weekly (on the day after methotrexate) for the duration of the treatment			A E
For rapid relief of symptoms in severe early disease consider adding:					
	Prednisolone po	Starting dose: 1 mg/kg/dose once daily. Reduce dose gradually to 5 – 7.5 mg daily, depending on response.			A V

Note:

- **Intra-articular steroids (IAS) may be used in conjunction with methotrexate.**

Systemic onset JIA

- Systemic JIA is an aggressive systemic disease. ***Refer*** to a rheumatologist early.
- Initiate treatment after consultation with a rheumatologist.

	Medicine	Dose	Frequency	Duration	Codes
Start NSAID as soon as possible.					
	Ibuprofen po	10 mg/kg	6-8 hourly	review	A E
For patients with mild disease:					
	Prednisolone po	Starting dose: 2 mg/kg/dose once daily. Reduce dose gradually once disease is controlled.			

- Critically ill patients with internal organ involvement, such as pleuritis, pericarditis, myocarditis or evidence of early macrophage activation syndrome should be referred urgently.

	Medicine	Dose	Frequency	Duration	Codes
	Methylprednisolone IV	30 mg/kg	Once daily	3 days	B E
	Follow with Prednisolone po	2 mg/kg once daily until disease is controlled.			A V

  - o These patients may respond to methotrexate or cyclosporine in the long term, but the response is not as good as other JIA patients.

Psoriatic arthritis

- Treat as for oligoarthritis if ≤ 4 joints, or polyarthritis if severe disease or >4 joints at onset.
- ***Refer*** early as most children will require a DMARD.

Enthesitis related arthritis

- Start NSAID as soon as possible.

	Medicine	Dose	Frequency	Duration	Codes
	Ibuprofen po	10 mg/kg	6-8 hourly	review	A E
For patients with severe disease:					
	Prednisolone po	starting dose: 1-2 mg/kg as a single daily dose for 2 weeks and wean over 2 weeks. If no remission in 2–4 months, refer.			A V

Uveitis management

- Manage in consultation with an ophthalmologist.

Referral

- **Urgent:** uncontrolled systemic disease.
- Paediatrician referral:
  - All for confirmation of diagnosis.
  - All patients requiring DMARD.
  - Adverse reaction to NSAID.
  - Suspected JIA not responding to NSAID therapy.
- Ophthalmology referral:
  - For slit lamp examination.
  - Patients with iridocyclitis and uveitis.
- For orthopedic treatment, e.g. where intra-articular corticosteroids is indicated, or if TB oligoarthritis is suspected.

CHAPTER 17

CHILD ABUSE

Child abuse is any recent act or failure to act on the part of a caretaker which results in death, physical or emotional harm, sexual abuse, or exploitation of the child.

17.1 Physical Abuse

Physical injury inflicted upon the child with cruel intent. Physical abuse can be the result of punching, beating, kicking, biting, burning, shaking, or otherwise harming a child physically.

Symptoms and signs

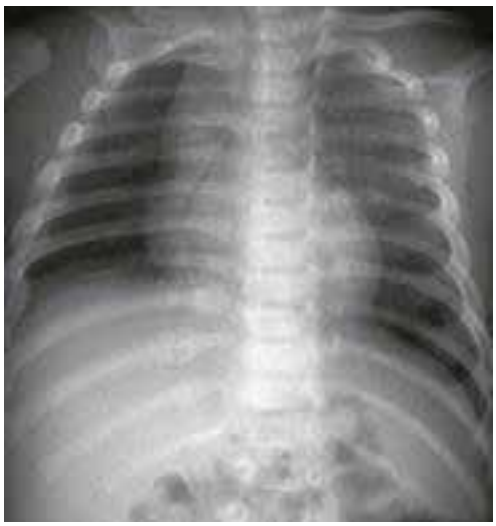
- Suspect abuse if:
  - o History of mechanism of injury does not match the developmental age of the child
  - o No explanation to the event
  - o Significant delay in presentation to hospital
- Physical exam findings suggestive of abuse:
  - o Any injury to a young, pre-ambulatory infant, including bruises, mouth injuries, fractures, and intracranial or abdominal injury.
  - o Injuries to multiple organ systems
  - o Multiple injuries in different stages of healing
  - o Patterned injuries
  - o Injuries to non-bony or other unusual locations (torso, ears, face, neck upper arms)
  - o Additional evidence of child neglect.
  - o Burns suspicious for abuse: immersion lines (glove and stocking appearance), circumferential burns, spared skin creases or ring sign on buttocks, well defined margins or contact burn marks (stove, cigarette), uniform depth and symmetry, genital injuries.

