Emergency Triage Assessment and Treatment Plus (ETAT+)

1st edition: January 2017

SIERRA LEONE

National Training Manual

Foreword

Child health in Sierra Leone is a key priority of the Ministry of Health and Sanitation, and the continued improvement of the child mortality rate continues to be central to the Ministry's efforts. Sierra Leone has one of the highest rates of child mortality in the world, and has been greatly challenged after the Ebola outbreak ended in 2015. There was a rundown of the health system during the outbreak, as all funds were directed towards ending the surge of Ebola. In view of this, the triage system was directed towards capturing Ebola suspected cases, and this was general, involving both adults and children. As a result, there were substantial delays between arrival and treatment for sick children presenting to hospital.

This manual and its accompanying guidelines mark a new phase in the continued development of healthcare for Sierra Leone's children: a national standard of care for emergency treatment in the hospital setting. Of all the children that die in hospital, 50% will die in the first 24 hours of admission. Many of these deaths could be prevented by the implementation of simple measures. Early recognition of the sick child and prompt appropriate treatment can save many lives. By the time they arrive at a referral hospital, children are often severely unwell, and further delays may be fatal. If a system of triage is in place, the sickest children can be identified, and their treatment commenced, without delay. That treatment should be prompt and efficient, with all members of the team working to a clear plan.

The WHO Emergency Triage, Assessment and Treatment Plus (ETAT+) guidelines are widely acknowledged to provide a strong, evidence-based platform for the provision of emergency treatment to acutely unwell children in African hospitals. For over thirty years, the World Health Organisation and other partners have been investigating which signs and symptoms best identify the sick child. ETAT+ is based on those signs and symptoms and offers a clear framework for the recognition and triage of the sick child. Once the sick child has been identified, the ETAT+ guidelines provide a systematic approach to their assessment and treatment.

This ETAT+ manual has been updated, adapted, and expanded, so that it is tailored to the needs of healthcare in Sierra Leone. With the implementation of this guidance across secondary care in the country, we will see a significant fall in the number of children who die in hospital. I commend this manual and its accompanying guidelines to you, the frontline healthcare worker, and I urge you to take on the task of making the practice described in the pages of this manual a reality across the districts of our country.

Dr Brima Kargbo
Chief Medical Officer
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Acknowledgements

These guidelines were developed thanks to the unstinting efforts of a large team of people from many different agencies, who are committed to improving the care of children in hospital in Sierra Leone.

The ETAT working group of the Child Health EPI team gave many hours of work to updating and revising the existing documentation, to produce guidance that is most relevant to paediatric care in Sierra Leone. The dedication of the Child Health team to saving children's lives is evidenced by the quality of this material, and will continue to be demonstrated by its implementation across the country.

The group's work was greatly enhanced by the assistance provided by the World Health Organisation, the Royal College of Paediatrics and Child Health, members of staff from Ola During Children's Hospital, and Dr Paul Gibson, and we gratefully acknowledge their support. We would also like to acknowledge the important technical expertise provided by Dr Sandra Dankwa and Dr Christopher Hands.

Lastly, we would like to express our appreciation to the United Kingdom's Department for International Development for funding this project as part of the President's Post-Ebola Recovery Priorities.

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Contents

1.Introduction

A two-year-old girl is carried into the children's section of the outpatient department in her mother's arms. She appears to be asleep. At the triage desk, the nurse notices that the girl is in respiratory distress, and she is taken straight into the resuscitation room for emergency treatment. She is noted to have deep acidotic breathing. In the resuscitation room, she is given oxygen from an oxygen concentrator. Her hands are cold to touch, the capillary refill time is prolonged to four seconds, she looks very pale, and she is suspected to be anaemic. An intravenous cannula is inserted. A blood sample is taken at the same time for blood glucose level, haematocrit and other investigations. Her blood glucose level is 1.1 mmol/L and her haemoglobin concentration is 2.1 g/dL, with a positive malaria test. She is immediately given a bolus of dextrose, a dose of artesunate, and blood grouping and cross matching is performed. Within seconds of the dextrose being started, the child is opening her eyes. It is only 10 minutes since the little girl came through the outpatient department door. She has been given all the appropriate emergency treatments, and she is waiting for her blood transfusion to commence. It is now time for a full history and examination to make a definitive diagnosis. She is diagnosed as having severe malaria with anaemia and hypoglycaemia. However, before we come to this diagnosis no time is wasted, and her condition was stabilised based on a few key signs and symptoms.

This was good triage and emergency management. Would it have happened like this in your hospital? This training manual has all the necessary knowledge and skills for the triage and emergency management of sick children. Deaths in hospital often occur within 24 hours of admission. Many of these deaths could be prevented if very sick children are identified soon after their arrival in the health facility, and treatment is started immediately. Therefore, a process of rapid triage for all children presenting to hospital needs to be put in place, to determine whether any emergency or priority signs are present. Triage may be done in 15-20 seconds by medical staff or by non-medical staff (after appropriate training) as soon as the child arrives, and no special equipment is needed for this. Once emergency signs are identified, prompt emergency treatment must be given to stabilise the condition of the child.

Objectives

The purpose of this reference manual to support learning of ETAT + principles and to complement your clinical training and practice. The manual is for use before, during, and after an ETAT + course.

This manual contains the necessary information to help you to:

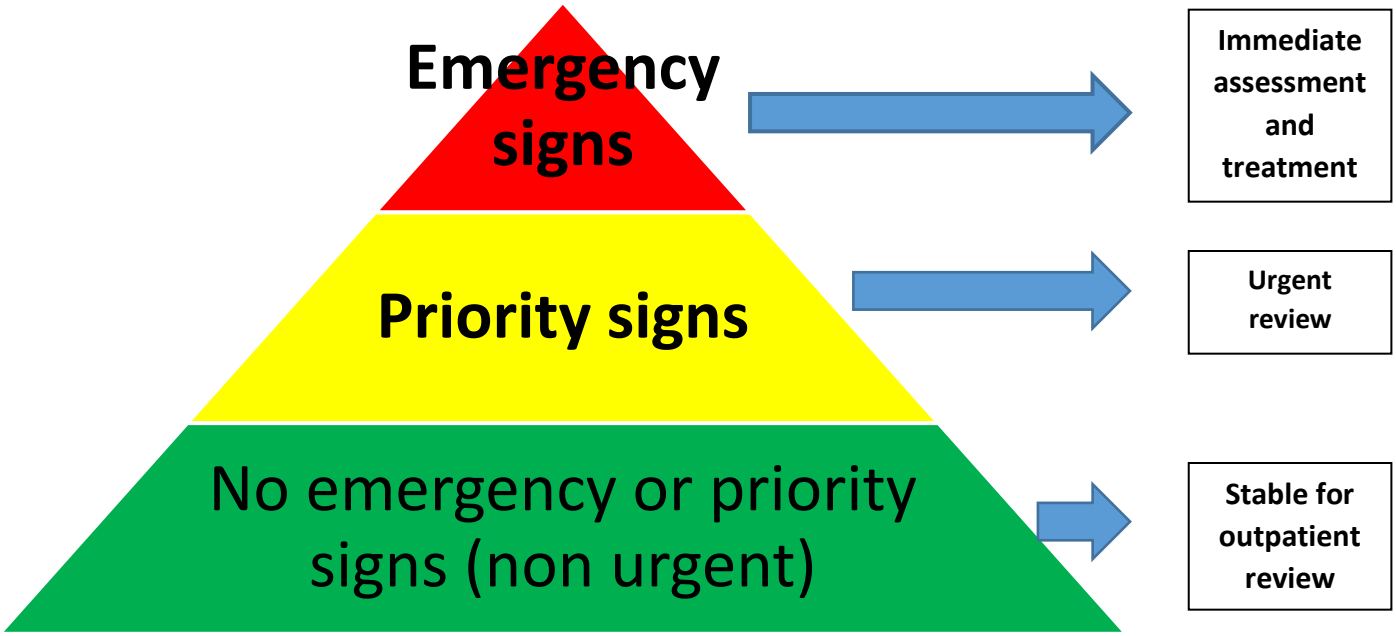
- Triage all sick children when they arrive at a health facility, into the following categories:
  - those with emergency signs
  - those with priority signs
  - those who are non-urgent cases
- Assess a child's airway and breathing and give appropriate treatments
- Assess the child's circulatory status and level of consciousness
- Manage shock, coma, and convulsions in a child
- Assess and manage severe dehydration in a child with diarrhoea
- Plan, implement, and evaluate ETAT in your own working area in your hospital

2.Triage and the “ABCD” concept

Triage is the process of identifying and separating stable patients and sick patients. The purpose of triage is to determine which group of patients needs to be treated first depending on the severity of their condition. Patients who present with immediately life threatening conditions are described as having emergency signs and should receive immediate intervention. The next group of patients that need to be seen soon are described as having priority signs. Children or babies with priority signs need to be assessment and managed quickly because they have conditions or signs that without rapid management might also develop into emergencies.

At triage, children should be divided into 3 groups:

- **Emergency signs**
- **Priority signs**
- Queue/non-urgent (no emergency or priority signs)



2.1. The ABCD concept

A	**A**irway
B	**B**reathing
C	**C**irculation **C**oma **C**onvulsion
D	**D**ehydration (Severe)

Triage of patients involves looking for signs of serious illness or injury. These emergency signs relate to the **Airway-Breathing-Circulation/Consciousness-Dehydration** and are easily remembered as "**ABCD**". Each letter refers to an emergency sign which, when positive, should alert you to a patient who is seriously ill and needs immediate assessment and treatment.

2.2. The triage process

Triaging should not take much time. For a child who does not have emergency signs, it takes on average 20 seconds. The health worker should learn to assess several signs at the same time. A child who is smiling or crying does not have severe respiratory distress, shock or coma. The health worker looks at the child, observes the chest for breathing and priority signs such as severe malnutrition, and listens for abnormal sounds such as stridor or grunting.

When and where should triage take place?

Triage should be carried out as soon as a sick child arrives in the hospital, well before any administrative procedure such as registration. This may require reorganizing the flow of patients in some locations. Triage can be carried out in different locations – for example in the outpatient queue, in the emergency room, or in a ward if the child has been brought directly to the ward at night. In some settings, triage is done in all these places. Emergency treatment can be given wherever there is room for a bed or trolley for the sick child and enough space for the staff to work on the patient, and where appropriate drugs and supplies are easily accessible. If a child with emergency signs is identified in the outpatient queue, he/she must quickly be taken to a place where treatment can be provided immediately, e.g. the emergency room or ward.

Who should triage?

All clinical staff involved in the care of sick children should be prepared to carry out a rapid assessment to identify the few children who are severely ill and require emergency treatment. If possible, all such staff should be able to give initial emergency treatment, as described in the flowcharts and treatment charts. In addition, people such as security personnel, record clerks, and cleaners, who have early patient contact, should be trained in triage for emergency signs, and should know where to send people for immediate management.

How do you triage?

Keep in mind the **ABCD** steps: Airway, Breathing, Circulation, Coma, Convulsion and Dehydration.

To **assess if the child has airway or breathing problems** you need to know:

- ✓ Is the child breathing?
- ✓ Is the airway obstructed?
- ✓ Is the child blue (centrally cyanosed)?

Look, **listen** and **feel** for air movement and sounds such as stridor.

Does the child have severe respiratory distress or central cyanosis?

Is the child having trouble breathing, so that it is difficult to talk, eat or breastfeed?

Is he breathing very fast and getting tired, does he have severe chest in-drawing or is he using accessory respiratory muscles?

To **assess if the child has circulation problems** you need to know:

- ✓ Does the child have warm hands?
- ✓ If not, is the capillary refill time longer than 3 seconds?
- ✓ And is the pulse weak and fast?

In the older child the radial pulse may be used; however, in the infant, the brachial or femoral pulses may need to be felt.

To **assess for coma** you need to know:

A rapid assessment of conscious level can be made by assigning the patient to

one of the **AVPU** categories:

- ✓ **A A**lert
- ✓ **V** responds to **V**oice
- ✓ **P** responds to **P**ain
- ✓ **U U**nresponsive

A child who is not alert but responds to voice is lethargic. If the assessment shows that the child does not respond to voice and only responds to pain (with targeted or untargeted movements), or does not respond at all, the level is “P” or “U”. We then refer to that child as having coma and the child needs to be treated accordingly.

To **assess for dehydration** you need to know:

- ✓ Has the child had diarrhoea?
- ✓ If the child is lethargic or unconscious
- ✓ If the child has sunken eyes
- ✓ If the skin pinch goes back very slowly

When **ABCD** has been completed and there are no emergency signs, continue to assess the priority signs.

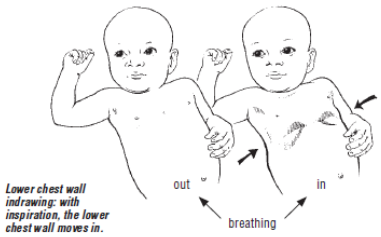
Should you reassess?

During and following emergency treatment, the child should be re-assessed using the complete ABCD process. The disease course is dynamic and there could be new developments within a short time. Reassessment should begin with assessment of the airway and follow the ABCD pattern.

2.3. Emergency signs

Airway and **B**reathing

- Obstructed or absent breathing *or*
- Central cyanosis *or*
- Severe respiratory distress



Lower chest wall indrawing: with inspiration, the lower chest wall moves in.

Circulation

SHOCK:

- Cold skin WITH
  - Capillary refill longer than 3 seconds
  - AND Weak and fast pulse

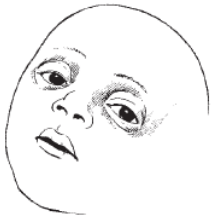
Coma/**C**onvulsion

- Unconscious
- Convulsing (now)

Severe **D**ehydration

Diarrhoea plus **2** of:

- Lethargy
- Sunken eyes
- Very slow skin pinch
- Unable to drink/drinking poorly


Sunken eyes

2.4. Priority signs

3 T	**T**rauma (major) **T**iny (<2months) **T**emperature (>39º **or** <35.5ºC)
3 P	**P**allor (severe) **P**ain (severe) **P**oisoning
3 R	**R**estless, irritable, lethargic **R**espiratory distress **R**eferral (urgent)
MOB	**M**alnutrition (severe visible wasting) **O**edema (both feet) **B**urns

Summary

Triage is the sorting of patients into priority groups according to their needs.

All children should undergo triage. The main steps in triage are:

- ✓ Look for emergency signs.
- ✓ Treat any emergency signs you find.
- ✓ Look for any priority signs.
- ✓ Place priority patients at the front of the queue.
- ✓ Move on to the next patient.

Triage should be carried out quickly. You will soon learn to observe several things at once. For example, when assessing the airway and breathing you may note that the baby is very small or is restless. With practice, a complete triage (if no emergency treatment is needed) takes less than a minute.

Assessment Questions

2-year-old Aminata is carried into the triage area by her mother, who says that Aminata has had watery diarrhoea for 4 days, is vomiting, and is unable to drink. She is lethargic and looks floppy. Her lips and tongue are blue, and her breathing looks difficult. Her eyes are sunken. Her hands and feet feel cold to touch and her capillary refill time is 6 seconds. She is not responding to her mother's voice but moans when a cannula is inserted. Her buttocks look wasted and you notice that she only weighs 6kg.

1) Now let us triage Aminata together

   a) How is Aminata's airway? Is It open? If so how do you know?

   b) What can you tell me about Aminata's breathing?

   c) Did you notice any problems with Aminata's circulation?

   d) What is Aminata's AVPU score?

   e) What signs of dehydration does Aminata have?

2) Are there any emergency signs present and if so which ones?

3) Are there any priority signs present and if so which ones?

4)How would you triage this child, to emergency, priority or queue?

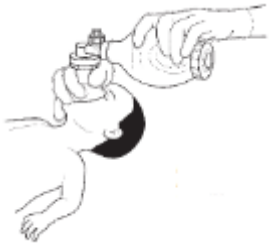
3. Basic Life Support: assessing and managing the collapsed child

This protocol describes how to approach a collapsed child, and when and how to undertake cardiopulmonary resuscitation. This protocol should be followed in any child who is collapsed or unresponsive. If the child is found to be breathing regularly and to have a heart rate above 60bpm, then the child should be assessed using the protocol for assessment of a sick child. The basic life support algorithm follows a **SSSS ABC** approach and stands for:

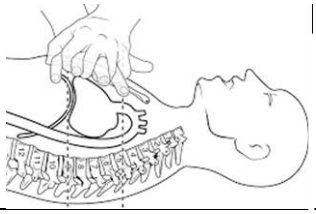
SSSS: safety, **setting**, **stimulate**, **shout** for help

A: Airway
B: Breathing
C: Circulation

<table>
<tr><td>Assess a collapsed child</td><td>Safety First!
Stimulate
Shout for help
Setting</td><td>Personal Protective Equipment, safe environment
Call to the child; move the child
Get more hands to help you
Is the child in the appropriate setting for resuscitation?</td></tr>
<tr><td>Open the airway</td><td colspan="2">Open the airway
▪ Head tilt, chin lift, or jaw thrust
Position airway
▪ Neutral position for infants
▪ Sniffing the morning air for older children
  </td></tr>
<tr><td>Check for adequate breathing</td><td colspan="2">Once the airway has been positioned and cleared
▪ Look rise and fall of the chest
▪ Listen for breathing sounds
▪ Feel for breath on your face
  </td></tr>
<tr><td>Give 5 rescue breaths</td><td colspan="2">If not breathing, start bag valve mask ventilation
• deliver oxygen to the lungs and circulation
• ideally with a reservoir bag and oxygen

Bag valve mask ventilation (BVM) technique
• Select appropriate mask
• Make sure there is a good seal
• Gently squeeze the bag until you see the chest rise
• Attach oxygen (if available)
 

Too little: not enough oxygen into the lungs
• If there is a bad seal, use a two-person technique
• If the airway is obstructed, reposition the head
Too much: air into the stomach
• Pass a nasogastric tube, and aspirate</td></tr>
</table>

<table>
<tr><td>Check for signs of life</td><td colspan="2">No signs of life?
• no breathing
• no pulse or a slow heart rate: less than 60bpm</td></tr>
<tr><td>Chest compressions</td><td colspan="2">If no signs of life, start chest compressions
• Aim: to get blood flow to organs (heart, brain)
Chest compressions - technique
• Over lower half of the chest
• Ratio: 15:2 (15 compressions: 2 breaths)
• Rate: 100 to 120bpm
• Depth: one third of the chest
• Equal time for compression and relaxation
• Firm, flat surface, resus board
 
  </td></tr>
<tr><td>Chest compressions</td><td>Infant
• Two fingers: for one rescuer
• Two thumbs: for two rescuers
(more effective: recommended)</td><td>Child
• Two handed chest compressions
• Heel of lower hand on the lower end of the sternum
• Second hand placed on top of the first
• Elbows straight, shoulders over the hands</td></tr>
</table>

Adrenaline

- Dose 0.1ml/kg (10mcg/kg)
- Concentration 1:10,000 (must be diluted from the 1:1000)
- Give adrenaline immediately and after every other cycle (every 3-4 minutes)

Cycles

- 15 chest compressions to 2 breaths
- Every 2 minutes, check for the pulse or signs of life

When to stop?