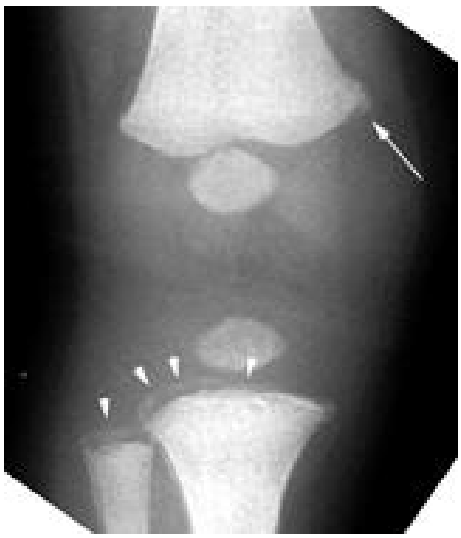
Diagnosis

- History: details surrounding all reported injuries, details regarding child's behavior before, during, and after event, child's developmental capabilities, history of abuse to child, substance abuse by caregivers, mental health of caregivers, social and financial stressors, past criminal history
- Physical exam:
  - o Measure and plot growth
  - o Dental and mouth exam (frenulum in infant)
  - o Assess for bruising to the torso, ear, neck in children <4 years
  - o Bruising anywhere in infant < 4 months
  - o Burns, lacerations, bites, other skin injuries.
  - o Palpation of extremities, rib, head to assess for healing fractures.
  - o Neurologic exam
- Laboratory evaluation:
  - o FBC with differential
  - o PT, PTT
  - o AST, ALT, amylase, lipase
  - o Toxicology screen if altered mental status (if available)
- Imaging:
  - o If stable patient has head injury (laceration, swelling): obtain skull X ray to assess for linear skull fractures, followed by head CT to assess for underlying brain injury.
  - o If patient has cranial facial injury or altered mental status: obtain head CT if available (Note: inflicted head trauma is the most common cause of death in child physical abuse, incidence is increased in infancy. Head CT will show subdural or subarachnoid hematomas, hemorrhages).
  - o If abdominal injury is suspected: obtain abdominal ultrasound/CT abdomen and pelvis

- For children age <24 months or age <36 months with long bone fractures: once stable, obtain a skeletal survey (X-rays of the skull, entire spine, pelvis, ribs, bilateral humerus and femur (proximal long bones) looking for multiple fractures in various stages of healing
- Bucket handle fracture- subacute metaphyseal fracture that forms an arc along the proximal margin of the metaphysis. Caused by excessive torsional forces concerning for child abuse.
- Rib fractures: child ribs are flexible and difficult to break, so suspect child abuse. Obtain AP and oblique view on X-ray, looking for multiple healing fractures with callous formation.

Figure 11





Pharmacological Management

- Analgesia and pharmacologic management as appropriate for burns, fractures

Non pharmacologic Management

- If unstable, manage patient according to primary and secondary trauma survey.
- If X ray reveals multiple fractures in different stages of healing: consult orthopedics.
- Non-depressed skull fractures without neuro deficit can be managed conservatively, all other skull fractures or intracranial injuries should be evaluated by neurosurgeon.
- You may do preliminary fundoscopic exam to assess for retinal hemorrhages, but full dilated ophthalmologic exam may be required once the patient is stable (retinal hemorrhages require high acceleration deceleration forces, highly suggestive of abuse).
- If abnormal LFTs or abdominal ultrasound/CT: surgery consult.

Non-Medical Management (according to Eswatini Children Protection and Welfare Act 6):

Duty of Medical Officer:

1. If a medical officer believes on reasonable grounds that a child he is examining or treating is physically, psychologically, or emotionally injured as a result of being ill-treated, neglected, abandoned, or exposed, or is sexually abused, he shall immediately inform a social worker or police officer.
2. Any medical officer who fails to comply with the above commits an offense and is liable on conviction to a fine not exceeding ten thousand Emalangeni or to imprisonment to a term not less than 6 months or both.
3. RSP medical form must be filled out.

Steps to be taken after medical treatment:

1. The child should be brought before Children's Court within 48 hours of completion of medical examination and treatment or within 48 hours upon discharge from the hospital.
2. If it is not possible to bring the child before a Children's Court within the above time specified, the child should be brought before a magistrate who may direct that the child be placed in a place of safety or the care of a fit and proper person until the time that the child can be brought before Children's Court.

17.2 Sexual Abuse (often managed by department of Gynecology)

Sexual abuse occurs when a child is used for sexual purposes by an adult or adolescent. Involves exposing a child to any sexual activity or behavior, whether direct or indirect.

- Sexual assault is any form of unwanted sexual activity that is forced upon a person (male or female) without that person's consent. Sexual assault can range from unwanted sexual touching to forced intercourse.

Diagnosis

- **History:** if possible, obtain history from caregiver, police, not the child and not in the presence of the child. History may be gathered from an adolescent with caution). Ask when did the abuse occur, type of contact, physical symptoms.
- **Physical exam:** *note*: **most patients reporting sexual abuse have normal physical exam findings.**
- Complete full physical examination including genitalia (a chaperone should be present)
- Evaluate for other signs of abuse (e.g. Bruising).
- Make an effort to ensure patient comfort, privacy
- Never restrain or sedate to examine
- Genital examination may be difficult for a patient in the context of sexual abuse/assault, provide appropriate support when necessary.