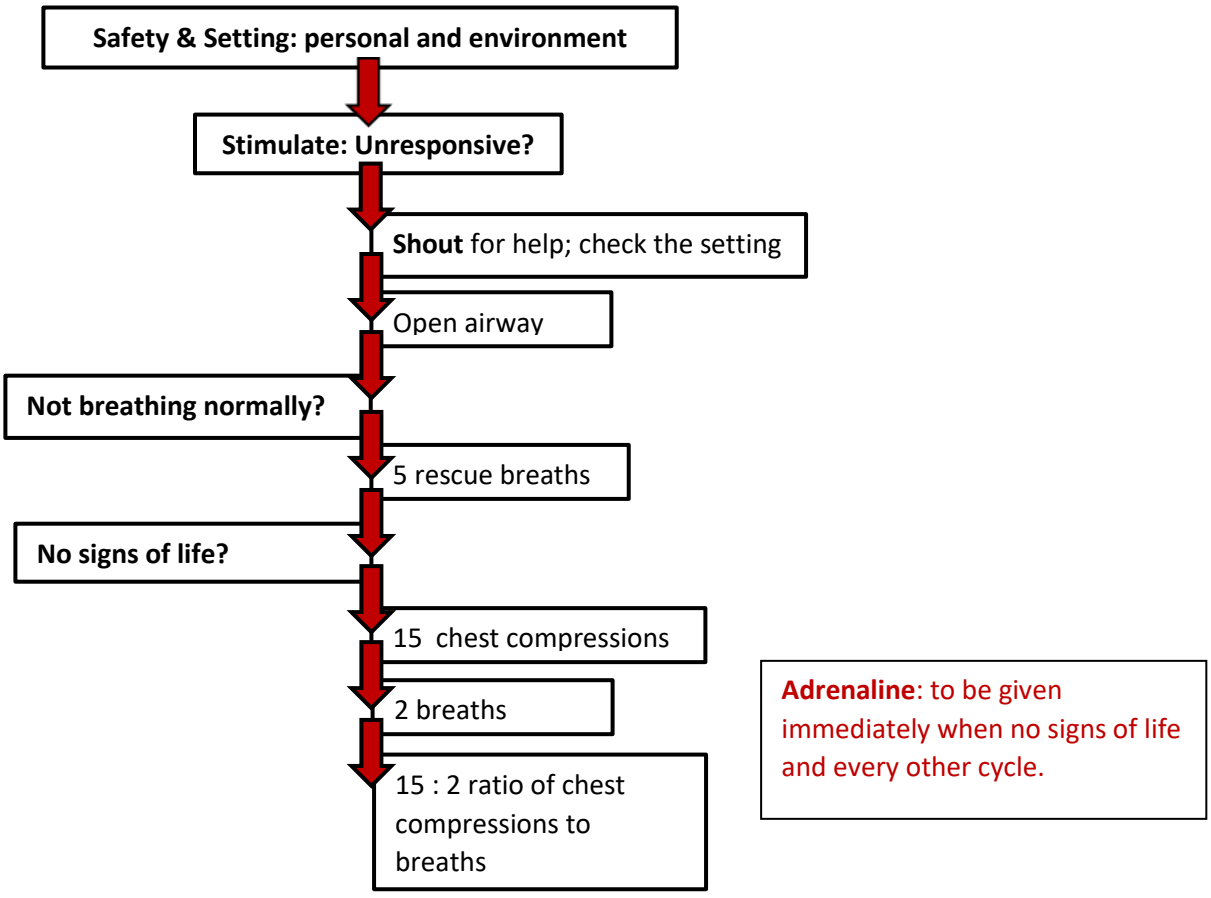
- If the patient shows signs of life
- If the patient, even after CPR, does not show signs of life and the team think it is time to stop

Documentation

- Date
- Time
- Who was present?
- How many cycles?
- Which drugs given?
- Outcome (does the patient have a pulse or not?)
- Plan: if the patient is successfully resuscitated, to which ward should they go?

Summary Diagram of Basic Life Support

SSSS ABC approach



Summary

Basic life support is the protocol to manage any collapsed child. Don't forget your SSSS ABC approach

- ✓ Safety, stimulate, shout for help, setting
- ✓ A: ensure the Airway is open
- ✓ B: if the child is not breathing give 5 rescue breaths
- ✓ C: If the heart is not beating or beating slowly start CPR
- ✓ Call for help early

Assessment Questions

1) What does SSSSABC stand for?

2) Name 2 techniques for opening the airway

3) What 3 things should you do to assess whether a child is breathing?

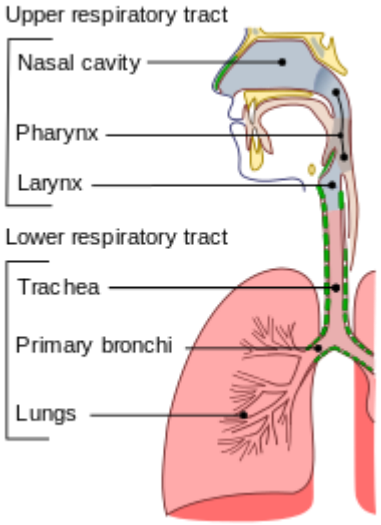
4) How many rescue breaths should you give?

5) When should you start chest compressions?

6) How many chest compressions to how many breaths should you give?

4. Airway & Breathing

Upper Airway	nose pharynx larynx
Lower Airways	trachea two main bronchi bronchi of the lung lobes (2 left, 3 right) bronchioles (smallest airways) alveolae (little balloons at the end of the airways)



4.1 Upper airways

4.1.2 Assessment of breathing: upper airway signs

A	**A**irway
B	**B**reathing
C	**C**irculation **C**oma **C**onvulsion
D	**D**ehydration (Severe)

How do you know if the airway is ok?

- Talking
- Crying
- Not cyanotic
- Alert

How do you know the airway has a problem?

Look	▪ Chest movement? ▪ Vomit, secretion or foreign body in the mouth ▪ Drooling ▪ Lethargy ▪ Central cyanosis
Listen	▪ Stridor ▪ No sound/apnoea ▪ Snoring ▪ Hoarse voice
Feel	▪ No breath on your cheek ▪ No/difficult chest movement
Measure	▪ Respiratory rate ▪ SpO_2

Treat	▪ Open airway
	▪ Position:
	  ○ Infant: neutral
	  ○ Child: sniffing the morning air
	▪ Jaw thrust
	▪ Give oxygen
	▪ Oropharyngeal (Guedel) or nasopharangeal (NP) airway
	▪ Consider NG tube to protect the lungs from aspiration of vomit

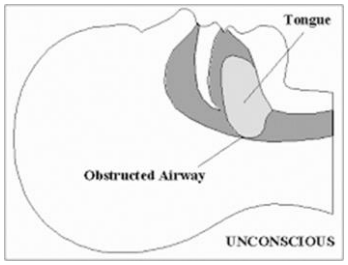
- Normal: unobstructed breathing
- Partial obstruction: stridor, snoring
- Complete obstruction: apnoea

Causes of airway obstruction

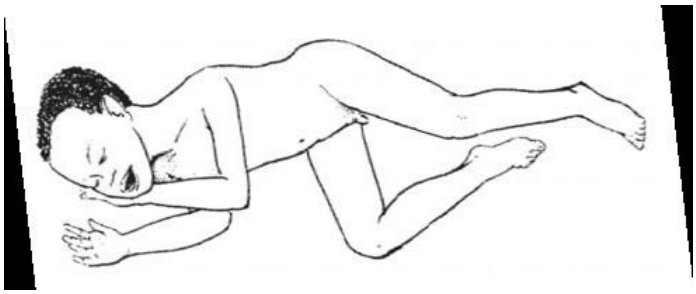
- **Unconsciousness**
- **Foreign body**
- **Infection (swelling)**
- **Anaphylaxis (swelling)**
- Inflammation: burns (swelling)
- Tumour/mass
- Secretions

4.1.2. Airway management for an unconsciousness child

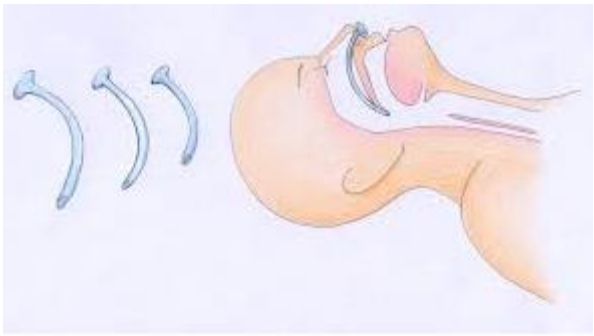
- Tongue obstructs pharynx (most common cause)
- AVPU: child with **P** (only responding to pain) or **U** (unconscious) is at risk of airway obstruction and aspiration
- Treatment: open airway (position head); recovery position; give oxygen jaw thrust; consider oropharyngeal or nasopharyngeal airway; consider NG tube insertion to aspirate stomach and prevent inhalation of stomach contents



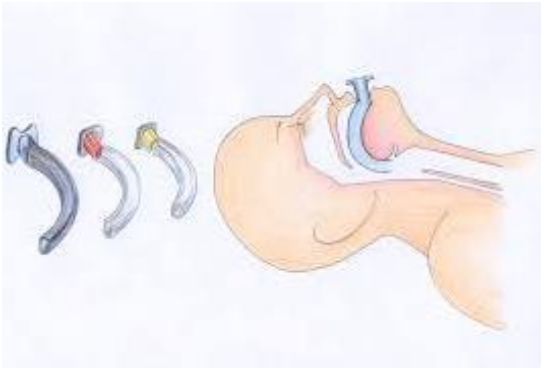
Jaw thrust being applied to an unconscious person



A child in the recovery position

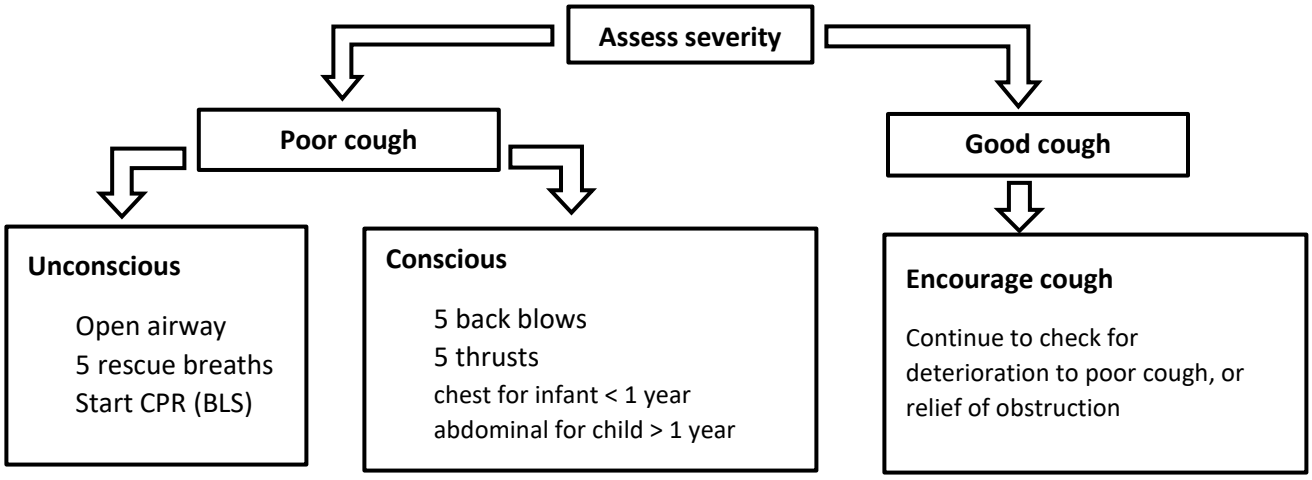


A nasopharyngeal airway inserted in an unconscious person



An oropharyngeal airway/Guedel inserted in an unconscious person

4.1.3. Management of the choking child



Management of foreign body aspiration (Chart 3, Chart 4 in WHO pocket book)

<u>Infant < 1 year</u>

Back blows

- Support babies neck with one hand
- Position baby head down with face lower than body
- Apply 5 back thrusts between the shoulder blades with one hand

Chest thrusts

- Turn baby over and support the neck
- Apply 5 chest thrusts using 2-3 fingers
- Compress around 1 inch deep

Repeat until object is removed or state of consciousness changes

<u>Child > 1 year</u>

Back blows

- Support the child to lean forward
- Apply 5 back thrusts between the shoulder blades with the palm of one hand

Abdominal thrusts

- Stand behind the child
- Put both arms around the upper body of the child.
- Make sure they are bending forwards
- Clench your fist and place it between the belly button and the bottom of their breastbone.
- Grasp your fist using your other hand and then pull sharply inwards and upwards.
- Repeat 5x

4.1.4. Recognition and management of upper airway infection

	Presentation	Treatment
Tonsillitis Bacterial or viral infection of tonsils	Commonly: sore throat, pain on swallowing, fever, with no airway problem Rarely: airway obstruction in severe tonsillitis • Child looks sick • Drooling: too painful to swallow • Fever • Dehydration • Occasionally stridor	Treatment of **tonsillar abscess** Sit the child up Oxygen Antibiotics: ceftriaxone 80mg/kg OD Dexamethasone IV: 0.15mg/kg, 4 doses in 24 hours Analgesia: ibuprofen, paracetamol IV fluid: maintenance
Epiglottitis Bacterial infection (commonly H. influenza) of the epiglottis causing swelling	• Sore throat: child drooling, difficulty swallowing, difficult speaking or crying • Soft stridor • Fever • Child looks very sick	Keep the child calm: sit the child up Give oxygen but don't upset the child Pass an IV line: most experienced person to do it Antibiotics: ceftriaxone 80mg/kg OD Dexamethasone IV: 0.15mg/kg, 4 doses in 24 hours Analgesia: Paracetamol, Ibuprofen IV fluid: maintenance Distressing the child might completely block their airway Prevention: Immunised children are protected
Croup Laryngotracheobronchitis Viral infection of larynx, trachea and bronchi	Usually children <2 yrs Commonly mild: • Fever • Hoarse voice • Barking cough • Stridor when child upset Rarely, can be serious: • Stridor when at rest • Respiratory distress: in-drawing of the chest	Keep the child calm and sit the child up Only give oxygen if hypoxic; it might upset the child Dexamethasone: 0.6mg/kg oral Antibiotics: not required (it's a virus) only give if the diagnosis is in doubt IV fluid: maintenance Distressing the child might completely block their airway

4.1.5. Recognition and management of Anaphylaxis (severe allergic reaction)

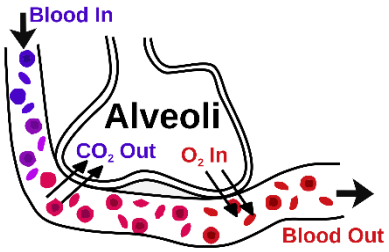
Anaphylaxis severe allergic reaction (for example to antibiotics, blood product, nuts)	Swelling of lips, mouth, tongue Stridor (upper airways) Wheeze (lower airways) Collapse (shock) Urticarial rash (skin) Vomiting, abdominal pain and diarrhoea (GI system)	Give oxygen IV access or IO Adrenaline: 0.15mls/kg 1:1000 IM every 5-15min (undiluted adrenaline) Hydrocortisone IV: 4mg/kg (max 100mg) Fluid bolus: Normal Saline or Ringer's Lactate 20mls/kg bolus

4.2. Lower Airways

4.2.1. Physiology: Gas exchange

The gas exchange (letting out carbon dioxide, taking in oxygen) takes place in the alveoli. The alveoli are surrounded by tiny blood vessels, capillaries). The blood comes from the body to the right side of the heart, and is then pumped into the lungs. The venous blood without oxygen has a dark red, slightly bluish colour. In the lung capillaries, the red blood cells take up oxygen. The oxygenated blood has a bright red colour.

A	**A**irway
B	**B**reathing
C	**C**irculation **C**oma **C**onvulsion
D	**D**ehydration (Severe)



4.2.2. Assessment of breathing: lower airway signs

Look	▪ Increased work of breathing: recession, nasal flaring, head bobbing, tracheal tug ▪ Fast breathing ▪ Lethargy ▪ Central cyanosis ▪ Unable to feed because of respiratory distress
Listen	▪ Gasping ▪ Grunting ▪ Audible wheeze ▪ Stridor ▪ Apnoea
Feel	▪ Equal chest movement
Measure	▪ Respiratory rate ▪ SpO_2
Treat	▪ Give oxygen if SpO_2 below 90% ▪ Specific treatments for specific findings/diseases

Normal respiratory rates in children

Count respiratory during 1 min *when the child is calm*

▪ < 2 months	≤ 60 breaths
▪ 2–11 months	≤ 50 breaths
▪ 1–5 years	≤ 40 breaths
▪ > 5 years	≤ 30 breaths

4.2.3. Oxygen therapy

4.2.3.1. When to start oxygen therapy

Severely ill children with

- Obstructed breathing
- Central cyanosis
- Severe respiratory distress
- Signs of shock
- Unconscious child
- SPO_2 <90%

4.2.3.2. Pulse oximetry

Pulse oximetry to guide when to start or stop oxygen therapy

- over 90%: keep reassessing SpO_2 and respiratory rate
- under 90%: give oxygen (face mask and reservoir bag), nasal cannula/prongs
- under 90% *and* no improvement with oxygen go back to A (assess airway) and consider starting Continuous Positive Airway Pressure

4.2.3.3. Oxygen Delivery

Delivery method	Flow required	% oxygen delivered	When to use it
Nasal prongs	0.5 – 1L Neonate 1-2L infant 2-4L older children	Up to 40%	SpO_2< 90% on room air
Face mask	>4L	Up to 60%	SpO_2 <90% on nasal cannula
Non-rebreathe mask	10-15L	Over 80%	SpO_2 <90% on face mask

4.2.4. Bronchiolitis

Age: Under 1 year of age

Cause: Viral infection with inflammation of the smallest airways (bronchioles)

Sometimes with pneumonia or other complications

History: Cold symptoms, cough, respiratory distress and low grade fever

Assessment:
- Runny nose, cold symptoms, cough, difficulty breathing and respiratory distress, mostly low grade fever, difficulty feeding
- Auscultation: crackles, often wheeze

Treatment:
- **Oxygen** if required
- **Supportive care**, help with feeding (NGT), IV Fluids
- Gentle nasal suction
- Nurse sitting up
- Antibiotics (to treat possible additional pneumonia)

4.2.5. Wheeze associated with cough or cold

Age: 1 to 2 years

Cause: viral infection of the airways, cough, cold

History: cold symptoms, cough and respiratory distress

Assessment:
- Respiratory distress (recession, nasal flaring, head bobbing, tracheal tug)
- Cough and cold symptoms
- Takes longer to breathe out
- Auscultation: wheeze, usually both lungs

Treatment:
- **Oxygen**
- **Salbutamol** puffs via spacer
- Check for improvement

4.2.6. Asthma

Age: older than 2 years

Cause: sensitive airways (bronchi). The bronchi get tight in the presence of a trigger.

History: previous episodes of shortness of breath or wheeze, history of asthma, allergy, use of inhaler (puff), triggers (exercise, infection, dust, allergies), history of night cough, shortness of breath

Assessment:
- Respiratory distress (recession, nasal flaring, head bobbing, tracheal tug)
- Auscultation: wheeze in the chest; less air entry
- Silent chest (cannot hear any breathing) if very severe
- Takes longer to breathe out
- Low grade or no fever

Treatment:
- Sit the child up
- Give oxygen if required
- **Salbutamol** puffs with spacer (give as needed, 6 to 10 puffs), then

Reassess after 15 – 20 min. Repeat if still no improvement.

- Don´t be afraid of overdosing
- Most cases can be managed by inhalers

Hydrocortisone IV or oral prednisolone

Salbutamol works by opening the small airways that become swollen but the medication needs to be given with a spacer for it to reach the lungs and will need to be repeated. The steroids are important to also reduce the swelling of the airways and improve the breathing.

<u>How to use a spacer</u>

The inhaler works much better with a spacer. The spacer contains air with a high concentration of salbutamol.

If the child breathes the air from the spacer, the salbutamol is transported into the airways deep in the lung. Smaller children need a mask for a seal between mouth and spacer, older children can manage with the mouthpiece of the bottle.

- The spacer should be clean
- Shake the inhaler

- The child should sit upright
- Make sure that the mask has a tight seal
- Give one puff and wait for 10 seconds/ or until the child has breathed for 3 to 5 times
- Don´t give more than one puff at one time

4.2.7. Pneumonia

Age: Possible in ALL age groups

Cause: bacterial (or viral) infection of the lungs. Oxygen cannot enter the blood from part of the lung with the infection and if it a large area the child can become hypoxic.

History: Fever, cough, respiratory distress, poor appetite, vomiting

Assessment:
- Respiratory distress (recession, nasal flaring, head bobbing, tracheal tug)
- Listen: decreased air entry into the lungs or noisy breathing
- **Severe pneumonia**: if the child is very lethargic or cannot drink; has severe respiratory distress; or has central cyanosis or SpO_2 <90%, the child must be admitted to hospital for intravenous antibiotics, and oxygen therapy where appropriate

Treatment:
- **Antibiotics**
- Give **oxygen** if there is central cyanosis, severe respiratory distress, or if the SpO_2 is <90%
- Treat for shock if present
- Maintenance fluid if unable to take NG or oral

Age	**Possible diagnosis**
under 1 year	Bronchiolitis Pneumonia
1 to 2 years	Viral induced wheeze Pneumonia
over 2 years	Asthma Pneumonia

Summary

Airway comes before breathing and should be assessed first because it can kill quickest.

- ✓ Stridor, no chest movement, drooling are signs that the airway is at risk
- ✓ If a choking child can cough well, then encourage coughing
- ✓ Try to find the cause of the airway problem and treat the cause
- ✓ If the child is in severe respiratory distress, or the oxygen saturations are <90%, give oxygen and sit the child up
- ✓ Give IV antibiotics promptly for severe pneumonia
- ✓ For asthma, salbutamol through a spacer is the best treatment

Assessment Questions

1) An 8-month-old boy was playing with his brother and swallowed a coin by accident. In the beginning he can cough, but by the time his father brings him to the hospital he is now coughing weakly.

a) What should you do?

b) After your intervention, he is still struggling to cough and his lips are blue. What are you going to do next?

2) A 4-year-old boy is brought to you in triage by his grandmother. She says that he has had a high fever for 2 days and is unable to eat or drink. When you look at the child he is drooling, and you hear a soft noise when he breaths in. He is unable to talk and when he tries to cry it sounds strange.

a) What do think is wrong with this child?

b) What immediate treatments would you give this child?

c) Would you directly examine this child's mouth or throat?

3) A 9-year-old girl comes to your hospital with her school nurse. The nurse says that the girl was playing in school and suddenly started coughing and looked like she was struggling to breath. When you examine her, she is too breathless to talk. She is in severe respiratory distress and you can hear wheezing. Her oxygen saturations are 82%.

a) What is the most likely diagnosis

b) Should you sit the child up or lie her flat?

c) What 3 treatments does she need urgently?

4) A 5-month-old baby is admitted with bronchiolitis and is too breathless to breastfeed. What other ways can you keep this baby hydrated?

5) A 5-year-old child arrives at the hospital with severe respiratory distress, and is placed on oxygen support. Her mother tells you she has had coughing for 3 days and very high fever. What is the most likely cause of her respiratory distress?

6) Is stridor a sound you hear when a child is breathing in or breathing out?

7) Is wheeze a sound you hear when a child is breathing in or breathing out?

5. Circulation

A	**A**irway
B	**B**reathing
C	**C**irculation
	Coma **C**onvulsion
D	**D**ehydration (Severe)

5.1 Pathophysiology of impaired circulation and shock

Circulation is the transport of oxygenated blood with glucose to all body tissues. A good circulation requires

- a heart with good pumping function
- healthy blood vessels (arteries, capillaries, veins)
- normal blood volume

Blood has two components:

- cell: mainly red blood cells white blood cells and platelets
- fluid: called plasma.

Red blood cells are small discs that contain haemoglobin (Hb). Haemoglobin holds on to oxygen in the lungs and delivers it to the tissues. Glucose and other nutrients the tissues require are also transported in the blood, and waste products are removed. Blood has also an important role in fighting infections (immune system) and in mending injured blood vessels (blood clotting).

What is impaired circulation?

Impaired circulation is seen when the circulation is not working effectively but the body is trying to compensate. In impaired circulation, the child will have some of the features of shock but not all of them.

What is shock?

Shock: is a condition in which there is too little blood carrying glucose and oxygen to important organs. Organs don´t work well without oxygen and glucose, and can be permanently damaged in shock

- heart reduced pumping function
- brain lethargy, irritability, coma, convulsion
- kidneys stop producing urine

Causes of shock:

Cause	Mechanism
Severe dehydration	Because of fluid loss through vomiting and diarrhoea there **is not enough fluid in the body and in the circulation (hypovolemic shock).**
Severe infection Bacterial (Septic shock) Viral (Ebola, Lassa)	Infection can damage **blood vessels** and make them **leaky.** Fluid leaks out of the vessels into the tissues (oedema) and there is too little fluid left in the circulation **(distributive shock).**
Severe anaemia Bleeding Damage to RBC (malaria)	In severe anaemia the heart becomes unable to pump effectively because it has too little oxygen to work and this causes heart failure. Shock then occurs because the heart cannot pump effectively **(cardiogenic shock)**
Severe allergic reaction	Severe allergic reactions cause **anaphylactic shock**. They blood vessels become leaky causing fluid to escape into the tissues and the heart is unable to pump effectively

5.2. Assessment of circulation

Look	▪ lethargy, reduced level of consciousness (AVPU ≤V), signs of dehydration, severe pallor, cyanosis
Listen	▪ heart beat (fast or slow)
Feel	▪ **hands and feet** (cold or warm), if **cold** to which point? ▪ **pulse** volume (peripheral and central, **weak** or strong)
Measure	▪ Pulse rate ▪ **Capillary refill time**
Treat	▪ Assess severe acute malnutrition: this will influence how much fluid you give ▪ Give blood, if Hb <5g/dL or If Hb 5-6 with signs of heart failure or shock ▪ Give fluid bolus, if in shock ▪ Give maintenance fluid if there is impaired circulation

Normal pulse rates in children

- 0-1 year 100-160
- 1-3 years 90-150
- 3-6 years 80-140

Note: normal pulse rates are 10% slower in sleeping children

Shock:

1. Cold extremities **with**
2. Capillary refill longer than 3 seconds **and**
3. Weak and fast pulse (tachycardia)

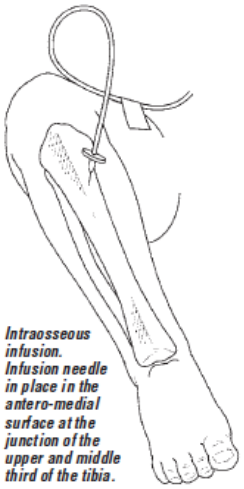
ALL 3 features must be present to diagnose **shock**

If only **1-2** features are present, the child has **impaired circulation** but is not in shock

Bradycardia, absent peripheral, weak central pulses and low blood pressure all indicate the child is going to die very soon, and needs emergency treatment immediately. Most children in shock also need airway and breathing management because they are not getting enough blood with oxygen and sugar to their brain so their level of consciousness will be reduced.

5.3. Intraosseous access

Access: to give fluids
to give medication
to take blood samples



Intraosseous infusion. Infusion needle in place in the antero-medial surface at the junction of the upper and middle third of the tibia.

Access can be intravenous (IV) or intraosseous (IO)

Intraosseous access

When?	In emergencies, if IV access is not possible In shock, after 2 failed attempts to place an IV line
Where?	Inner side of the lower leg, below the knee; knee slightly bent Junction upper third to middle third of the tibia
How?	Sterile procedure Insert the needle at 90 degree angle by gentle, firm, drilling or twisting movement Stop if you can aspirate blood or if you feel loss of resistance Flush (3 ml) and feel for leakage
Don't if	Skin infection Broken bones Bleeding problem
Complications	Fluid leaking into tissue and not in the bone Infection Fracture the bone

5.4 Assessment of pallor/anaemia

Pallor is a very common priority sign. To assess for pallor, you can compare the colour of the child's palm and feet with those of the caregiver. Pallor can also be assessed by pulling down the lower eyelid and looking at the conjunctivae. A complication of anaemia is cardiogenic shock and heart failure.

Ages: all

Causes: most common is **malaria**

Assessment:
Respiratory distress, with deep acidotic breathing, hypoxia
Palmar pallor
Hepatomegaly
Decreased level of consciousness

5.5 Treatment of severe anaemia: giving blood

- If the child is severely anaemic with an Hb of ≤5: give blood.
- If the child has a Hb of 5-6 with signs of shock or heart failure: give blood

For children who are not malnourished:

- 10-15mls/kg of packed cells
- 20mls/kg of whole blood
- Over 4 hours

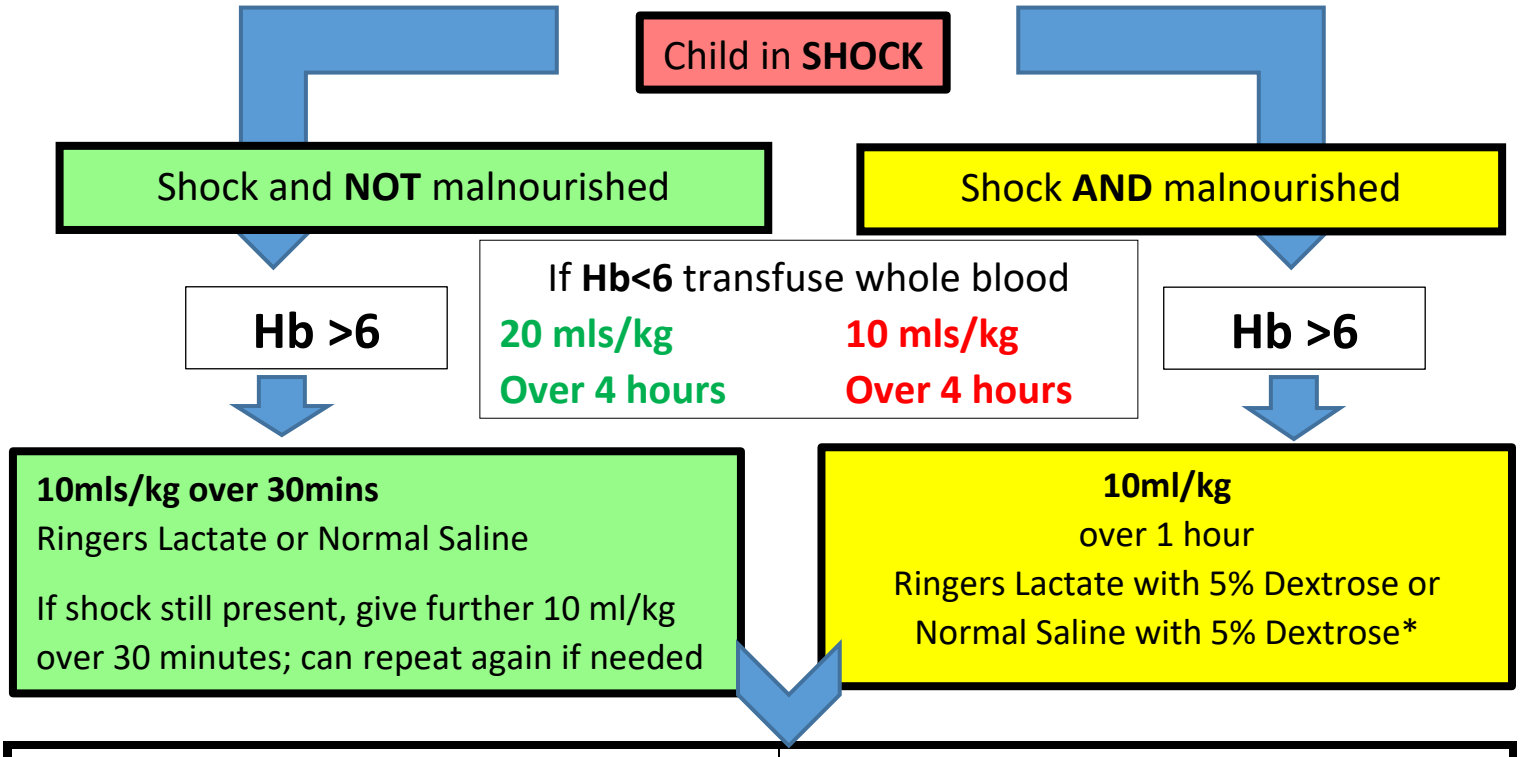
For children who ARE malnourished

- 10mls/kg of blood (ideally packed cells)
- Look for signs of heart failure
- over 4 hours

If the child is in shock and anaemic than give blood at the earliest opportunity but cautious treatment with IV fluid bolus can be started while waiting for blood to be available.

5.6 Fluid management in children with emergency sign of shock

Shock = cold extremities **with** prolonged capillary refill time > 3 seconds **and** weak and rapid pulse



NO MALNUTRITION	SEVERE MALNUTRITION
If shock not secondary to diarrhoea: **SHOCK RESOLVED**: Give maintenance fluids or feeds following the protocol below **SHOCK PERSISTS:** Give maintenance fluids **AND** **Consider blood transfusion**	**If shock not secondary to diarrhoea:** **SHOCK RESOLVED**: Start NG/oral ReSoMal following **Step 2** for malnourished children **SHOCK PERSISTS**: Start NG/oral ReSoMal following **Step 2** for malnourished children **AND** **Consider blood transfusion**

SHOCK SECONDARY TO DIARRHOEA
NO MALNUTRITION: Follow Severe Dehydration **Step 2**
SEVERE MALNUTRITION: Start NG/oral ReSoMal following **Step 2** for malnourished children

*Ringer´s lactate (RL) with 5% dextrose – 450 ml of RL with 50ml of 50% Dextrose
*Normal saline (NS) with 5% dextrose – 450 ml of RL with 50ml of 50% Dextrose

- In the malnourished child the heart muscle is weak and wasted, therefore giving IV fluids in big amounts is dangerous
- IV fluids should only be used in the malnourished child as a treatment for **shock** and given cautiously.

Summary

The circulation is a difficult area to assess because you cannot see shock from the end of the bed, but it something you feel and measure.

- ✓ Cold extremities, cap refill time >3 seconds and weak or rapid pulse are the 3 signs of shock
- ✓ All 3 signs must be present to diagnose shock
- ✓ If a child only has 1 or 2 signs then they are not in shock, but have an impaired circulation
- ✓ If a child is in shock and anaemic the best treatment is blood
- ✓ If a child is in shock *consider* a bolus of fluid
- ✓ If a child has impaired circulation start maintenance fluid
- ✓ Don't forget to ask about diarrhoea, and to assess for malnutrition

Assessment Questions

1) A 5-year-old boy is brought into the hospital with a 3-day history of fever. His mother says that today he has been very quiet and has not opened his eyes. You see the child in triage, and you have already assessed his airway and breathing. You are now assessing his circulation. What 3 things do you need to do to assess his circulation?

2) 2-year-old girl is sent to your triage area with an urgent referral from a small clinic. The referral letter tells you that the girl has a haemoglobin of 3 and her malaria RDT is positive. When you assess the child, you realise that she is in shock. The girl weighs 12kg. What fluid will you prescribe for her, and what volume?

3) A 6-month-old baby that is not malnourished is in shock. You decide to give the baby a fluid bolus. The baby weighs 8kg
   a. How much fluid are you going to give?

   b. Over how long with you give the fluid?

   c. Which fluid are you going to give?

4) What is impaired circulation?

5) List 3 occasions when you would insert an intraosseous needle (IO)

A	**A**irway
B	**B**reathing
C	**C**irculation
	Coma **C**onvulsion
D	**D**ehydration (Severe)

6 Severe Dehydration

6.1. Watery diarrhoea

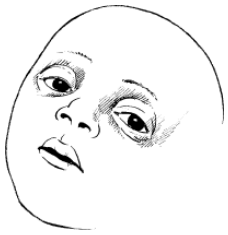
Age: Common in small children

Cause: mostly caused by viruses; bacteria are less common

History: Diarrhoea (watery, without blood)
Vomiting (not always)
Might be unable to drink
Low grade fever

Treatment of watery diarrhoea:
Rehydration (IV or oral depending on degree of dehydration and nutritional status)
Zinc
Advise to feed continuously
Antibiotics **only** if bloody diarrhoea

6.2. Assessment of Dehydration



Emergency signs for **severe dehydration**

- Watery diarrhoea **and**
- 2 out of the 4:
  - **lethargy**
  - **sunken eyes**
  - **very slow skin pinch (>2sec)**
  - **unable to drink**

Watery diarrhoea + 2 out of 4 of the features below:

Severe Dehydration	Some Dehydration
Sunken eyes	Sunken eyes
Very slow skin pinch (> 2 secs)	Slow skin pinch (< 2 secs)
Unable to drink/feed	Thirsty
Lethargic	Irritable

6.3. Treatment of severe dehydration

6.3.1. Treatment of severe dehydration in well-nourished children

In children with severe dehydration without signs of shock give IV fluid RL/NS/DNS as described below

	Step 1: 30mls/kg	**Step 2**: 70mls/kg
Infant (<1yr)	Over 1 hour	Over 5 hours
Children (>1yr)	Over 30 mins	Over 2.5 hours

Monitor/reassess every 15 to 30 min

Also give ORS (about 5 ml/kg per hour) as soon as the child can drink

Reassess an infant after 6 hours and a child after 3 hours (when IV fluids are finished)

6.3.2. Treatment of severe dehydration in malnourished children

Assessment of dehydration and degree of dehydration in malnourished children is very difficult because the features of malnutrition can make differentiating between severe dehydration and some dehydration very difficult. **In a malnourished child with watery diarrhoea the treatment for severe and some dehydration is the same.**

Treatment of severe or some dehydration in malnourished children:

- Oral/NG Rehydration with ReSoMal
- 5ml/kg for every 30min for the first 2 hours
- 5 to 10 ml/kg every hour for the next 4 to 10 hours. If possible, alternate F75, 5 mls/kg, with ReSoMal

- IV glucose only if the child is unconscious
- Every child with SAM and diarrhoea should receive ReSoMal (treatment or prevention of dehydration)

6.4. Treatment of some dehydration

6.4.1. Treatment of some dehydration in a well-nourished child

Oral rehydration is the best route for a child who has features of some dehydration

ORS 75mls/kg over 4 hours

- More can be given is the child wants more
- The child can continue breast feeding
- If the child becomes puffy stop ORS and encourage breastfeeding