Internal speculum exam (performed by gynecologist):

- Do NOT perform on pre-pubertal children
- A speculum examination is rarely indicated in the adolescent patient in the context of sexual abuse/assault.
- Indications for a speculum examination in adolescents:
  - o Ongoing bleeding (no external source)
  - o Suspected foreign body
  - o Forensic evidence collection (if available)
- If speculum exam indicated, obtain gynecology referral
- Assess for sexually transmitted infections if:
  - o Child has symptoms of STI (vaginal discharge or pain, genital itching or odor, urinary symptoms, genital ulcers or lesions
  - o Information suggestive of genital, oral, or anal contact
  - o Obtain hepatitis B serological testing
  - o Obtain pregnancy test in pubertal females

STI prophylaxis

- Prophylaxis for gonorrhea and chlamydia is not recommended in prepubescent children.
- In adolescents, treat according to the following table.
- If patient has not received Hepatitis B vaccine, provide first dose.

Table 32:

Medication	Indication
Ceftriaxone 250 mg IM in a single dose	**Gonorrhea prophylaxis** Prevents incubating syphilis from being clinical
Azithromycin 1 gm orally in a single dose **OR** Doxycycline 100mg orally BD x 7 day	**Chlamydia prophylaxis**
Metronidazole 2 gm orally in a single dose	**Trichomoniasis prophylaxis** ***Note:*** may decrease absorption of emergency contraception, recommend giving several hours after other medications.

HIV post-exposure prophylaxis:
- For all children and adolescents who present within 72 hours of sexual assault or abuse
- Follow PEP instructions in HIV management guidelines

Emergency contraception
- Offer to pubertal patients who report vaginal-penile penetration who present within 120 hours (5 days) of exposure.
- Perform urine pregnancy test prior to providing emergency contraception.

Nonpharmacological Management
Mental health assessment (psychology/psychiatry referral)
- Appropriate psychosocial support is integral to care
- Trauma symptom screen
- Suicide and/or self-harm risk assessment
- Psycho-education for patient and caregivers

Non-Medical Management (according to Eswatini Children Protection and Welfare Act 6):
Duty of Medical Officer:
1. If a medical officer believes on reasonable grounds that a child he is examining or treating is physically, psychologically, or emotionally injured as a result of being ill-treated, neglected, abandoned, or exposed, or is sexually abused, he shall immediately inform a social worker or police officer.
2. Any medical officer who fails to comply with the above commits an offense and is liable on conviction to a fine not exceeding ten thousand Emalangeni or to imprisonment to a term not less than 6 months or both.
3. REP medical form must be filled out

Steps to be taken after medical treatment:
1. The child should be brought before Children's Court within 48 hours of completion of medical examination and treatment or within 48 hours upon discharge from the hospital.
2. If it is not possible to bring the child before a Children's Court within the above time specified, the child should be brought before a magistrate who may direct that the child be placed in a place of safety or the care of a fit and proper person until the time that the child can be brought before the Children's Court.

ESSENTIAL MEDICINE LIST

MEDICINE	STRENGTH	DOSAGE FORM	LEVEL OF USE	VEN
Antispasmodics and Anticholenergics				
Hyoscine butylbromide	10mg	Tablets	A	E
Antidiarrhoeals				
Oral Rehydration salts		Powder	A	V
ReSoMal rehydration salts		Powder	A	V
Antiemetics and antinauseants				
Metoclopramide	5mg, 10mg	Injection	B	V
Metoclopramide	5mg/5ml	syrup	A	E
Promethazine	25mg	Injection	A	E
Promethazine	5mg/5ml	syrup	A	E
Laxatives				
Glycerine, paediatric	0.891 ML/ 1.26g	Suppository	B	E
Antihaemorrhoidals				
Liquid paraffin BP		Liquid	B	E
Bismuth subgallate compound (bismuth subgallate + bismuth oxide + zinc oxide)	59mg+24mg+256mg	ointment	B	E
Insulins				
Biphasic insulin	100 units/ml	Injection	B	V
Intermediate-acting insulin	100 units/ml	Injection	B	V
Insulin, soluble	101 units/ml	Injection	B	V
Oral Antidiabetics				
Vitamins				
Ascorbic Acid	100mg, 250mg	tablet	A	N
Multivitamins		Syrup	A	E
Multivitamins		drops	A	N
Phytomenadione	2mg	injection	A	E
Pyridoxine	100mg	injection	S	E
Pyridoxine	10mg	Tablets	A	E
Vitamin A (retinol)	100 000IU	capsule	A	V
Vitamin A (retinol)	200 000IU	capsule	A	V
Vitamin B1 (thiamine)	100mg	Injection	A	N
Vitamin B12	1mg	Injection	B	N
cholecalciferol	500 units	tablet	B	E
One alpha (Vitamin D analogues)	0,25MCG	tablet	C	E
Mineral Supplements				
Calcium gluconate	300mg	tablet	A	E
Calcium gluconate	10%	injection	B	E
Magnesium Sulphate	50%	Injection	C	V
Potassium chloride	20%	injection	B	V
Potassium chloride	150mg,300mg	tablet	B	V
Zinc Sulphate	20mg	Tablet	A	E
HAEMATOLOGICAL CONDITIONS				
Albumin	25%	Infusion	B	E
Packed red blood cells			B	V
Factor VIII			C	V