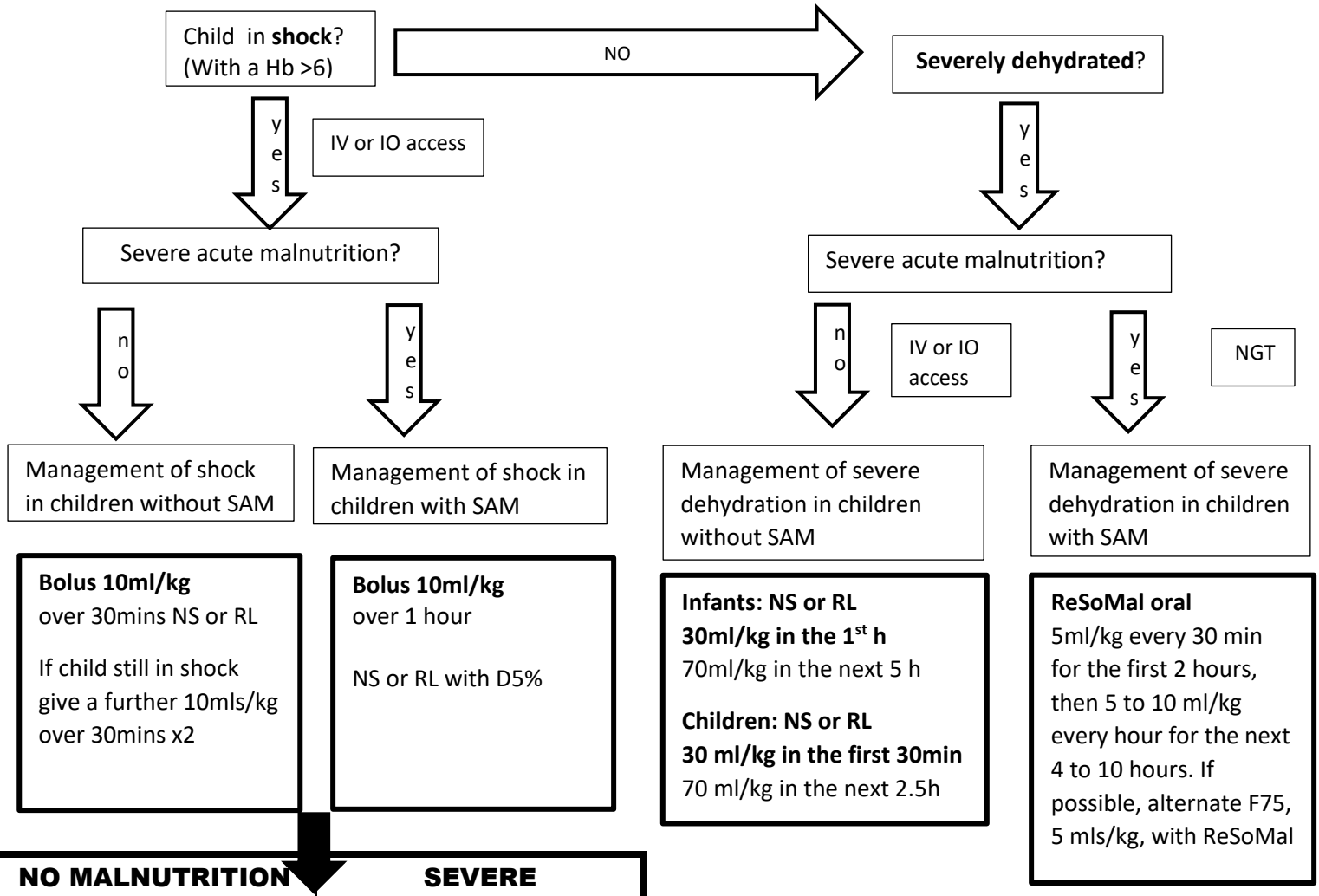
All children over 6 months should be given some food before discharge

6.4.2. Treatment of some dehydration in a malnourished child

Treatment of severe or some dehydration in malnourished children:

- Oral/NG Rehydration with ReSoMal
- 5ml/kg for every 30min for the first 2 hours
- 5 to 10 ml/kg every hour for the next 4 to 10 hours. If possible, alternate F75, 5 mls/kg, with ReSoMal

Treatment of Shock or Severe Dehydration:



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SHOCK SECONDARY TO DIARRHOEA

NO MALNUTRITION: Follow Severe Dehydration **Step 2**
SEVERE MALNUTRITION: Start NG/oral ReSoMal following **Step 2** for malnourished children

6.5. Maintenance fluids and feed

6.5.1. Maintenance fluid for a child over 1 month

Give intravenous maintenance fluid to any child who is:

- Nil by mouth (NPO)
- In severe respiratory distress
- Who has signs of impaired circulation
- After treatment for shock
- Being treated for suspected intestinal obstruction

Maintenance fluids will normally be given as dextrose/normal saline (DNS)
The maintenance fluid calculation for 24 hours is detailed below:

First 0-10kg of body weight 100mls/kg
Next 10-20kg 50mls/kg
Subsequent weight >20 Kg 25mls/kg

If the child has a fever consider giving more fluid: 10% more fluid for every 1 degree of fever

In the malnourished child the preferred route for fluid is oral/NG ReSoMal

Example:

- Calculate the hourly rate for maintenance fluid in a well-nourished 22kg child

10kg x 100 = 1000
10kg x 50 = 500
2kg x 25 = 50

1000 + 500 + 150 = 1550
1550 mls over 24 hours = **65 mls/hr**

Drop Rates

- The drop rate for a standard (adult) giving set is 20 drops/ml
- The drop rate for a paediatric burette (Soluset) is 60 drops/ml

The calculation to derive the number of drops/min from the number of mls/hr is as follows:

(X mls/hr ÷ 60) x drop rate

Example:

- Calculate the drop rate for administering the IV fluid to the 22kg child mentioned above

65mls/hr ÷ 60 = 1.1 mls/min
1.1ml/min x 20 = **22 drops/min**

6.5.2. Maintenance feeds for a child over 1 month

The amount of maintenance fluid and feed required over 24 hours for children over one month is calculated using the same formula as above. The total amount of feed in 24 hours can be divided to give the correct amount for each feed, depending on how often you will feed the child. For example: for 2 hourly feeding divide the total amount by 12 or for 3 hourly feeding divide it by 8.

Example:

- Calculate volume of maintenance fluid or feed required over 24 hours for a 12 kg child

10kg x 100= 1000
2kg x 50 = 100
1000+ 100=1100mls

1100mls over 24 hours of IV fluid or PO/NG feeds

- How much feed would you give If you want to feed the child every 3 hours?

1100mls ÷ 8= 137.5mls every 3 hours

Summary

Severe dehydration is an emergency signs and needs immediate treatment

- ✓ Watery diarrhoea is common in small children and usually caused by a virus. Antibiotics are only indicated in bloody diarrhoea
- ✓ In children that are not malnourished severe dehydration needs treatment with IV fluid
- ✓ In children that are not malnourished with some dehydration the treatment is with oral fluid (ORS)
- ✓ In children with malnutrition it is difficult to assess severe from some dehydration but the treatment is the same
- ✓ Children with malnutrition and dehydration should be given oral ReSoMal.
- ✓ Maintenance fluid and feeds are calculated using the same formula

Assessment Questions

1) When would you start a child on maintenance fluid? List 3 reasons

2) Name the 4 signs of severe dehydration

3) Name the 4 signs of some dehydration

4) A 4-year-old boy presents to your triage with severe dehydration. He is not malnourished and weighs 17kg.
    a. Which route will you give him fluid? IV or oral?

    b. How much fluid will you give him in step 1?

    c. Over how long will you give the fluid over in step 1?

    d. How much fluid will you give him in step 2?

    e. Over how long will you give him the fluid in step 2?

5) A 6-year-old well-nourished girl comes to the outpatient department with severe pneumonia; she weighs 16kg. You decide that she will need to be placed on maintenance fluid until her respiratory distress improves.

    a. What fluid will you prescribe?

    b. How many mls/hr will be required?

    c. What will be the drop rate with a paediatric burette?

7. Coma & Convulsions

A	**A**irway
B	**B**reathing
C	**C**irculation
	Coma **C**onvulsion
D	**D**ehydration (Severe)

7.1. Physiology

This part of the assessment deals with the child's level of consciousness. Coma is a state where the patient's level of consciousness is so low that they cannot respond to stimulation. Children with an AVPU of P or U are in coma. Convulsion is disorganised electrical activity in the brain that causes stiffness of the muscles or abnormal jerky movement of limbs, face or eyes. Convulsions that last longer than a few minutes can cause irreversible damage to the brain. Coma and convulsion can be caused by many of the same underlying conditions. Identification and treatment of those factors will mean less damage to the brain. A child's level of consciousness can be affected by many factors such a low blood sugar level (hypoglycaemia), hypoxia, infection, shock, and head trauma.

7.2. Assessment of level of consciousness

Look	Awake, alert, appears unconscious, convulsing, does not like light (photophobia)
Listen	Talking, responding to voice, crying, groaning, silent
Feel	Do they respond to pain or touch? Assess for neck stiffness
Measure	Blood sugar, temperature
Treat	Treat convulsions Treat low blood sugar Treat infection

AVPU

A common way to describe a child's level of consciousness is **AVPU**.

Is the child

- **A**lert?
- Responsive to **V**oice?
- Responsive to **P**ain?
- **U**nresponsive?

7.3. Causes of coma and convulsion

Causes	Presentation	Treatment
Cerebral malaria (severe malaria with altered consciousness)	Fever, unable to eat, change in behaviour, altered consciousness+/- convulsions Investigations: • RDT positive, blood film: parasite count • LP exclude meningitis	Artesunate or artemether Manage A,B,C,D If present: • Treat hypoglycaemia • Treat shock • Treat anaemia • Treat convulsions
Meningitis Infection of the meninges: bacterial or viral (meninges are thin layers of tissue around the brain and the spinal cord)	Neck stiffness, photophobia (pain looking at light), headache, convulsions, fever, stiffness, bulging fontanelle Investigations: LP: should NOT delay treatment	Manage A,B,C,D Ceftriaxone 100mg/kg once a day Treat convulsions if present Treat hypoglycaemia if present
Febrile convulsion	Age: 6 months to 5 years Convulsion associated with fever Short convulsions usually stopping on their own within five minutes	Manage A,B,C,D Give antibiotics Give artesunate or artemether if malaria positive Treat hypoglycaemia if present Remove clothes Give paracetamol
Hypoglycaemia: low blood sugar level	Glucose needed for all vital organs Low blood sugar level causes, irritability, convulsion, coma Common in cerebral malaria, dehydration, severe malnutrition	If random blood sugar level <3mmol/L Give 10% Dextrose 5ml/kg If no IV access: oral sugar Recheck blood sugar level after treatment If not possible to check blood sugar level, give 5ml/kg of 10% dextrose to all patients presenting with coma or convulsion, and immediately re-assess

7.4. Management of Coma

Airway	**If P or U on the AVPU score, then the airway is at risk** Give oxygen Jaw thrust Recovery position Consider guedel or nasopharyngeal airway and NG tube
Breathing	**Give oxygen**
Circulation	Insert cannula If shocked, then treat for shock Give ceftriaxone and artesunate to cover for malaria and Take blood sample for RDT/malaria thick film, Hb
Coma/Convulsions	Manage convulsions if present Check blood sugar, and treat if <3mmol/L with 5mls/kg 10% dextrose If unable to check blood sugar and AVPU <V give 5ms/kg of 10% dextrose Place NG tube and aspirate (don't feed) stomach to protect from aspiration

How to prepare Dextrose 10%

- To make approximately 10% Dextrose from 50% Dextrose and 5% Dextrose: add 1 part of 50% dextrose to 9 parts of 5% dextrose. Ratio 9:1

For example:

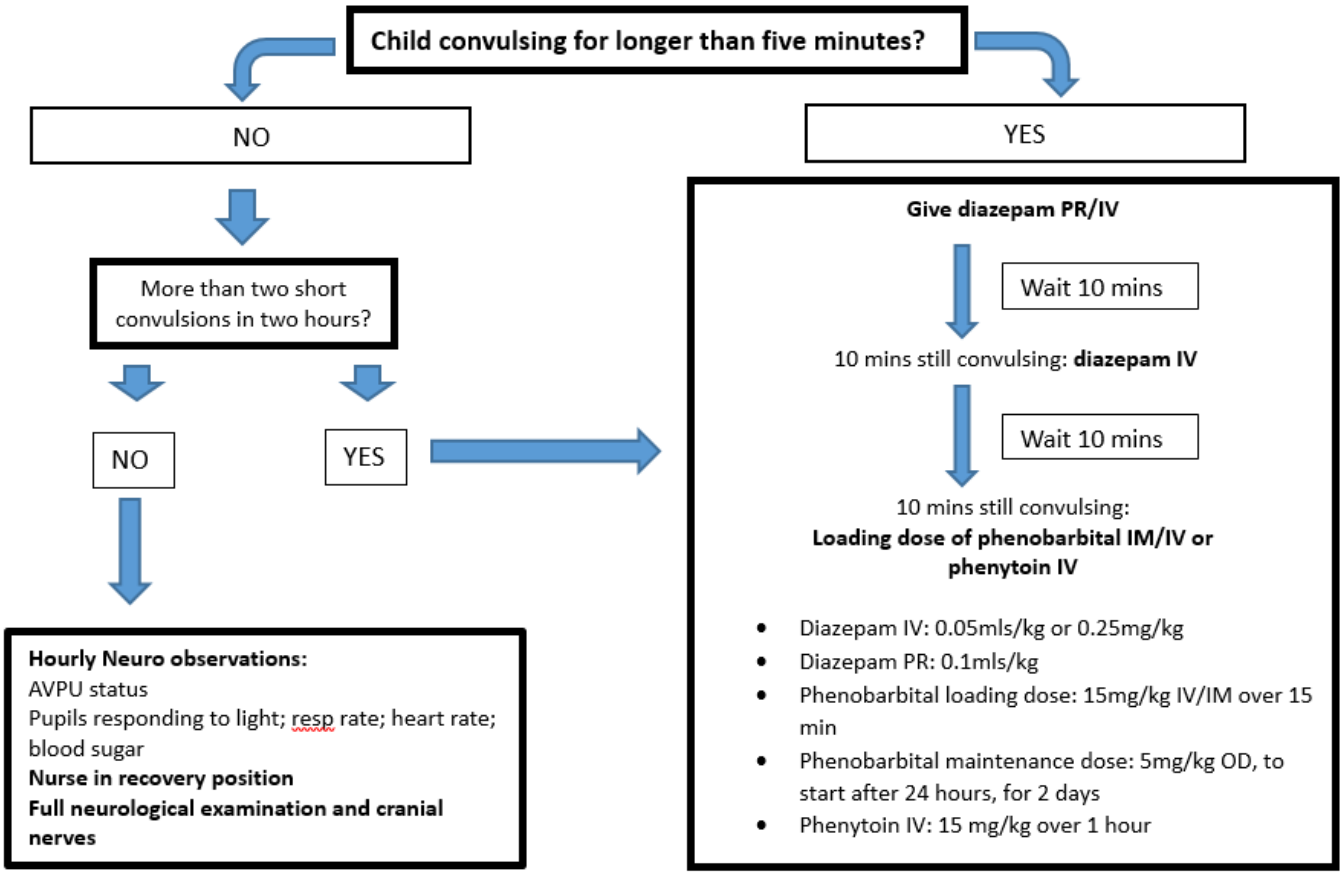
To make 100mls 10% dextrose: add 10mls of 50% dextrose to 90mls of 5% dextrose

To make 500mls of 10% dextrose: remove 50mls of 5% dextrose from a 500ml bag of 5% dextrose and replace it with 50mls of 50% dextrose. It is the same 9:1 ratio as above.

- To make 10% dextrose from 50% dextrose and sterile water: add one part 50% dextrose to 4 parts sterile water.

7.5. Management of Convulsions

Follow ABCD as for coma, but to treat the convulsions use the flow chart below:



Summary

Prolonged coma and convulsions causes damage to the brain and can cause death.

- ✓ If a child is in a coma or having a convulsion their airway is at risk and needs special attention
- ✓ If a convulsion last over 5 minutes or there are more than 2 convulsions in 2 hours, then you need to give anti-convulsants
- ✓ Diazepam is the first line treatment for convulsions
- ✓ Don't forget to check the blood sugar
- ✓ If you cannot check the blood sugar and the child is convulsing or has a AVPU that is P or U, be safe and give sugar

Assessment Questions

1) If a child is convulsing what is their AVPU score?

2) A 5kg child has a low blood sugar, please calculate how much 10% dextrose you will give them.

3) A 4-year-old boy has been convulsing for over 5 minutes you try to put in a cannula but it is difficult. What would you do next?

4) A 6-month old child with a AVPU of U is in your triage. You are worried about her airway. What 3 things can you do to protect her airway?

5) After the first dose of diazepam how long do you wait before you reassess the child and consider repeating the dose?

6) A 3-year-old girl is brought into your hospital by her aunt with a 2-day history of fever, vomiting and one convulsion at home. The little girl has her eyes closed and starts to cry when she has her eyes open. She has a stiff neck and says her head hurts.
    a. What is the likely diagnosis?

    b. What is the best treatment for this child?

    c. What investigation would you arrange for this child when she is stable?

7) A 4-year-old child is brought to triage by his father in a coma. His AVPU is U. There are no blood sugar strips available. What will you do next?

8. Malaria

8.1. Pathophysiology

Malaria is a major cause of death and disability in Sierra Leone and in many countries in Africa. Malaria is a common and life threatening condition caused by a parasite that lives in the mosquito. Malaria is the most common reason for children to present to hospital in Sierra Leone. The most common malaria parasite to cause severe disease in Africa is *plasmodium falciparum*. The mosquito has the malaria parasite in its saliva. When the mosquito bites a human the parasite goes into the human's blood stream and then into the person's liver where it replicates. After some time in the liver, the parasite then enters the blood again in the red blood cells. The parasite causes the red blood cells to become damaged and this results in anaemia. The red blood cells infected with the malaria parasite can become sticky and cause blockages to small blood vessels; when this happens in the brain the child presents with cerebral malaria. Many children die of the complications of malaria such as anaemia, hypoglycaemia and convulsions. This section focuses on how to assess children with malaria, assess the severity and manage the complications.

8.2. Assessment

History: fever, vomiting, loss of appetite, weakness, lethargy

Investigations: malaria parasite thick film is the best test for malaria and can give you information on how many parasites are in the blood. The malaria rapid diagnostic test (RDT) is a quick test that is also commonly used.

Uncomplicated Malaria

- child is alert
- no convulsion on examination, and history of maximum one short convulsion **only**
- normal examination
    - child not lethargic or weak (able to sit and walk)
    - no evidence of deep acidotic breathing
    - no signs of shock or heart failure
    - no severe pallor on examination (or if known haemoglobin >6)
    - no dark urine (signs of red blood cells being destroyed)
    - no jaundice

A child with uncomplicated malaria can be started on oral antimalarial treatment and discharged home with advice to return to hospital if the condition worsens.

Severe Malaria (malaria with complications)

Common complications of malaria:

- Hypoglycaemia (blood glucose <3mmol/L)
- Coma and convulsions (AVPU < V or over 2x convulsion in 24 hours
- Severe anaemia (Hb <5)
- Respiratory distress (deep acidotic breathing)

Children with malaria might present with more than one of the above complications.

<u>Hypoglycaemia</u>

Hypoglycaemia in children with malaria is due to increased glucose use by the body and the red blood cells infected with the parasite. Not only is there an increase in the glucose use but the parasite prevents the body

from producing more glucose to replace it. Antimalarial treatments such as quinine can also further reduce the level of sugar in the blood.