MEDICINE	STRENGTH	DOSAGE FORM	LEVEL OF USE	VEN
Haematological Conditions - continued				
Factor IX			C	V
Frozen Fresh plasma			B	V
Blood substitutes				
Polygeline		Infusion	B	V
Anti-anaemics				
Erythropoietin beta	4 000IU	injection	C	E
Epoietin beta	50mcg/0,3ml	injection	C	E
Ferrous sulphate	200mg	Tablets	A	E
Folic Acid	5mg	Tablet	A	E
Anicoagulants				
Heparin	5000IU	Injection	C	V
Enoxaparin	40mg	Injection	B	V
Warfarin	5mg	Tablets	B	E
Low molecular weight heparin				
Thrombolytics				
Alteplase (t-PA)	50mg	injection	S	V
Anti-platelets				
Clopidogrel	75mg/5ml	Tablets	B	E
Antihaemorrhagics				
Tranexamic acid	500mg	Injections	B	E
Tranexamic acid	500mg	tablet	B	E
IV Solutions				
4.3% glucose in 0.18% sodium chloride	4,3%+0,18%	Infusion	A	V
5% dextrose in 0.9% sodium chloride	5%+0,9%	Infusion	A	V
Dextrose	5%	Infusion	A	V
Dextrose	10%	Infusion	A	V
Dextrose	50%	Infusion	A	V
Dextrose + sodium chloride	5% + 0.9%	Infusion	A	V
Half-strength darrows with 5% dextrose solution		Infusion	A	V
Mannitol	20%	Infusion	B	E
Normal saline	0,45%, 0,9%	Infusion	A	V
Ringer lactate		Infusion	A	V
Sodium bicarbonate	8.4%	Injection	B	V
Sorbitol solution	3%	solution	B	E
Water for injection	-	solution	A	V
CARDIOVASCULAR SYSTEM				
Adrenaline	1mg	Injection	A	V
Amiodarone	600mg	Injection	C	V
Atropine	0,1mg	Injections	B	V
Antihypertensives and antihypotensives				
Diuretics				
Furosemide	1%	syrup	B	V
Furosemide	20mg	Injection	B	V

MEDICINE	STRENGTH	DOSAGE FORM	LEVEL OF USE	VEN
ACE Inhibitors				
Enalapril	5mg	Tablet	B	V
DERMATOLOGICALS				
Anti-infective Dermatologicals				
Silver sulphadiazine cream	1%	Cream	A	E
Mupirocin cream	2%	Cream	B	E
Sulphur	2%,10%	Ointment	C	E
Acyclovir	5%	Cream	A	E
Clotrimazole cream	1%	Cream	A	E
Ketoconazole shampoo	2%	Shampoo	C	N
Nystatin	100 000IU	Cream	A	E
Selenium sulphide	2%	Shampoo	C	N
Urea	15%	Ointment	C	E
Benzoic Acid	6%	Ointment	A	E
Emolients and Protectives				
Vitamins				
Aqueous cream		Cream	A	N
Emulsifying ointment		Ointment	A	E
Liquid paraffin		Lotion	A	N
Antipruritics				
Calamine lotion		Lotion	A	V
Antipsoriatics				
Salicylic acid	5%	Ointment	C	N
Crude coal tar	10%	Cream	C	E
Corticosteroids for Dermatologic use				
Hydrocortisone	1%	Cream/Oint	A	E
Betamethasone	0.10%	Cream/Oint	B	N
Dexamethasone	0.10%	Cream/Oint	B	E
Triamcinolone acetonide	0.10%	Cream	B	E
Antiseptics and disinfectants				
Glycothymol PB		Solution	A	E
Gentian violet	0.50%	Solution	A	E
Chlorhexidine digluconate	0.20%	Solution	A	E
Povidone iodine	10%	Solution	A	E
Povidone-iodine cream	10%	Cream	A	E
Chemotherapeutics for dermatological use				
Podophyllin	15%	Lotion	A	E
Silver nitrate/potassium nitrate (caustic pencil)	40%	Pencil	A	E
Trichloroacetic acid	80%	Solution	C	E
Anti-scabies				
Benzyl benzoate	25%	Lotion	A	N
Permethrin	5%	Cream	C	E
SYSTEMIC HORMONES, excluding SEX HORMONES				
Calcitonin	100 IU	Injection	C	E

MEDICINE	STRENGTH	DOSAGE FORM	LEVEL OF USE	VEN
Systemic corticosteroids				
Methylprednisolone	40mg/ml	Injection	C	E
Dexamethasone	4mg/ml	Injection	B	V
Hydrocortisone	100mg	Injection	A	V
Prednisolone	5mg/5ml	Syrup	A	V
Prednisolone	5mg	Tablet	A	V
INFECTIONS AND INFESTATIONS (10)				
Tetracyclines				
Doxycycline	100mg	Tablet	A	V
Amphenicols				
Chloramphenicol	1g	Injection	C	E
Chloramphenicol	250mg	Tablet	C	E
Floroquinolones				
Ciprofloxacin	250mg	Tablet	A	V
Aminoglycosides				
Gentamycin	40mg/ml	Injection	B	V
Neomycin	500mg	Tablet	B	E
Spectinomycin	2gm	Injection	A	E
Vancomycin	1g	Injection	S	E
Aminoglycosides				
Sodium bicarbonate	8.4%	Injection	B	V
Sorbitol solution	3%	Solution	B	E
Water for injection	-	Solution	A	V
Carbapenem				
Meropenem	500mg, 1 g	Injection	S	E
Cephalosporines				
Cefotaxime	500mg	Injection	B	E
Cefoxitin	1g	Injections	S	E
Ceftazidime	500mg	injection	C	E
Ceftriaxone	250mg, 1g	injection	B	V
Cefuroxime	1.5g	Injections	S	V
Cephalexin	500mg	Tablet	B	E
Cephazolin	1g	Injections	B	V
Macrolides				
Azithromycin	100mg/5ml	Suspension	B	E
Clindamycin	600mg	Injection	C	E
Clindamycin	75mg/5ml	Suspension	C	E
Clindamycin	150mg	Capsules	C	E
Erythromycin	250mg	Tablets	A	V
Erythromycin	125mg/5ml	Suspension	A	V
Penicillins				
Amoxicillin	250mg	Capsules	A	V
Amoxicillin	250mg/5ml	Suspension	A	V
Amoxicillin	125mg/5ml	Suspension	A	V

MEDICINE	STRENGTH	DOSAGE FORM	LEVEL OF USE	VEN
Penicillins - continued				
Amoxycillin + clavulanic acid	250mg+125mg	Tablets	B	E
Amoxycillin + clavulanic acid	1000mg+200mg	injection	B	E
Amoxycillin + clavulanic acid	125mg +31mg	Syrup	B	E
Amoxycillin Syrup	250mg/5ml	Syrup	A	V
Ampicillin	500mg	injection	A	V
Benzathine Benzylpenicillin	2,4mu	Injection	A	V
Benzylpenicillin	5MU	Injection	A	E
Cloxacillin	250mg	Capsules	A	E
Cloxacillin	125mg/5ml	Suspension	A	E
Cloxacillin	500mg	Injection	A	E
Phenoxymethylpenicilin	250mg	Tablet	A	V
Phenoxymethylpenicillin	125mg/5ml	Suspension	A	V
Piperacillin + tazobactam	4g+500mg/vial	Injection	S	E
Procaine penicillin	3 million IU	injection	A	V
Sulphonamides with anti-infectives in combination				
Co-Trimoxazole	400/80mg	Tablet	A	V
Co-Trimoxazole	100/20mg	Tablet	A	V
Co-Trimoxazole	240mg/5ml	Susponsion	A	V
All other antibacterials				
Systemic antimycotics				
Fluconazole	2mg/ml	Injection	B	V
Fluconazole	50mg/5ml	suspension	B	E
Griseofulvin	125mg	Tablets	A	N
Tuberculostatics				
Cycloserine	125mg	Capsules	B	V
Ethambutol	100mg	Tablet	A	V
Ethionamide	125mg	tablet	B	V
Kanamycin	1g	injection	B	V
Levofloxacin	100mg	tablet	B	V
Pyazinamide	150mg	tablet	B	V
Rifampicin+Isoniazide	150/75mg	Tablet	A	V
Rifampicin+Isoniazide	75/50mg	Tablet	A	V
Rifampicin+Isoniazide+Pyrazinamide	75/50/150mg	Tablet	A	V
Rifampicin+Isoniazide+Pyrazinamide+Ethambutol	150/75/400/275 mg	Tablet	A	V
Antivirals for systemic use				
Acyclovir	50mg/ml	injection	C	E
Acyclovir	200mg	Tablet	A	E
Antivirals				
Abacavir+Lamivudine	120mg+60mg	Tablet	A	V
Abacavir+Lamivudine	600+300mg	Tablet	A	V
Dolutegravir	10mg, 50mg	Tablet	A	V
Lamivudine	50mg/5ml	Solution	A	V
Lopinavir+ Ritonavir	40+10mg	Granules	A	V