Causes of hypoglycaemia in malaria

- Increased use of blood glucose by red blood cells infected with the malaria parasite
- Increased use of glucose by the vital organs
- Decreased production of glucose by the body
- Antimalarial treatment causing low blood glucose level

Glucose is required for the function of all cells and organs in the body. Without glucose, the vital organs cannot function and the child presents with lethargy, irritability leading to coma, and convulsions. All children with malaria and an AVPU <V should have a blood sugar tested. If random blood sugar is <3mmol/L then give a bolus of 5mls/kg of 10% dextrose. If a glucometer is not available, then give 5mls/kg of 10% dextrose and observe for any improvement in the neurological status.

If no immediate IV access, consider the below while you try to insert an IV line:

- Oral sugar under the tongue
- Oral 10% dextrose
- Nasogastric 10% dextrose
- IO access for 10% dextrose

The more quickly the blood sugar is corrected the less damage to the brain and other vital organs

The risk of further hypoglycaemia is very high. The blood sugar and the AVPU status must be rechecked regularly. Treatment with 5mls/kg 10% dextrose must be repeated as frequently as required. To prevent further hypoglycaemia consider feeding the child as soon as possible with oral or NG feed. Do not feed if the child is convulsing.

Coma and convulsion

Malaria with altered level of consciousness is often called cerebral malaria. Children that present with lethargy, AVPU <V, unable to sit or stand unaided (when previously able to too) or 2 or more convulsions in 24 hours need an urgent ABCD assessment (see section 7.4). Altered level of consciousness may be secondary to microvascular damage due to parasite-infected red blood cells in the brain. However, it can also be due to other complications of malaria such hypoglycaemia, hypoxia, anaemia and shock. The management of cerebral malaria is to support the airway, breathing, circulation and disability to prevent further damage to the brain by hypoxia, anaemia, hypoglycaemia and shock. Children with cerebral malaria need to be admitted for IV/IM antimalarial treatment and intensive care. Neuroprotective nursing care should be delivered with an aim to prevent further brain damage or secondary complications. The child should be turned every 2 hours, nursed with their head slightly elevated at 30°, kept hydrated and normal blood sugar concentration maintained.

Severe anaemia

Red blood cells have haemoglobin (Hb) inside them. Haemoglobin transports oxygen from the lungs to the vital organs that require it. In severe malaria, red blood cells become damaged and destroyed by the parasite: this is called haemolysis. If the red blood cells become damaged then this results in a low level of haemoglobin available to transport oxygen and disrupts the normal function of vital organs such as the brain, heart, lungs and liver. When the Hb is 5 or under, there is not enough Hb available in the blood to transport oxygen from the lungs to all the vital organs, and this causes damage to the organs. For example, in severe anaemia with Hb <5 there is not enough Hb to carry oxygen to the heart and this causes the heart to fail and not pump effectively. For the treatment of anaemia see section 5.6.

Respiratory Distress

Children with malaria might present with signs of respiratory distress; **deep acidotic breathing**, nasal flaring, grunting, chest indrawing and cyanosis. Respiratory distress is a common finding in complicated malaria and can be due to:

- Acidosis
- Heart failure
- Severe anaemia
- Pneumonia

Children with malaria and signs of severe respiratory distress: SpO_2 <90% on air; critically unwell or convulsing should be given oxygen therapy. The cause of respiratory distress should be investigated and treated if possible. If respiratory distress is due to anaemia and heart failure a blood transfusion should be considered. If respiratory distress is secondary to pneumonia, an appropriate antibiotic should be administered.

8.3. Treatment

Name	Indication	Dose	Frequency	route
Artesunate	Severe malaria	<20kg 3mg/kg >20kg 2.4mg/kg	0hrs, 12 hrs, 24hrs and then OD *After 3 doses can be converted to PO ACT*	IV or IO
Artemether	Severe malaria	Loading dose 3.2mg/kg Maintenance dose 1.6mg/kg	OD	IM
ACT	Uncomplicated malaria		OD for 3 days	PO
10% dextrose	Blood sugar <3mmol/l	5mls/kg	As required	IV
Blood	Hb <5 Hb 5-6 and signs of heart failure	Packed cells: 15ml/kg Whole blood 20m/kg		IV

Summary

Malaria is a common cause for a child to be brought to hospital and a major cause of death and disability in Sierra Leone.

- ✓ Uncomplicated malaria can be treated with oral antimalarial
- ✓ Hypoglycaemia, anaemia, coma, convulsion and respiratory distress are signs of complicated malaria.
- ✓ The quicker the antimalarial is given the better the outcome for the child.
- ✓ Don't forget to check the blood sugar and treat if in doubt

Assessment Questions

1. A 2-year-old boy is brought to the triage by his father. The father tells you that he has been sick for 3 days with fever and last night he convulsed 4 times. When you assess the child, you notice that his airway looks ok. His breathing is very difficult, and he is in severe respiratory distress with deep acidotic breathing. Assessing his circulation, you notice that his hands and feet are very cold up to the elbows and knees. His capillary refill time is 5 seconds and his radial pulse is weak and rapid. You compare the colour of his palm with his father's palms and notice that he has severe pallor. The boy does not respond to voice or pain and suddenly starts to convulse. The boy does not have diarrhoea and you don't think he has any signs of dehydration.

   Vitals: oxygen saturation 89%, heart rate 188, respiratory rate 74, temperature 40.1,
   weight 14kg

   Blood results: Haemoglobin 3.4, Malaria RDT positive, Random blood sugar 2.1mmol/l

   a. Which emergency signs does this child have?

   b. Which priority signs does this child have?

   c. How would you manage the boy's airway?

   d. How would you support his breathing?

   e. Is the boy's circulation a problem? If so what treatment will you give him?

   f. The child is convulsing for 2 minutes and has had more than 2 convulsions in 2 hours. Which medications are you going to give him? Please calculate the dose and/or volume.

   g. Please calculate the dose of artesunate you will give him

   h. Which complications of malaria does this boy have?

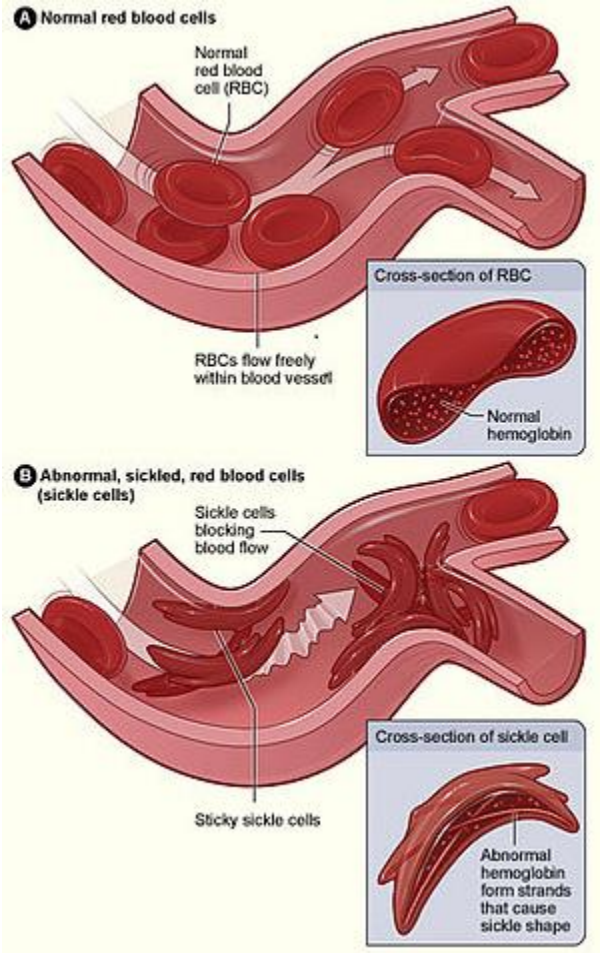
9. Sickle cell disease

9.1. Pathophysiology

Children with sickle cell disease have haemoglobin S, which causes red blood cells to become sickle shaped when under stress. These blood cells:

- block blood vessels causing pain and difficulty in delivering oxygen
- are easily destroyed, causing anaemia, and often jaundice

Children with sickle cell disease are also at high risk of infection because their spleens have been destroyed or damaged by the sickle cells.



9.2. Sickle cell emergency presentation assessment and treatment

	What happens?	Presentation	Treatment
Painful crisis	Sickle cells block the small vessels, restricting oxygen delivery to the tissues	Severe pain in any part of the body	• Analgesia – paracetamol, Ibuprofen, diclofenac, morphine • Oxygen if available • IV maintenance fluids if not drinking enough • Antibiotics if fever • Blood transfusion if Hb <6
Chest crisis	Sickle cells block the small vessels in the lungs	Chest pain, respiratory distress, hypoxia	• Oxygen if SpO_2<95% • Antibiotics • Analgesia – paracetamol, ibuprofen, diclofenac, morphine • IV maintenance fluids if not drinking enough • Encourage deep breaths / blowing to keep lungs expanded • Blood transfusion if Hb <6

Stroke	Sickle cells block vessels in the brain, starving parts of the brain of oxygen	Weakness, speech problems, coma	• Manage airway if at risk • Oxygen if available • Antibiotics (exclude meningitis) • IV maintenance fluids if not drinking enough • Blood transfusion if Hb < 6
Infection	The spleen is damaged or destroyed by sickling so can't protect from infections	Fever, impaired circulation, signs of painful crisis	• Antibiotics • Treat shock if present ideally with blood but IV fluid can be used until blood available ○ 10ml/kg NS bolus over 1 hour • Blood transfusion if Hb <6 • IV maintenance fluids if not drinking enough
Sequestration	Red blood cells become trapped in the spleen or liver	Pallor, impaired circulation, large spleen or liver	• Blood transfusion • If in shock, can give fluid bolus while waiting for blood • Antibiotics

Summary

The prevalence of sickle cell disease is high in west Africa. The complications of sickle cell disease are very serious and this group of children need to be managed with great care.

- ✓ Painful crisis, chest crisis, infection, stroke and sequestration are some of the serious complications of sickle cell disease.
- ✓ Don't forget to give this children medication for their pain.
- ✓ Treating infection, keeping them warm and hydrated can save their lives.
- ✓ This is a difficult group to look after, so don't forget to ask for help.

Assessment Questions

1. A 5-year-old girl with known sickle cell disease attends your hospital. Her mother tells you that she has been crying for 4 days and is not able to walk because of foot and leg pain. When you triage her, your assessment is that her airway and breathing are normal. You assess her circulation and notice that she is very pale but she is not in shock. She is alert and crying and does not seem dehydrated.

   Vitals: oxygen saturation 97%, respiratory rate 44, heart rate 150, temperature 39°C.

   a. What investigations are you going to do urgently?

   b. What treatments are you going to give this girl?

2. Please list 3 complications of sickle cell disease

3. A seven-year-old boy with known sickle cell disease attends your hospital because of difficulty in breathing. His airway is patent, he has moderate respiratory distress, and oxygen saturations of 92%. He is warm and well-perfused, although he appears pale, and he is alert and complaining of pain in his chest. His weight is 28kg.
   Results: malaria RDT negative, Haemoglobin 4.1 and blood sugar 4.3mmol/L

   What immediate treatments will you prescribe for this child? Please calculate doses.

10. Severe acute malnutrition (SAM)

SAM is a common reason for children to present to hospital. SAM is a priority sign because children with malnutrition frequently have other associated serious medical conditions that need immediate treatment. Children with SAM are immunosuppressed, they are likely to be hypothermic, hypoglycaemic and severely dehydrated. The prognosis for a child with SAM that presents with a medical complication is poor if immediate attention is not given. This section provides a summary of the assessment and management of a child with SAM. There are two categories of SAM, marasmus/severe wasting and kwashiorkor. Both are managed in similar ways: no distinction needs to be made, and both presentations are described as SAM.

Marasmus/severe wasting

- Old person's face
- Irritable
- Visible wasting (buttocks, upper arms) and low weight

Child with marasmus

Kwashiorkor

- apathy
- oedema of legs, arms, face (pitting oedema both feet)
- Pale, spare hair, weak roots
- Pale, thin, peeling skin
- Hepatomegaly

Child with severe acute malnutrition oedema

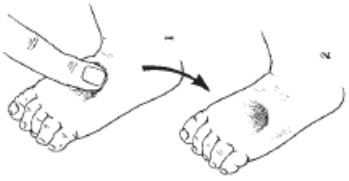
10.1. Diagnosing SAM

SAM is defined as:

- Severe wasting
  - mid upper arm circumference <11.5cm
    or
  - weight for height/length <-3SD

OR

- Oedema of both feet



Pitting oedema on dorsum of foot. When pressure is applied for a few seconds, a pit remains after the finger is removed.

On presentation, a child with SAM needs to be assessed to see if they have **complicated SAM**.

Complicated SAM:

- SAM **with** medical complication
  or
- SAM **with** lack of appetite

On presentation, a child with SAM needs to be assessed to see if they have any medical complications and have an appetite test.

ALL CHILDREN WITH COMPLICATED SAM NEED ADMISSION

10.2. Initial assessment of SAM

History

- Feeding
  - What is the current food intake? Does the baby/child have a loss of appetite?
  - Normal diet before current illness
  - Is the baby breast feeding?
- Does the baby/child have diarrhoea and vomiting?
  - If so, how long for?
  - If diarrhoea present, is it watery or bloody?
- What is the social situation?
  - Who does the baby/child live with?
- Is there risk of other infections and immunosuppression?
  - Cough for >2 weeks
  - Contact with TB
  - Known or expected HIV exposure or infection
  - Recent contact with measles

Examination

On examination look for the following:

Airway	
Breathing	respiratory distress secondary to pneumonia or pulmonary TB
Circulation	shock secondary to dehydration or sepsis
	pallor or anaemia
Dehydration	dehydration
Disability	hypoglycaemia, convulsions, coma, fever or hypothermia
Others:	
General	wasting of big muscles such as buttocks and upper arms

Eyes	eye changes because of vitamin A deficiency: ○ dry eyes, corneal ulcers
Mouth	mouth ulcers
Skin and hair	peeling skin, ulceration, skin colour changes, skin infection hair colour and texture changes

Appetite test to see if the child has an appetite to eat

10.3. Management of SAM

There is a 10-step approach to managing children with SAM

1. **Hypoglycaemia**
2. **Hypothermia**
3. **Dehydration**
4. **Electrolytes**
5. **Infection**
6. **Micronutrients**
7. **Initial feeding**
8. Catch up feeding
9. Sensory stimulation
10. Prepare for follow up.

In this ETAT manual we will go through points 1-7 as these are part of the immediate emergency assessment and treatment.

Hypoglycaemia and Hypothermia:

Hypoglycaemia and hypothermia are very common in children with SAM and are often seen together. A child with SAM who has a temperature <35°C is very likely to also be hypoglycaemic. All children with SAM are at risk of hypoglycaemia and immediately on presentation should have a feed, or oral glucose. If it is possible to test the blood sugar level, then this should be done on assessment. If it is not possible to test, then it is better to be safe, and to treat for hypoglycaemia. Malnourished children who can feed should have oral sugar: this can be given as 50mls of 10% dextrose or 1 teaspoon of sugar dissolved in 3 tablespoons of clean water. This oral sugar can be given by mouth or by nasogastric tube. The therapeutic feed F75 should be started as soon as possible and children with SAM should **feed frequently** to prevent hypoglycaemia, **every 2 hours**. Children with SAM that are unable to take oral feeds (for example those with severe respiratory distress, unconscious or convulsing) can have IV 10% dextrose 5mls/kg.

Hypothermia is associated with hypoglycaemia, and all children with SAM and hypothermia should be assumed to have a low blood sugar level, and managed as above. Having a low body temperature, like having a high body temperature, can be sign of infection**. All children with complicated SAM should be assumed to have an infection and treated with antibiotics.** Children with hypothermia should be kept warm. This can be done by ensuring the child has a hat on, clothes, socks, blanket, not situated somewhere windy, and if possible having skin to skin contact with a caregiver.

Dehydration:

Many children with SAM also have dehydration. It is very difficult to assess the amount of dehydration in a malnourished child, because some of the signs that help us to assess dehydration resemble signs of malnutrition, or are exaggerated due to malnutrition. Children with SAM who are wasted can have a slow or very slow skin pinch even when they are not dehydrated. Children with SAM might have sunken eyes because they are so wasted. If a child with SAM has diarrhoea it can be assumed that they are dehydrated, but it is not necessary to estimate the severity of dehydration because the treatment for severe and some dehydration is the same for malnourished children (see section 6.3.2. and 6.4.2). Oral rehydration is recommended; IV fluid should only be given to a child with SAM if they are in shock. Oral treatment with ReSoMal is the treatment for dehydration.

Treatment:

First 2 hours: ReSoMal 5mls/kg every 30mins

For 4-10 hours: Alternate between ReSoMal 5-10mls/kg and F75 every hour

If the child is still breastfeeding continue breastfeeding

Electrolytes imbalance and micronutrient deficiencies:

Electrolyte imbalance and micronutrient deficiencies are seen in all children who are severely malnourished. There will be low potassium and magnesium, and a high sodium. You might notice oedema; this often occurs because of low potassium and high sodium. All severely malnourished children will have vitamin and mineral micronutrient deficiencies including zinc, copper, iron, and vitamin A. To correct these deficiencies safely, ReSoMal and therapeutic feeds (F-75 and F-100) are used. They have a collection of all the appropriate electrolytes and minerals required. If ReSoMal and therapeutic feeds are not available, the WHO blue book provide recipes on how to make your own.

Infection:

Children who are malnourished are at a high risk of getting an infection because their immune systems are compromised. Children with SAM might have a serious infection but not show any of the usual signs. Hypoglycaemia or hypothermia are signs of severe infection in the child with SAM. You should assume that all children with SAM have an infection and treat them with **immediate antibiotics**. Treat for malaria if present and ensure all children with SAM that are over 6 months old are vaccinated against measles.

	Drug	Route	Duration
Complicated SAM	Ampicillin Gentamicin	IV IV	2 days then change to amoxicillin 7 days
Uncomplicated SAM	Amoxicillin	PO	5 days

The above are general antibiotic options for children with SAM but they can be changed to a more appropriate regime for a specific infection.

Initial feeding:

Feeding should be started as soon as possible. Small regular feeds are important, aiming to give the child 100 kcal/kg day. Start with starter F-75 therapeutic feed and move to catch up formula F-100 after 2 days.

			Child **with** severe oedema		Child **without** severe oedema	
Days	Feed	Frequency	Volume/kg per feed	Volume/kg per day	Volume/kg per feed	Volume/kg per day
1-2	F-75	2h	8 ml	100 ml	11 ml	130 ml
3-5	F-100	3h	13 ml	100 ml	16 ml	130 ml
≥6	F-100	4h	17ml	100 ml	22 ml	130 ml

Summary

Severe acute malnutrition is common and because of the high mortality associated with it, it is considered a priority sign that needs quick assessment and treatment.

- ✓ The two types of SAM are marasmus and kwashiorkor.
- ✓ Complicated SAM is SAM with a medical complication or lack of appetite.
- ✓ All children with complicated SAM need admission
- ✓ Keep the malnourished child warm, hydrated and fed.
- ✓ All children with complicated SAM need immediate antibiotics

Assessment Questions

1. A 2-year-old boy is brought to your hospital by his aunt. She tells you that he has had severe diarrhoea for 5 days. When you triage the boy, you assess that his airway is patent but he is in respiratory distress, with a normal circulation. You notice the boy is only responding to pain. His nappy is full of watery diarrhoea. When you look at the boy you notice that he looks wasted and has an old person's face. You suspect he is malnourished.

   Vitals: oxygen saturation 83%, heart rate 120, respiratory rate 44, temperature 33.5°C
   Weight: 5kg

   a. How could you check if this boy has SAM?

   b. What immediate treatment are you going to give this child? Please describe using the ABCD approach

   c. Are there any investigations you would like to do?