MEDICINE	STRENGTH	DOSAGE FORM	LEVEL OF USE	VEN
Antivirals - continued				
Lopinavir+ Ritonavir	(80mg+20mg)/ml	Solution	A	V
Lopinavir+ Ritonavir	100+25mg	Tablet	A	V
Lopinavir+ Ritonavir	200+50mg	Tablet	A	V
Nevirapine	50mg/5ml	Suspenson	A	V
Tenofovir+Lamivudine+Dolutegravir	300mg+300mg+50mg	Tablet	A	V
Tenofovir+Lamivudine+Efavirenz	300mg+300mg+400mg	Tablet	A	V
Zidovudine	50mg/5ml	Solution	A	V
Zidovudine+Lamivudine	300+150mg	Tablet	A	V
Zidovudine+Lamivudine	60mg+30mg	Tablet	A	V
Antimalarials				
Artemeter-Lumefantrine	20/120mg	Tablet	A	V
Artesunate	60mg	injection	B	V
Mefloquine	250mg	Tablet	A	E
Primaquine	7,5mg	tablet	A	V
Quinine	600mg	injection	B	V
Quinine	300mg	Tablet	B	V
Immune sera and immunoglobulins				
Antivenom polyvaleny		injection	B	V
Rabies vaccine		injection	B	V
Rabies immunoglobulin		injection	B	V
MUSCULOSKELETAL SYSTEM (11)				
Anti-inflammatory and antirheumatic products (including paracetamol)				
Diclofenac	25mg	Suppository	B	E
Diclofenac Sodium	75mg/3ml	Injections	A	V
Ibuprofen	100mg/5ml	Syrup	A	E
Ibuprofen	200mg	Tablets	A	E
Mefenamic Acid	50mg/5ml	Tablets	C	E
Paracetamol	125mg	suppository	B	E
Paracetamol	120mg/5ml	Syrup	A	E
Paracetamol	1g	injection	B	E
Muscle relaxants				
Atracurium	50mg	injection	B	V
Orphenadrine	50mg	Tablets	B	E
Pancuronium	10mg	injection	B	V
Rocuronium	50mg	injection	B	V
Suxamethonium	100mg	injection	B	V
NERVOUS SYSTEM				
General Anaesthetics				
Ketamine	50mg	injection	B	V
Propofol	1%	injection	B	V
Sodium Thiopentone	1mg/10ml	injection	B	V
Etomidate	2mg	injection	C	E
Erythromycin	125mg/5ml	Suspension	A	V

MEDICINE	STRENGTH	DOSAGE FORM	LEVEL OF USE	VEN
General Anaesthetics - continued				
Isoflurane	250ml	Liquid	B	V
Sevoflurane	250ml	Liquid	B	V
Halothane	250ml	Liquid	B	V
Local Anaesthetics				
Phenylephrine	2-10mcg	Injection	A	V
Dobutamine	5-10mcg/kg	Injection	S	E
Bupivaciane PLAIN	0,25mg	Injection	B	V
Bupivaciane with dextrose	5mg+80mg / ml	Injection	B	V
Prilocaine	2%	Injection	C	V
Resuscitation medicines				
Phenylephrine	2-10mcg	Injection	A	V
Dobutamine	5-10mcg/kg	Injection	S	E
Opiod Analgesics				
Morphine	5mg, 20mg	Solution	B	E
Morphine	15mg	Injection	B	E
Paracetamol+codeine phosphate	500+8mg	Tablet	B	N
Fentanyl	500mcg	Injection	B	E
Tilidine	2,5mg/ml	Drops	C	E
Anti-epileptics				
Carbamazepine CR	200mg,	Tablets	B	V
Clonazepam	0.5mg, 2mg	Tablets	B	E
Lamotrigine	25mg	Tablet	B	E
Levetiracetam	500mg/5ml	Injection	B	E
pentobarbitone	200mg	Injection	B	E
Phenobarbitone	200mg	Injection	B	E
Fosphenytoin	100mg	Injection	C	N
Phenytoin	250mg	Injection	B	E
Sodium valproate	100mg	Injection	B	E
Sodium valproate CR	200mg	Tablets	B	E
Sodium valproate CR	200mg/5ml	Syrup	B	E
Anticholinergics				
Biperiden	2mg	Tablet	B	E
Biperiden	2mg/ml	Injection	B	E
Trihexyphenidyl	2mg	Tablet	B	E
Anti-psychotic agents				
Chlorpromazine	100mg	Injection	C	E
Flupenthixol decanoate	200mg/ml	Injection	C	V
Haloperidol	1,5mg, 5mg	Tablets	B	E
Haloperidol	5mg/ml	Injection	C	V
Olanzapine	5mg, 10mg	Tablets	B	E
Quetapine	25mg	Tablets	C	E
Risperidone	2mg	Tablets	B	E
Risperidone	25 mg	Injection	B	E

MEDICINE	STRENGTH	DOSAGE FORM	LEVEL OF USE	VEN
Anti-psychotic agents - continued				
Sulpiride	50mg, 200mg	Tablets	B	E
Zuclopenthixol decanoate	200mg	Injection	C	E
Anxiolytics				
Clonazepam	0.5mg	Tablets	B	N
Diazepam	10mg/ml	Injection	B	V
Lorazepam	1mg, 4mg	Tablet	B	E
Lorazepam	4mg/ml	Injection	B	E
Midazolam	10mg	Injection	B	E
Antidepressants				
Amitriptyline	25mg, 50mg	Tablet	A	E
Fluoxitine	10mg, 20mg	Tablet	B	E
Sertraline	50mg	Tablet	A	N
Duloxetine	20mg	Tablet	B	E
Psychostimulants				
Methylphenidate	10mg	Tablet	S	N
Caffeine	500mg	Injection	S	E
Caffeine	100mg	Tablet	S	E
ANTIPASITIC PRODUCTS, INSECTICIDES & REPELLANTS				
Antiprotozoal				
Metronidazole	200mg	Tablet	A	V
Metronidazole	500mg	Injection	B	V
Metronidazole	125mg/5ml	Tablet	A	V
Antihelminthics				
Albendazole	100mg/5ml	Suspension	A	V
Albendazole	200mg	Tablet	A	V
Mebendazole	250mg	Tablets	A	E
Praziquantel	600mg	Tablet	A	E
RESPIRATORY SYSTEM				
Nasal decongestant & other decongestants for topical use				
Fluticasone	100mcg	Nasal spray	B	E
Xylometazoline	0.10%	Nasal drops	B	E
Ephedrine	0.50%	Nasal drops	B	E
Beclomethasone diproprionate	0.05%	Nasal spray	B	V
Sodium Chloride	0.90%	Nose drops	A	E
Anti-asthmatics				
Beclomethasone inhaler	100mcg	Inhaler	B	V
Budesonide	100mcg	Inhaler	B	E
Montelukast	10mg	Tablet	B	E
salbutamol inhaler	100mcg	Inhaler	A	V
Ipratropium Bromide + Salbutamol	0,5mg+2,5mg	Nebuliser	A	E
Salmeterol	50mcg	Inhaler	B	E
Theophylline SR anhydrouse	200mg	Tablet	S	E

MEDICINE	STRENGTH	DOSAGE FORM	LEVEL OF USE	VEN
Systemic Antihistamines				
Chlorpheniramine	4mg	Tablet	A	E
Chlorpheniramine	2mg/5ml	Syrup	A	E
SENSORY ORGANS – OPTHALMOLOGICALS				
Anti-infectives				
Acyclovir	1%	Ointment	C	V
Chloramphenicol	0.01	Eye Ointment	A	V
Chloramphenicol	0.01	Eye drops	A	E
Ciprofloxacin	0.3%	Eye drops	B	V
Gatifloxacin	0.3%	Eye drops	S	E
Gentamycin	0.003	Eye drops	B	E
Moxifloxacin	0.3%	Eye drops	S	V
Natamycin	0.05	Eye drops	C	V
Natamycin	0.05	Ointment	C	V
Ofloxacin	0.003	Eye drops	C	V
Tetracycline	0.01	Eye Ointment	A	E
Corticosteroides				
Prednisolone	0.001	Eye Drops	C	V
Dexamethasone	0.001	Eye Drops	B	V
Hydrocortisone	0.01	Eye Drops	B	E
Betamethasone	0.1%	Eye drops	B	V
Fluorometholone	0.001	Eye Drops	B	N
Corticosteroides & Anti-infectives in combination				
Dexamethasone + chloramphenicol	0.1% + 0.5%	Eye drops	B	V
Dexamethasone+ chloramphenicol + neomycin	0.1% + 0.5% + 0.35%	Eye drops	B	N
Antiglaucoma and Miotics				
Acetazolamide	250mg	Tablet	B	E
Dorzolamide	10 mg/mL	Eye drops	C	V
Timolol	0.25%, 0.5%	Eye Drops	B	V
Betaxolol	0.25% or 0.5%	Eye Drops	C	E
Latanoprost	0.005%	Eye drops	B	V
Prostamide bimatoprost	0.03%	Eye drops	C	E
Pilocarpine	10 mg/0.5 mL	Injection	C	E
Pilocarpine hydrochloride	2%	Eye drops	C	V
Glycerin / glycerol	-	Solution	B	E
Brimonidine	0,15%,0,2%	Eye drops	C	E
Fixed Combinations				
Timolol+Latanoprost (Ganforte)	0.5%+ 0.03%	Eye drops	C	E
Timolol+Brimonidine (Combigan)	0.5%+0.2%	Eye drops	C	E
Mydriatrics and Cycloplegics				
Atropine	10mg/ml	Eye Drops	B	E
Homatropine	0.02	Eye Drops	B	E
Decongestants ant ant-allergics				
Oxymetazoline	0,005% v/v	Eye Drops	A	E