2) How do you manage dehydration in children with SAM?

3) In children with SAM, what condition is linked to hypothermia (<35°C)? And how would you manage it?

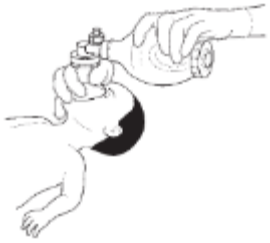
4) For feeding: what is the recommended initial therapeutic feed that should be given?

5) What is complicated SAM?

11. Neonates

11.1 Neonatal Resuscitation

- Some babies don't breathe after birth; this protocol is for babies who have never breathed
- The aim is to open the lungs and establish regular respiration

<table>
<tr><td colspan="3">PREPARATION IS VERY IMPORTANT
If problems are suspected, make sure that two members of staff are present to help the baby
Make sure that you have ready:
• A clock
• Gloves
• At least two warm towels/cloths
• Scissors; ties; a hat
• Suction
• A bag-valve-mask (ambu-bag); a stethoscope</td></tr>
<tr><td>Assess the baby</td><td>• Safety First: PPE, safe environment
• Dry the baby and stimulate
• Keep the baby warm
• Shout for help</td><td>Assess:
▪ Crying or breathing?
▪ Good muscle tone or vigorous movement?</td></tr>
<tr><td>Open the airway</td><td colspan="2">Open the mouth
▪ Suction mouth and nose only if meconium blocking the airway
Position airway
▪ Neutral position
  </td></tr>
<tr><td>Ventilate the baby for one minute</td><td colspan="2">▪ If not breathing or only gasping, start bag and mask ventilation
• Give one breath every one-two seconds: continue ventilation for one minute
Bag and mask ventilation (BVM) - technique
• Select appropriate mask
• Good seal (covering nose and mouth)
• Gently squeeze the bag until you see the chest rise
• If the chest is not rising:
• Bad seal: two-person technique
• Airway obstruction: reposition head, jaw thrust
  </td></tr>
<tr><td>After one minute: Check for signs of life</td><td colspan="2">Signs of life?
▪ no breathing but heart rate present: continue ventilation and consider further treatment – oxygen therapy; intravenous glucose; intravenous fluid
▪ no breathing and no heart rate present: continue ventilation, and discuss whether it is appropriate to continue resuscitation</td></tr>
</table>

▪ Every 2 minutes check for the heart rate or signs of life

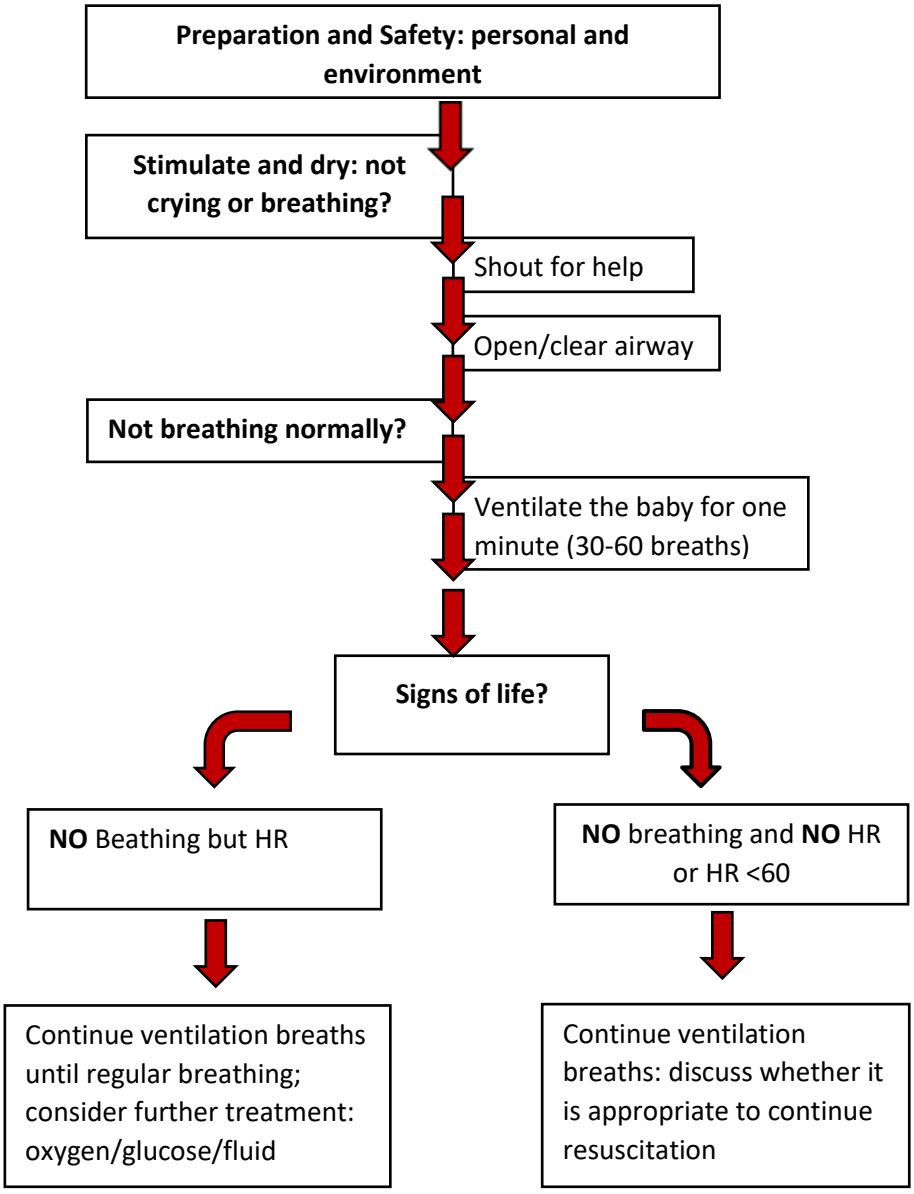
When to stop?

- When the baby is breathing regularly or crying
- If NO heart rate for more than 10 minutes, or a heart rate less than 60 bpm for more than 20 minutes, discontinue resuscitation

After resuscitation

- Keep the baby warm
- Check the blood sugar if glucometer available and correct hypoglycaemia if concerned
- Breast feed (or NG feed/spoon feed / iv fluid if too unwell to feed) within 1 hour of birth
- Document: date, time, who was present
- Make a plan: if the patient is successfully resuscitated organise senior review and send them to SCBU or to the mother

Summary Diagram of Newborn Life Support



11.2. Principles of neonatal care

11.2.1. How to support infant feeding

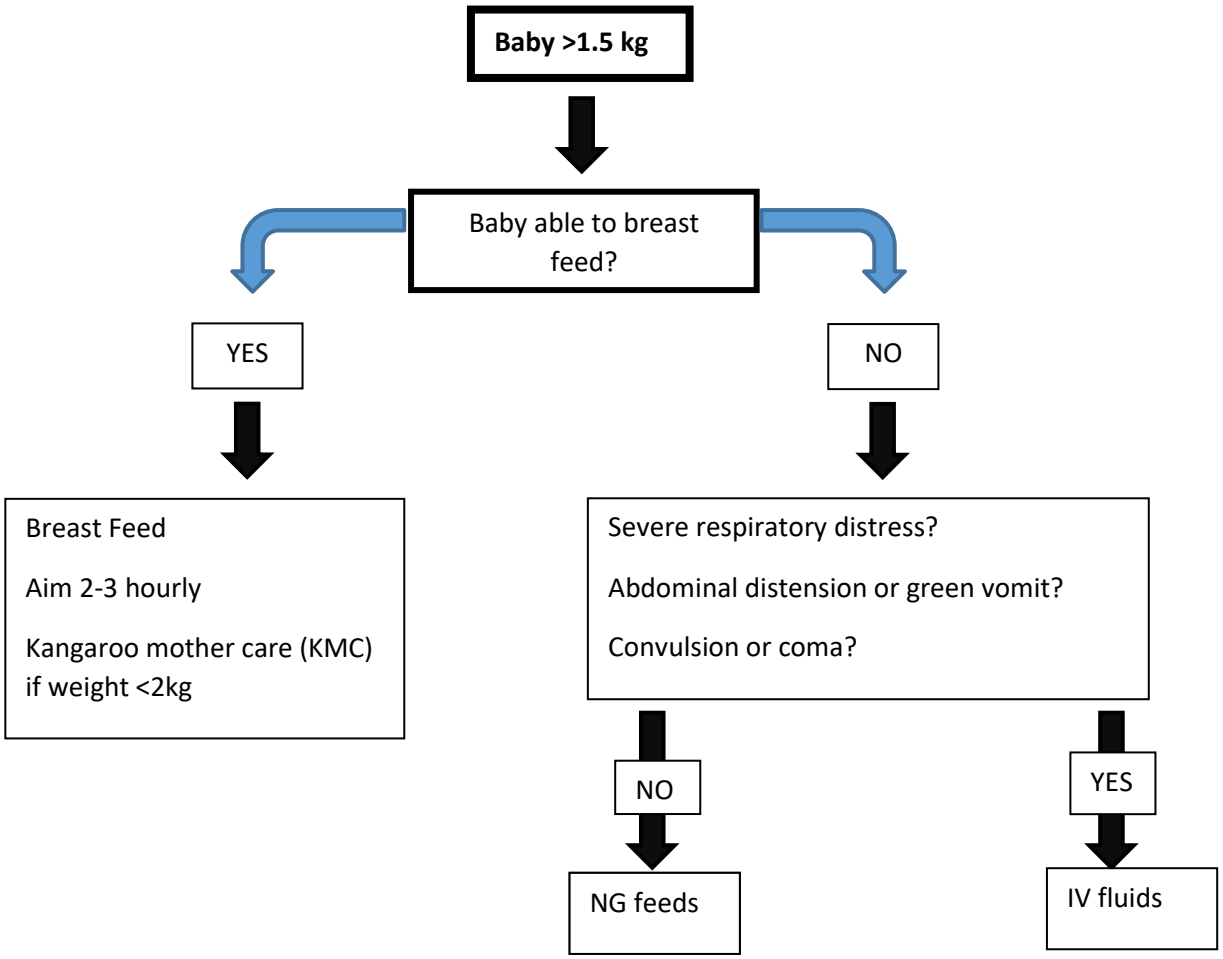
Encourage breast feeding whenever possible. Exclusive breastfeeding for the first six months of life is the best feeding option for all babies; the advice below is only for those babies who are not able to breastfeed.

When to use NG feeds:

- Preterm baby less than 34 weeks gestation: if unable to suck properly
- Baby having sucking / swallowing problems: a baby with meningitis or HIE who is starting to recover
- Baby with mild-moderate respiratory distress
- If possible, feed only mothers milk

When to use IV fluids:

- Preterm baby / low birth weight infants less than 1.5kg in first few days of life (while NG feeds are being built up slowly)
- Baby with convulsions or coma
- Baby with severe respiratory distress
- Baby with abdominal infection / severe abdominal distension / green vomiting
- Use 10% dextrose, and add sodium after 48 hours of life.



Baby >1.5 kg

Increase feeds each day:

Day	Volume of feeds per day
1	60ml/kg
2	90ml/kg
3	120ml/kg
4	150ml/kg
If the baby is not gaining weight well, consider gradually increasing the feed volume, up to a maximum of 200ml/kg	

Increase fluids each day:

Day	Volume of IV fluid
1	60ml/kg
2	90ml/kg
3	100ml/kg (120ml/kg if febrile or on phototherapy) Introduce NG or breast feeds as soon as baby is stable
4	

Baby < 1.5kg

Premature and very low birth weight babies have an **immature gut, so early feeding can be dangerous.** Feeds should be introduced very slowly (no more than 20ml/kg per day). On **day 1** of life the baby should have **only IV fluids** and no NG feeds. From **day 2** you can start to introduce NG feeding of small amounts of expressed breast milk according to the table below. It is important even for very small or very sick preterm babies to be given milk early in life unless you think there are signs of necrotizing enterocolitis (gut infection). Watch out for abdominal infection and green vomits and if present then stop feeds. The baby should be assessed every day and if they are tolerating the NG feeding then you can reduce the IV fluid and increase the NG feeds and example of this is suggested below.

Day 1	Total fluids (IV + NG) per day	IV fluids per day	NGT feeds per day
1	60ml/kg	60ml/kg	0
2	90ml/kg	70ml/kg	20ml/kg
3	120ml/kg	80ml/kg	40ml/kg
4	150ml/kg	90ml/kg	60ml/kg
5	150ml/kg	70ml/kg	80ml/kg
6	150ml/kg	50ml/kg	100ml/kg
7	150ml/kg	30ml/kg	120ml/kg
8	150ml/kg	0	150ml/kg
9	150ml/kg	0	150ml/kg
10	180ml/kg (if required)	0	*180ml/kg*
11	200ml/kg (if required)	0	*200ml/kg*

11.2.2. Maintaining temperature stability

Hypothermia (low temperature) is a temperature less than 36°C

Why is it a problem?

- Reduces oxygen delivery to tissues
- Causes hypoglycaemia
- Can cause breathing problems
- Increases risk of infection
- Slows weight gain

Prevention and treatment

- Monitor temperature every 4 – 6 hours in premature (<36 weeks) or low birth weight (<2kg) babies
- Dry well after birth
- Keep nappy dry
- Make sure babies have a hat and socks
- Kangaroo mother care (KMC): **see section 11.6.2**
- If KMC not possible can use overhead heater to warm cot

11.2.3. Essential care for all newborns and medications after birth

- Keep the baby warm
- Skin to skin contact as soon as possible
- Breast feed within the first hour and frequently (2-3 hourly) after that
- Give intramuscular vitamin K 1mg (or 0.4mg/kg for premature babies) – prevents bleeding
- Cord Care:
    - Babies born in hospital: keep umbilical cord clean and dry
    - Babies born at home: apply chlorhexidine aqueous solution or gel (or surgical spirit if chlorhexidine not available) daily for the first week of life
    - Watch for signs of infection: discharge from cord, redness around cord, and start IV antibiotics if present
- Apply tetracycline eye drops to both eyes
- Advise mother about vaccination

11.3. Neonatal Sepsis

Neonatal sepsis / meningitis

- What is neonatal sepsis? **Severe bacterial infection in a baby up to 28 days of life**
- Cause:
    - Can be contracted before delivery, during delivery or after delivery from the environment
    - Includes meningitis, pneumonia, urinary tract infection, umbilical infection, skin infection

Babies born in hospital should be assessed regularly to check for signs of possible sepsis

History:	Poor feeding, lethargic and quiet, fast breathing, severe jaundice, fever
Assessment:	Grunting, respiratory distress, high respiratory rate (>60), apnoeas, low SpO_2 Central cyanosis High (>38) or low (<35.5) temperature Lethargic, AVPU = P or U History of convulsions Bulging fontanelle Redness or pus around/from umbilicus Distended abdomen
Treatment:	**Antibiotics**: as quickly as possible

Give oxygen if SpO_2 is <90%
Treat for shock if present: 10 – 20ml/kg NS fluid bolus over 1 hour
Treat hypoglycaemia: 2ml/kg D10%
Maintain normal temperature
Maintenance fluid / NG feeds if too unwell to feed

Meningitis

- What is meningitis? **Bacterial infection of the covering around the brain and spine**

History: Poor feeding, lethargic and quiet, convulsions, restlessness, abnormal cry, fever

Assessment: Grunting, high respiratory rate (>60), apnoeas, low SpO_2
High or low pulse rate, signs of shock
Hypoglycaemia (blood sugar <2.2mmol/l)
High (>38) or low (<35.5) temperature
Lethargic, floppy or convulsing
Bulging fontanelle, restlessness, abnormal cry

Treatment: **Antibiotics**: as quickly as possible
Give oxygen if SPO_2 is <90%
Treat for shock if present: 10 – 20ml/kg NS fluid bolus over 1hour
Treat hypoglycaemia: 2ml/kg D10%
Treat convulsions: phenobarbitone 20mg/kg
Maintain normal temperature
Maintenance fluid / NG feeds if too unwell to feed
Lumbar puncture if stable

On the next page is a flow diagram showing how to assess and manage neonatal sepsis.

Early Detection in Hospital

All babies in hospital should be observed at least every 6 hours

Review should include: full set of vitals; review of cord; review of activity and breastfeeding

Treatment of Suspected Neonatal Sepsis

If you notice any of the danger signs:

- fast breathing (>60bpm)
- respiratory distress
- grunting
- central cyanosis
- lethargy
- poor feeding
- temperature <35.5 or >38
- pus from cord
- redness spreading from cord
- history of convulsions
- bulging fontanelle

TREAT FOR SEPSIS

A/B

Assess breathing and measure SpO_2

If there is respiratory distress, or SpO_2 is <90%:
Give supplementary oxygen
If severe respiratory distress: **consider CPAP**

C

If the baby has severe respiratory distress:
Give maintenance IV fluid appropriate to the age and weight of the baby
If unable to feed and no respiratory distress:
Start NG feeds
If the baby has severe pallor: **consider transfusion**
If the baby is jaundiced: **start phototherapy**
If baby born at home, or Vit K not given in maternity:
Give Vitamin K

C

Assess for convulsions and signs of hypoglycaemia (lethargy, not feeding, not crying) and measure blood glucose level if possible

If hypoglycaemia clinically suspected, or blood sugar level under 2.2 mmol/L: **give dextrose 10% 2ml/kg IV bolus**
If the baby is clinically stable: **consider performing LP**

GIVE AMPICILLIN AND GENTAMICIN

CONTINUE TREATMENT FOR AT LEAST ONE WEEK

Ampicillin Doses

Age	Dose	Frequency
<7 days	50mg/kg	Twice a day
7-28 days	50mg/kg	Three times a day
29 days +	50mg/kg	Four times a day

Gentamicin Doses

Age	Weight	Dose	Frequency
<7 days	<2kg	3mg/kg	Once a day
	>2kg	5mg/kg	Once a day
7 days +		7.5mg/kg	Once a day

When to start ceftriaxone

- If there is no improvement after 48 hours treatment with amoxicillin + gentamicin

GIVE CEFTRIAXONE 100MG/KG ONCE A DAY

AIM TO CONTINUE FOR THREE WEEKS

11.4. Neonatal jaundice

What is neonatal jaundice?