MEDICINE	STRENGTH	DOSAGE FORM	LEVEL OF USE	VEN
Decongestants ant ant-allergics - continued				
Sodium chromoglycate	2%v/v	Eye Drops	A	E
Antazoline+tetrazoline	0,5+0,4 mg/ml	Eye Drops	B	E
Anaesthetics				
Oxybuprocaine hydrochloride	0.40%	Eye Drops	B	E
Tear replacements				
Hydroxypropyl methylcellulose	0.02	Eye Drops	C	V
Polyacrylic acid	2 mg/g	Liquid gel	C	N
Tears Naturelle®	—	Eye drops	B	N
Diagnostic agents				
Balance salt solution (BSS) vacolitres for cataract surgery	-	Solution	B	V
Fluoresin sodium	1mg	Paper strip	B	E
Flurescein	1%	Eye Drops	B	E
Intra-ocular lenses (various powers) posterior chamber and anterior chamber	-	Lense	C	V
Methylene Blue		Solution	C	V
SENSORY ORGANS-OTOLOGICALS				
Anti-infectives				
Chloramphenicol	0.50%	Eye Drops	B	N
Acetic acid	2%	Eye Drops	B	N
Ciprofloxacin	0.30%	Eye Drops	B	E
Clotrimazole	1%	Eye Drops	B	V
SENSORY ORGANS-VARIOUS				
Anti - Poisoning agents				
Flumazenil	0,1mg/ml	Injection	B	E
Activated charcoal	100mg	Tablet	A	E
Pralidoxime	300mg/ml	Injection	B	V
Potassium permanganate	400mg	Tablet	A	E
Sorbitol	70%	Solution	A	E
Acetylcysteine	500mg	Tablet	B	E
N-acetylcysteine	200mG	Injection	B	E
Desferrioxamine	500mg	Injection	B	E
Naloxone	0,4mg/ml	Injection	B	V
Glycopyrrolate	0,2-0,4mg/ml	Injection	B	V
Neostigmine	1mg/ml	Injection	A	V
Dopamine	40mg	Injection	C	E
Ipecacuanha	0.14%	Syrup	A	E
Glucagon	1mg	Injection	B	E
Methionine	2,5g	Injection	B	E
Alcohol (whisky or brandy)	40%	Solution	C	N
Medical gases				
medical oxygen	100%	Gas	A	V
Nitrous oxide	100%	Gas	B	V

MEDICINE	STRENGTH	DOSAGE FORM	LEVEL OF USE	VEN
DENTAL AND ORAL CONDITIONS				
Hydrogen peroxide mouth wash	3%	Solution	A	V
Amlexanox paste	5%	Paste	C	E
Miconazole	2%	Oral gel	A	E
Nystatin	100 000 IU	Suspension	A	E
ONCOLOGY				
Tx of hypercalcaemia				
Medicines used in oncology				
Bevacizumab (avastin)	25mg/ml	Intravitreal	S	V
Denosumab	120mg/1,7ml	Injection	S	E
Filgrastim	30Mio.IU/d	Injection	S	E
Gallium nitrate	200mg/m2	Injection	S	E
Lenograstim	5-10mcg/d	Injection	S	E
Pamidronate	60-90mg	Injection	S	E
Zoledronic acid	4mg	Injection	S	E
Doxorubicin	50mg	Injection	C	E
Paclitaxel	100mg	Injection	C	V
Aprepitant	125mg/80mg	Capsules	C	E
Granisetron	3mg/3ml	Injection	C	E
Ondansetron	8mg/4ml	Injection	C	E
Hydroxyurea	200mg	Injection	S	E
Methotrexate	2,5mg	Tablet	S	E
VACCINES AND TESTS				
Bacillus Calmette–Guérin (BCG)		Injection	A*	V
Diphtheria+pertussis+Tetanus (DPT)		Injection	A*	V
Diphtheria+Tetanus (DT)		Injection	A*	V
Hepatitis B		Injection	A*	V
Human papillomavirus vaccines (HPV)		Injection	A*	V
Inactivated polio vaccine (IPV)		Injection	A*	V
Measle+Rubella (MR)		Injection	A*	V
Oral polio vaccine (OPV)		Oral drops	A*	V
Pentavalent combination vaccine (DPT-Hep B/Hib)		Injection	A*	V
Pneumococcal Conjugate Vaccine (PCV)		Injection	A*	V
Rotarix		Injection	A*	V
Tetanus+diphtheria (Td)		Injection	A*	V
Tetanus immunoglobulin	250 IU/2ml	Injection	A*	V
Tetanus toxoid	40 IU/5ml	Injection	A*	V
Tuberculin, Mantoux test (diagnostic)		Injection	A*	V
Tuberculin, TINE test (screening)		Dry Powder	A*	E
Typhoid		Injection	A*	V
Yellow fever		Injection	A*	V
NUTRITIONALS				
F - 75		Powder	B	E
F - 100		Powder	B	E
Plumpy nut		-	B	E

World Health Organization

PEPFAR
U.S. President's Emergency Plan for AIDS Relief

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