- Caused by increased break down of red blood cells in the first few days of life, producing bilirubin which makes the baby's skin appear yellow
- Neonatal jaundice is very common (50% term babies, 80% preterm babies)
- Some problems may cause the bilirubin level to become very high:
    - Dehydration / **poor feeding**
    - **Neonatal sepsis**
    - If mother and baby have **different blood groups**
    - G6PD
    - Thyroid problems
    - Polycythaemia (very high level of RBCs)

- Some liver problems stop the body excreting the bilirubin so the levels become very high
    - Infections like syphilis, hepatitis, rubella which can pass from mother to baby
    - Obstruction in the liver / biliary system (causes pale stools, dark urine)

Assessment: Baby has yellow skin and eyes – if palms or soles are yellow the bilirubin level is high
Baby may be sleepy, lethargic with poor feeding
They may be unwell because of the cause of the jaundice
If bilirubin level very high it can cause convulsions, brain damage and disability

Normal versus abnormal jaundice:

Physiological (normal) / No need to treat	**Abnormal / Need to treat**
Starts on day 2 – day 5 of life	**ALWAYS TREAT IN PRETERMS**
	Starts on day 1 of life
Baby feeding well	Baby feeding poorly
Baby active	Baby lethargic
Well baby	Baby has fever or other signs of infection
Baby's skin and eyes yellow	Baby deep yellow including palms or soles
Normal stool and urine	Pale stool, dark urine
No liver or spleen enlargement	Enlarged liver and /or spleen

Treatment: Measure bilirubin level if possible, and decide whether to treat based on the level
Measure **haemoglobin** (could be anaemic or polycythaemic)
Start **phototherapy** (keep baby **warm** while naked under phototherapy)
Make sure the baby is breast **feeding well** – if not give NGT feeds (or iv fluids if too unwell to feed)
Give **antibiotics** for possible neonatal sepsis
Identify the cause if possible and treat
Treat convulsions – phenobarbitone 20mg/kg

11.5. Birth asphyxia/hypoxic ishaemic encephalopathy (HIE)

Lack of oxygen to organs (brain, kidneys, liver, heart, gut) before, during or immediately after birth

History:

- Difficult / long labour, bleeding ++ around delivery, difficult presentation, delay of C-section
- Not crying / breathing at delivery - needing resuscitation at birth
- Lethargic, floppy, restless, unable to feed, convulsing

Assessment: Grunting, respiratory distress, **apnoeas**, low SpO_2
High or low pulse rate,
Signs of shock, anaemia (if blood loss at delivery)
Hypoglycaemia (blood sugar <2.2mmol/l)
Convulsions
Poor suck
Floppy, restless

Treatment: **Resuscitation**
Support **airway**: NP, guedel
Give oxygen if SPO_2 is <90% and oxygen available
Treat for shock if present: 10 – 20ml/kg NS fluid bolus over 1hour
Treat convulsions: phenobarbitone 20mg/kg
Treat **hypoglycaemia**: 2ml/kg D10%
Maintain normal **temperature**: avoid fever
Maintenance fluid / NG feeds if too unwell to feed
Antibiotics (exclude sepsis / meningitis)

11.6. Care of the premature and low birth-weight neonate

11.6.1. Avoidance of hypoglycaemia

Blood sugar < 2.2mmol/l

Babies at risk:

- **Preterm**
- **Low birth weight < 2kg**
- Babies with sepsis
- Babies with respiratory distress
- Babies who are hypothermic (cold)

Prevention:

- Breast feed early (within 1 hour)
- Feed frequently: every 2-3 hours
- If unable to feed give NG feeds or iv fluids with 10% dextrose
- In at-risk babies check blood sugar every 6 hours (pre-feed)

Treatment

- If blood sugar < 2.2mmol give breast or NG feed immediately and re-check after 30 mins
- If blood sugar still <2.2mmol or unable to feed, give 10% dextrose 2ml/kg bolus and start 10% dextrose infusion
- Check blood sugar every 4-6 hours

11.6.2. Kangaroo mother care (KMC)

What is it?

Keeping baby skin to skin with mother at all times; providing safe and stable environment in which the baby can grow and develop; for most small babies this will be at least equivalent to caring for a baby in an incubator, and in many cases will be better.

When to use it?

All stable preterm or low birth weight (<2kg) babies. Start as soon as possible after birth and continue day and night.

What are the benefits?

- Prevents hypothermia (keeps baby warm)
- Improves breastfeeding
- Reduces infection
- Reduces stress
- Reduces apnoea in preterm babies

How to do it:

- Dress baby in nappy, hat and socks
- Place skin to skin on mother's chest, between the breasts, with head turned to one side
- Tie infant to mother with wide cloth
- Cover the mother and infant with mother's clothes
- Breast feed frequently: can also have NG feeds during KMC
- Keep baby's temperature 36 – 37 degrees centigrade
- If mother is not able to do KMC encourage other family members to do KMC instead

On the next page is a flow diagram showing when and how to initiate and continue kangaroo mother care, and how to decide when a baby in KMC is ready for discharge.

Stabilise Baby:

- Oxygen/CPAP for respiratory distress
- IV fluids where there are feeding problems
- Correct blood sugar level <2.2mmol/L
- Give antibiotics for suspected sepsis

WHEN BABY STABLE

Weigh Baby

<2kg

>2kg → **CONVENTIONAL CARE**

- Is the baby NOT breathing well?
- Does the baby have severe respiratory distress?
- Is the baby having only IV fluid?
- Is the mother too unwell to provide kangaroo mother care?

If any answer is yes, the baby is not stable for KMC

Yes → BABY NOT STABLE → **CONVENTIONAL CARE**

No → BABY STABLE → **Commence Kangaroo Mother Care**

REASSESS: IS BABY NOW STABLE?

Yes → **Commence Kangaroo Mother Care**

No → **CONVENTIONAL CARE**

1

- Explain to the mother what is kangaroo care, and the benefits for her baby
- Explain that kangaroo care should be given as near to continuously as possible
- Teach the mother to observe for apnoea and signs of serious illness

2

- Dress the baby in hat, diaper, and socks
- Position the baby between the mother's breasts, using lappa wound around the body to keep the baby in position
- Teach the mother how to move the baby in and out of the lappa
- Begin with a shorter session of kangaroo care (at least one hour) then increase gradually until it is given as near to continuously as possible

3

- The baby can remain in the kangaroo position whilst the mother is sleeping: the mother should be positioned at around 15 degrees from flat
- Twins CAN be given kangaroo care: they should be placed on either side of the chest
- Weigh baby daily; monitor feeding and weight gain

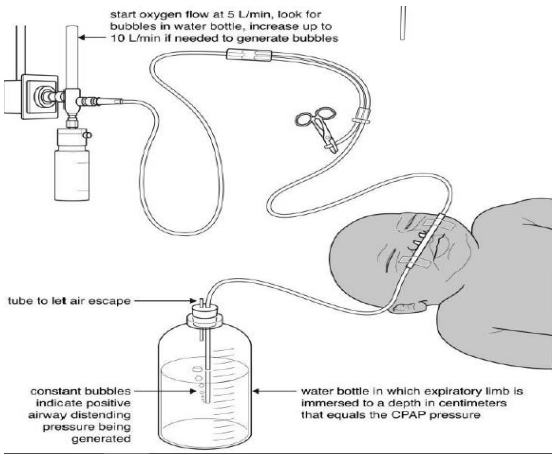
Discharge when:

- The baby is exclusively breastfeeding
- The baby has gained weight every day for the last three days
- The weight is at least 1.5kg
- There are no concerns about sepsis
- The mother is confident in looking after her baby

11.6.3. Continuous positive airway pressure (CPAP)

What is CPAP?

CPAP gives positive pressure to keep the alveoli open, making it easier to breathe in and out. CPAP reduces respiratory distress and improves oxygenation.



When to start CPAP?

- SpO_2 < 90% on oxygen
- Grunting
- Severe respiratory distress
- Preterm babies <32 weeks or birth weight <1.5kg

When to discontinue CPAP?

- When the baby's respiratory distress has improved
- When SpO_2 is >90%

Summary

Neonates are a priority group because they are at risk of infection, hypoglycaemia and hypothermia

- ✓ After birth, dry baby and keep baby warm. Remember to open the airway and if needed help baby breathe
- ✓ Encourage breastfeeding whenever possible
- ✓ Kangaroo mother care helps to keep baby warm and encourages breastfeeding
- ✓ Protect against hypoglycaemia and hypothermia
- ✓ Give early antibiotic if signs of sepsis

Assessment Questions

1) A mother gives birth outside your triage area. You have immediately dried and stimulated the baby and opened the airway. You notice the baby is not breathing, what are you going to do next?

2) Name 3 differences between neonatal life support and basic life support

3) List 5 actions that you can take for a newborn after birth, to keep them healthy and prevent them from getting sick

4) List 5 signs in a baby that might make you think that they have sepsis

5) Which babies would benefit most from kangaroo mother care?

12. Transfers, handover and communication skills

12.1. Communicating with colleagues

Good team working and clear communication is very important, especially in an emergency:

- Make sure everyone knows what their role is
- Make sure everyone knows who is leading / in charge
- Address other people by name
- If you ask someone to do something, make sure they have heard and understood
- Speak loudly and clearly but don't shout: one person at a time
- Listen to your colleagues

12.2. Communicating with children and families

- Reassure the child and try to avoid unnecessary discomfort
- Explain to caregivers what you are doing to their child and why it is necessary
- Be honest about what is happening
- Encourage caregivers to ask questions and confirm their understanding of the situation

12.3. Safe transport

BE PREPARED FOR TRANSFER

- Think about how far you are transporting the child – to the ward next door? to a ward at the other end of the hospital? to another hospital?
    - How long will it take?

- Think about what might happen on the way – convulsions, respiratory arrest, cardiac arrest, bleeding.
    - How can they be prevented?
    - How can we be prepared if it happens?

- Check if the receiving team is ready for the child:
    - Is there a nurse free to take over care?
    - Is there a bed available?
    - Is there oxygen available if necessary?

- Make sure the child is as stable as possible before moving.
    - Go through A, B, C, D before transfer:
        - Airway support if necessary
        - Oxygen to keep SpO_2 >90% if possible
        - Make sure shock and severe anaemia have been treated
        - Treat hypoglycaemia first
        - Wait for convulsions to stop if possible
        - Aspirate the NG tube
        - Make sure the cannula / IO is working

- What equipment is needed?
    - Oxygen if possible*
    - Ambu bag with mask of correct size
    - Guedel airway or NP of correct size
    - Child's chart and drugs

*If no oxygen is available for transfer, try to make the time off oxygen as short as possible:

- Take the child off oxygen just before leaving
- Plan the shortest route and move as quickly as possible
- *Make sure oxygen is ready at the other end to start immediately on arrival*

12.4. Handing over patients

Clear handover is important so that the child continues to get the care they need.

- Find out who you are handing over to: nurse looking after the patient; nurse in charge; doctor
- Introduce yourselves if you don't know each other already
- Make sure they are free to listen and are giving you their full attention
- Avoid interruptions

- Use a simple structure:
    - **Name, age and weight of child:**

      This is 2-year-old Aminata. She weighs 10kg.

    - **Diagnosis / possible diagnoses**

      She has cerebral malaria
      Or
      She has likely bronchiolitis or pneumonia

    - **Short background, including relevant medical conditions (such as HIV, TB or sickle cell disease)**

      She has had fever and poor feeding for 3 days and started convulsing today. She is known to be HIV positive.

    - **Go through A, B, C, C, D**

      A: *She was obstructing her airway so an NP has been inserted*

      B: *Her saturations were 80% in air. They are now 92% on nasal cannula oxygen. She has respiratory distress.*

      C: *She had all 3 signs of shock and is not malnourished so was given a 20ml/kg fluid bolus of NS over 1 hour. Her Hb was 4.2 so she received 20ml/kg of blood. Her RDT is positive so she has had artesunate. She has also had 80mg/kg of Ceftriaxone.*

      C/C: *Her blood glucose was 1.8mmol/dl so she received 5ml/kg D10%. On re-check the blood sugar was 4.8mmol/dl. She was convulsing on arrival which stopped after 1 dose of iv diazepam. She is now P on AVPU.*

D: *She is not dehydrated and cannot feed because of decreased consciousness so is on iv maintenance fluids.*

- Hand over the plan

  Continue oxygen, iv fluids, antibiotics and artesunate. Re-check blood sugar.

- Check the other person has understood the plan
- Give the other person a chance to ask questions

Summary

The ability to communicate effectively, compassionately and clearly with families, patients and your colleagues is an essential skill for all health care workers.

- ✓ Effective team work is dependent on clear communication.
- ✓ Don't forget to communicate with the child
- ✓ Listening is part of good communication
- ✓ Ask questions to confirm understanding
- ✓ Safe transfers are dependent on good preparation and a clear handover

Assessment Questions

1. Please list 5 consequences of poor team communication during a cardiac arrest.

2. A 2-year-old child presents to your hospital critically unwell and in shock. You are about to place an IO and her mother starts to shout at you. What are you going to do and say next?

3. List 5 things you will consider before transferring a child from one clinical area to another.

4. Please think about the last unwell child that you have managed. Use that case to complete the below.

   Hand over a child using the ABCD approach

   Background:

   A:

   B:

   C:

   D:

13. Monitoring and evaluation

Monitoring and evaluation are essential aspects of improving healthcare, and all healthcare workers are responsible for making sure that the quality of care being delivered is always improving.

It is important to **monitor** the number and type of patients that are treated at a facility, as well as the treatment they receive, and when they are discharged. Providers, managers, and ultimately the Ministry of Health all require this information so that the appropriate resources can be allocated to and within the facility to support the delivery of care.

It is equally important to **evaluate** the quality of care that is provided. Is the facility providing timely and appropriate treatment for all the patients who attend? Are there any problems with the way that care is delivered that could cause harm to patients? Are the facility guidelines being followed? If changes have been made to guidelines or processes, have these resulted in improvements to the care that is delivered?

13.1. Introduction to data collection

Information on the patients that attend a health facility, and about the treatment that they receive, is essential to the process of improving care. Data collection should be part of the routine processes of hospital care, and should be built into the normal operations of each hospital department. The number of attendances and admissions should be logged every twenty fours, and statistics by week and month should be available. The number of deaths and the causes of death should also be recorded in a like manner. In order to inform the process of improving quality of care, it is also important to collect more detailed data on the reasons for admission, the severity of illness, and the treatment administered. To this end, all hospitals should consider introducing standardised admission records, so that all the key information may be extracted and recorded at discharge.

13.2. Introduction to data management

All patient data should be stored securely, and only released to persons authorised to view or use that information. If statistics or case studies are required for the purpose of service improvement, then the data released should not contain any information that would identify individual patients. If possible, the data that is collected routinely in any health facility should be anonymised and stored in a computer database, so that it is easy to retrieve the key information that will help to drive improvements in the service. Access to the database should be logged and supervised.

13.3. Key indicators for ETAT+

The mortality rate, and especially the mortality rate within the first 24 hours of admission, is perhaps the most important indicator for ETAT interventions. ETAT methods, if correctly implemented, should help to prevent the deaths of children, particularly deaths early in the admission. It is important to maintain an accurate record of all the deaths that occur in any health facility.

Simply counting the death rate may not give an accurate understanding of the quality of care, however. The survival of children is affected by many factors, including the severity of illness; the length of time before the child is brought to the health facility; and the administration of any traditional remedies before the child arrives at the health facility.

In order to understand how the death rate is related to the quality of care, it is important to collect more information about every child who is admitted. In the box below are some suggestions of information that all hospitals should collect in order to record and analyse the severity of illness amongst its admitted patients.

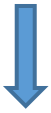
Neonates	• Need for resuscitation after birth and duration of resus • Presence of convulsions
Infants and Children	• MUAC: presence/absence of severe acute malnutrition • Haemoglobin concentration at presentation • Presence of convulsions • Presence of coma

Alongside the outcomes for children, it is also important for all health facilities to monitor the quality of care that is being delivered. Whilst it is usually too difficult to collect and analyse information on every aspect of inpatient care, it is possible to collect key data that give wider information about the quality of inpatient care; some of these quality indicators are listed in the table below:

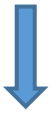
Neonates	• Admission temperature • Accurate antibiotic prescription • Weight gain after day 5
Triage	• Measurement of vital signs at triage • Time from triage to treatment (stratified by children with emergency or priority signs)
Treatment	• Time to anti-malarials for malaria • Time to antibiotics for sepsis

It is also important for health facilities to look more closely at the quality of care being provided in specific areas. This may require a more focused approach to data collection and analysis, looking at areas such as accurate recognition of emergency and priority signs in triage; appropriate prescription of fluids and bloods for inpatients, or timely administration of oxygen for patients with SpO_2 <90%. It is also important to review the management of specific conditions, using the ETAT guidelines as the gold standard. The audit cycle should follow a clear process:

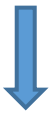
Identification of WHO ETAT guideline



Collecting data that demonstrates the facility's current performance against the guideline



Analysing the data and identifying areas for improvement



Making and sustaining improvements in the facility's delivery of care

Summary

Monitoring and evaluation are essential aspects of improving healthcare. It is everyone's responsibility to ensure that the quality of care that we provide is always improving.

- ✓ We should monitor the type of patients we see, and the treatments that we provide
- ✓ We need to evaluate the quality of care that we deliver
- ✓ We must accurately collect and collate data about the patients that we treat, so that we can identify good practice and areas for improvement

Assessment Questions

1. Which data do you collect in your hospital?

2. Why is monitoring and evaluation important?

3. Does your hospital have a data management system?

4. Why is it important to have a data management system?

5. In a hospital who should be responsible for ensuring quality improvement of care?

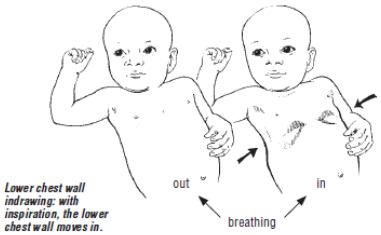
Appendix 1: Guidelines

Appendix 1.1: Triage Guideline

EMERGENCY SIGNS

Airway and **B**reathing

- Obstructed or absent breathing *or*
- Central cyanosis *or*
- Severe respiratory distress



Circulation

SHOCK:

- Cold skin WITH
- Capillary refill longer than 3 seconds
- AND Weak and fast pulse

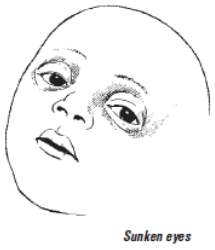
Disability

- Coma
- Convulsing (now)

Severe **D**ehydration

Diarrhoea plus **2** of:

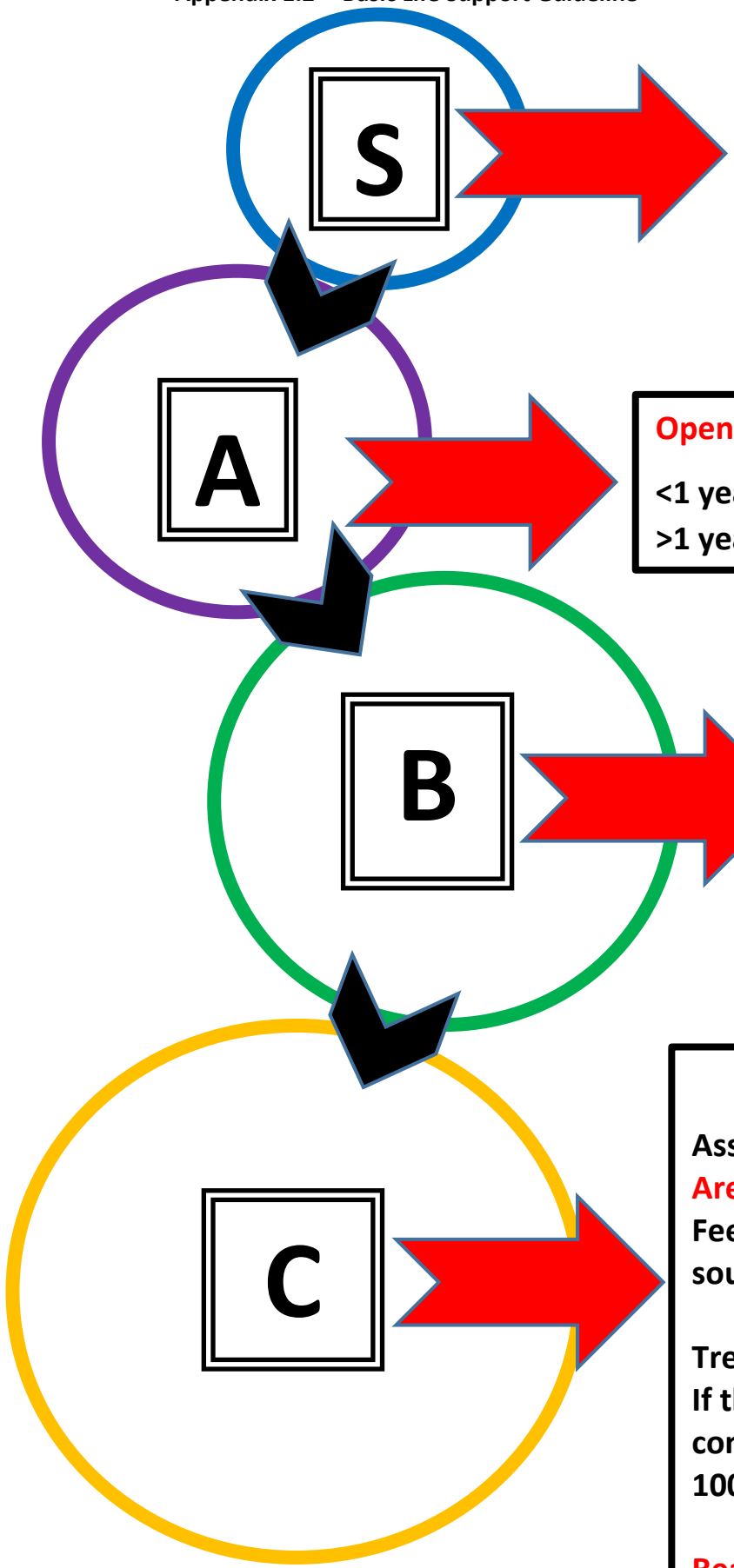
- Lethargy
- Sunken eyes
- Very slow skin pinch
- Unable to drink/drinking poorly


Sunken eyes

PRIORITY SIGNS

3 T	**T**rauma (major) **T**iny (<2 months) **T**emperature (>39°C **or** <35.5°C)
3 P	**P**allor (severe) **P**ain (severe) **P**oisoning
3 R	**R**estless, irritable, lethargic **R**espiratory distress **R**eferral (urgent)
MOB	**M**alnutrition (severe visible wasting) **O**edema (both feet) **B**urns

Appendix 1.2 Basic Life Support Guideline



Safety: ensure personal and environmental safety

Stimulate: Is the child responsive?

Shout for help

Setting: Are you in the appropriate place?

Open the airway:

<1 year: Neutral position
>1 year: Sniffing position

Breathing:

Assess:
Is the child breathing?
Look, Listen, Feel

Treat:
If the child is not breathing give 5 rescue breaths
RE-ASSESS: child breathing?

Circulation:

Assess:
Are there any signs of life?
Feel for a central pulse or listen for heart sounds

Treat:
If the heart is not beating then start chest compressions and breaths 15 to 2 (rate 100-120 per minute)

Reassess every 2 minutes
Give adrenaline 0.1ml/kg (1: 10,000) IV every 4 minutes

REASSESS THROUGHOUT

Appendix 1.3
Respiratory Distress Guideline

How to Assess and Treat Respiratory Distress

Count respiratory rate during 1 min when the child is calm

Fast breathing:

<2 months	**>60 breaths**
2–11 months	**>50 breaths**
1–5 years	**>40 breaths**
>5 years	**>30 breaths**

Does the child have respiratory distress?

- **Chest indrawing**
- **Nasal flaring**
- **Head nodding**
- **Tracheal tug**
- **Fast breathing**
- **Deep acidotic breathing**

NO → **Now assess the circulation**

YES

Does the child have any of the below features?

- **Airway obstruction: stridor**
- **Central cyanosis**
- **Severe indrawing**
- **Grunting**
- **Oxygen saturation ≤ 90% in air**
- **Too breathless to feed**
- **Lethargy**

YES

Severe Respiratory Distress:

- Sit the patient up
- Start oxygen
- Nil per oral (NPO)
- Start maintenance fluid
- Antibiotics

1. First Line:
   - Ampicillin 50mg/kg IV TDS
   - Gentamicin 7.5mg/kg IV OD
2. Second Line:
   - Ceftriaxone 80mg/kg OD

- If wheeze is present and child > 1 year old, try salbutamol bronchodilator using a spacer
- Consider continuous positive airway pressure (CPAP) if oxygen saturation <90% on oxygen.

NO

Mild-Moderate Respiratory Distress:

- Sit the patient up
- Antibiotics
  - Amoxicillin 40mg/kg PO BD
- Oral feeding or NG feeding as tolerated
- If wheeze is present and child >1 year old, try salbutamol bronchodilator using a spacer
- Reassess regularly and if the child's condition changes and they show signs of severe respiratory distress:

Now assess the circulation

SHOCK

✓ **Cold peripheries**
AND
✓ **Capillary refill time longer than 3 seconds**
AND
✓ **Weak and fast pulse**
YOU MUST HAVE **ALL 3 SIGNS** TO BE IN **SHOCK.**

Child in **SHOCK**

Shock and **NOT** malnourished

Shock **AND** malnourished

If **Hb<6** transfuse whole blood
20 mls/kg **Over 4 hours**
10 mls/kg **Over 4 hours**

Hb >6

Hb >6

10mls/kg over 30mins
Ringers Lactate or Normal Saline

If shock still present, give further 10 ml/kg over 30 minutes; can repeat again if needed

10ml/kg
over 1 hour
Ringers Lactate with 5% Dextrose or Normal Saline with 5% Dextrose*

NO MALNUTRITION	SEVERE MALNUTRITION
If shock not secondary to diarrhoea: **SHOCK RESOLVED**: Give maintenance fluids or feeds following the protocol below **SHOCK PERSISTS:** Give maintenance fluids **AND** **Consider blood transfusion**	**If shock not secondary to diarrhoea:** **SHOCK RESOLVED**: Start NG/oral ReSoMal following **Step 2** for malnourished children **SHOCK PERSISTS**: Start NG/oral ReSoMal following **Step 2** for malnourished children **AND** **Consider blood transfusion**

SHOCK SECONDARY TO DIARRHOEA

NO MALNUTRITION: Follow Severe Dehydration **Step 2**
SEVERE MALNUTRITION: Start NG/oral ReSoMal following **Step 2** for malnourished children

***Ringers with 5% dextrose = 450mls of Ringers with 50mls of 50% Dextrose**
If Ringers not available, make normal saline with 5% dextrose = 450mls of normal saline with 50mls of 50% Dextrose

SEVERE DEHYDRATION

WATERY DIARRHOEA + 2 out of the 4:

- Lethargy
- Sunken eyes
- Very slow skin pinch (≥ 2 seconds)
- Unable to drink

If child not in shock but **severely** dehydrated:

Child with **SEVERE** dehydration

Dehydrated and **NOT** malnourished

Ringer's Lactate, Normal Saline

Use DNS for dehydration only is RL or NS is not available

INFANTS (under 1 year)

Step 1: **30ml/kg in the first hour**

Step 2: **70ml/kg in the next 5 hours**

CHILDREN (over 1 year)

Step 1: **30 ml/kg in the first 30min**

Step 2: **70 ml/kg in the next 2.5hours**

Dehydrated **AND** malnourished

ReSoMal oral

- Step 1: **5ml/kg every 30 minutes** for the first 2 hours
- Step 2: **5 to 10 ml/kg every hour** for the next 4 to 10 hours. If possible, alternate F75, 5 mls/kg, with ReSoMal

If child unable to tolerate oral or NG fluids, consider careful IV rehydration with RL+D5

SOME DEHYDRATION

WATERY DIARRHOEA + 2 out of the 4:

- Restless, irritable
- Sunken eyes
- Slow skin pinch (< 2 seconds)
- Thirsty/drinks eagerly

If child not in shock but has **some** dehydration:

Child with **SOME** dehydration

Dehydrated and **NOT** malnourished

ORS 75mls/kg over 4 hours

- More can be given is the child wants more
- The child can continue breast feeding
- If the child becomes puffy stop ORS and encourage breastfeeding

All children over 6 months should be given some food before discharge

Dehydrated **AND** malnourished

ReSoMal oral

- Step 1: **5ml/kg every 30 minutes** for the first 2 hours
- Step 2: **5 to 10 ml/kg every hour** for the next 4 to 10 hours. If possible, alternate F75, 5 mls/kg, with ReSoMal

If child unable to tolerate oral or NG fluids, consider careful IV rehydration with RL+D5

MAINTENANCE FLUID

Give intravenous maintenance fluid to any child who is:

- nil by mouth (NPO)
- in severe respiratory distress or
- or who has signs of impaired circulation
- A child with SAM that cannot tolerate NG fluid
- Any child being treated for suspected intestinal obstruction

Maintenance fluids will normally be given as dextrose/normal saline (DNS) or dextrose/Ringer's Lactate
The maintenance fluid calculation for 24 hours is detailed below:

First 0-10kg of body weight 100mls/kg
Next 10-20kg 50mls/kg
Subsequent weight >20 Kg 25mls/kg

If the child has a fever, consider giving more fluid: 10% more fluid for every 1 degree of fever

National ETAT+ Anaemia Guideline
Children over 1 month

IS THE CHILD ANAEMIC?

WHAT IS THE HAEMOGLOBIN?

<5g/dl

Yes

NOT SAM: Transfuse 20mls/kg of whole blood over 4 hours

SAM: Transfuse 10mls/kg of whole blood over 4 hours

If the child is in shock because of anaemia the treatment is blood. For children in anaemic shock while waiting for blood maintenance fluid can be started until blood arrives.

5-6g/dl &
signs of anaemic heart failure:

- Fast heart rate
- Severe respiratory distress
- Hepatomegaly

YES
NOT SAM: Transfuse 20mls/kg of whole blood over 4 hours

SAM: Transfuse 10mls/kg of whole blood over 4 hours

NO

Do not transfuse blood

<6g/dl & Sickle cell positive
with signs of a sickle crisis:

- Severe respiratory distress
- Bone pain
- Fever
- Tender splenomegaly

YES
NOT SAM: Transfuse 20mls/kg of whole blood over 4 hours

SAM: Transfuse 10mls/kg of whole blood over 4 hours

NO

Do not transfuse blood

>6g/dl

Do not transfuse blood

-If anaemia due to bleeding, try and stop the bleeding.

-If anaemia due to malaria, treat with artesunate

-If anaemia due to nutritional deficiency, start iron supplementation

VITALS DURING BLOOD TRANSFUSION

Vitals must be taken before starting a blood transfusion and every 15 minutes. If signs of a transfusion reaction noted, then blood must be stopped immediately.

Draft 2017 National ETAT+ Guideline

Appendix 1.6 Convulsions Flow Chart: Children Over 1 month

1. Open and maintain airway
2. Check the time
3. Check SpO_2, PR, RR, temperature: if fever undress child
4. Give oxygen
5. Check blood sugar level
6. Site IV access if not already available
7. Give antibiotics and antimalarials if not already given
8. Recovery position
9. Site NG tube to decompress stomach
10. Consider taking blood for Hb, WCC, malaria, electrolytes

RBS: <3mmol/L

Give IV 10% glucose 5mls/kg or PO if no IV access. Reassess in 30mins and repeat

If not already given in last 24 hours: ceftriaxone (100mg/kg) and artesunate (<20kg: 3mg/kg; >20kg: 2.4mg/kg)

Child convulsing for longer than five minutes?

NO

YES

More than two short convulsions in two hours?

NO

YES

Hourly Neuro observations:

AVPU status

Pupils responding to light; resp rate; heart rate; blood sugar

Nurse in recovery position

Give diazepam PR/IV

Wait 10 mins

10 mins still convulsing: **diazepam IV**

Wait 10 mins

10 mins still convulsing:
Loading dose of phenobarbital IM/IV or phenytoin IV

- Diazepam IV: 0.05mls/kg or 0.25mg/kg
- Diazepam PR: 0.1mls/kg
- Phenobarbital loading dose: 15mg/kg IV/IM over 15 min
- Phenobarbital maintenance dose: 5mg/kg OD, to start after 24 hours, for 2 days
- Phenytoin IV: 15 mg/kg over 1 hour

Appendix 1.7
National Malaria Treatment Guideline

GOVERNMENT OF SIERRA LEONE
MINISTRY OF HEALTH AND SANITATION
NATIONAL MALARIA CONTROL PROGRAMME

Malaria Treatment Flow Chart for Hospitals

The Patient's Journey

If temperature ≥ 38.0°C or history of fever in recent 48 hours: test for malaria

1. The Health Worker completes urgent request form for laboratory tests
2. Test request for MPs sent to the Laboratory
3. Whilst waiting for laboratory results, RDT test could be done where applicable
4. For outpatients: tests are done in main laboratory (MPS)
5. Test done: laboratory technician gives report to caregiver and record
6. Health Worker records results in inpatient chart or on outpatient card

Test Positive

Check for signs of severe malaria:

- Prostration (unable to walk/sit without support or drink/breastfeed)
- ≥ 2 convulsions in 24 hours
- Altered consciousness
- Blood sugar ≤ 2.5 mmo/L
- Hb ≤ 5.0 g/dL (or PCV ≤ 15%)
- Shock (compensated or decompensated)
- Increased work of breathing where pneumonia is unlikely

Signs absent

Uncomplicated Malaria: Treat with ACT

1. Use dosage chart
2. Treat any co-infections
3. Tell caregiver to return if symptoms persist after 3 days

One or more

Signs present

Severe Malaria: Treat with Artesunate IV/IO (alternatively, Artemether IM or Quinine IV/IO)

1. Use dosage chart
2. Doctors to determine frequency of monitoring
3. Treat hypoglycaemia – use hypoglycaemia guideline
4. Check for malnutrition: record Z-score. Caution with fluids in malnutrition
5. Doctors to determine maintenance fluids/feeds
6. Do not give bolus iv fluids for shock unless the cause is gastroenteritis
7. If Hb ≤ 5 g/dl transfuse 20ml/kg whole blood urgently (note: if malnutrition or heart failure see anaemia guideline)
8. Treat co-infection – see guideline
9. If unconscious – use coma guideline

Test Negative

Antimalarial not required. Look for another cause of illness. Repeat test if concern remains.

This Malaria Treatment flow chart for hospitals is based on the Malaria Case Management Guideline and is approved by the National Malaria Control Programme of the Ministry of Health and Sanitation

Drug Treatment

Uncomplicated Malaria

First-line drug for children above 3kg is oral Artemether plus Lumefantrine twice daily for three days. Prescribe as in the table below. Nurse to supervise the first treatment. If child vomits tablets, admit & treat with iv/im artesunate or artemether i.m.

Weight (Kg)	Age	20/120mg					
		Day 1		Day 2		Day 3	
		Morning	Evening	Morning	Evening	Morning	Evening
5 – 14	>3yrs	1 tab/dose	1 tab/dose	1 tab/dose	1 tab/dose	1 tab/dose	1 tab/dose
15-24	4-8yrs	2 Tabs/dose	2 Tabs/dose	2 Tabs/dose	2 Tabs/dose	2 Tabs/dose	2 Tabs/dose
25-34	9-14yrs	3 tabs/dose	3 tabs/dose	3 tabs/dose	3 tabs/dose	3 tabs/dose	3 tabs/dose
>35	(>14yrs	4 tab/dose	4 tab/dose	4 tab/dose	4 tab/dose	4 tab/dose	4 tab/dose
>35	1 tablet AL 80/480mg fixed dose, twice per day						

AL 80/480mg fixed dose. A higher strength of AL that has 6 tablets instead of 24 for a complete dosing regimen

Severe Malaria

First-line drug: artesunate i.v./i.o. Alternative drugs: artemether i.m. or quinine i.v./i.o.

	Artesunate: Dose 2.4mg/kg at time 0 hr, 12 hr, 24 hr, then daily		Artemether: Loading 3.2 mg/kg Maintenance dose 1.6 mg/kg (once daily)		Quinine: Loading dose 20 mg/kg Maintenance dose 10 mg/kg (8 hrly)		
	i.v./i.o.		i.m. in thigh		Infusion i.v./i.o. over 4 hours		
Weight (kg)	Dose (mg)	Dose (ml) of 60mg in 6mls	Loading dose (mg)	Maintain dose (mg) 24 hrly	Loading dose (mg)	Maintain dose (mg) 8 hrly	Volume (ml) 5% dextrose
3.0 - 3.9	7.5	0.75	10	5	60	30	30
4.0 - 4.9	10	1	13	6	80	40	40
5.0 - 5.9	12	1.2	16	8	100	50	50
6.0 - 6.9	14	1.5	19	10	120	60	60
7.0 - 7.9	17	1.7	22	11	140	70	70
8.0 - 8.9	19	1.9	26	13	160	80	80
9.0 - 9.9	22	2.2	29	14	180	90	90
10.0 - 10.9	24	2.4	32	16	200	100	100
11.0 - 11.9	26	2.6	35	18	220	110	110
12.0 - 12.9	29	2.9	38	19	240	120	120
13.0 - 13.9	31	3.1	42	21	260	130	130
14.0 - 14.9	34	3.4	45	22	280	140	140
15.0 -15.9	36	3.6	48	24	300	150	150
16.0 - 16.9	38	3.8	51	26	320	160	160
17.0 - 17.9	41	4.1	54	27	340	170	170
18.0 - 18.9	43	4.3	58	29	360	180	180
19.0 - 19.9	46	4.6	61	30	380	190	190
20.0 - 20.9	48	4.8	64	32	400	200	200

Follow injection drugs with 3 days oral ACT (Artemether/Lumefantrine or ASAQ). If the child is unable to tolerate oral medication continue injection drugs for 6 days.

Artesunate i.v./i.o.: Give every 12 hours for the first three doses (time 0, 12 hrs. and 24 hrs.). Use a minimum of 3 doses before switching to oral ACT.

Artesunate typically comes as a powder together with a 1ml vial of 5% bicarbonate that then needs to be further diluted with either normal saline or 5%.

- ***DO NOT*** use water for injection to prepare artesunate for injection
- ***DO NOT*** give artesunate if the solution in the syringe is cloudy
- ***DO NOT*** give artesunate as a slow iv drip (infusion)
- ***YOU MUST*** use artesunate ***within 1 hour*** after it is prepared for injection

Preparing i.v. artesunate	**IV**	**I IM**
Artesunate powder (mg)	**60 mg**	**60 mg**
Sodium Bicarbonate (mls, 5%)	**1 ml**	**1 ml**
Normal Saline or 5% Dextrose (mls)	**5 mls**	**2 mls**
Total volume	**6 mls**	**3 mls**
Artesunate concentration mg/ml	**10 mg/ml**	**20 mg/ml**

Artemether i.m.: Use a minimum of loading and one maintenance dose before switching to oral ACT.

Quinine i.v./i.o.: Use a minimum of loading and three maintenance doses before switching to oral ACT.

Please note: If a patient is deteriorating on treatment please discuss immediately with the Doctor

Co-infection in Severe malaria for a child

There is high risk of a bacterial co-infection (~10%)

When no focal sign of bacterial infection consider

Ampicillin 50 mg/kg/dose four times per day. Change to amoxicillin syrup when changing to oral ACT. Treat for 5 days.

Sign of pneumonia or septicaemia

Ampicillin 50 mg/kg/dose four times per day PLUS gentamicin 7.5 mg/kg/dose once per day for 5 days.

Sign of coma or meningitis

Ceftriaxone 100 mg/kg/dose once per day (inject slowly over 5 minutes) or

Chloramphenicol 25 mg/kg/dose four times per day PLUS ampicillin 50 mg/kg four times per day

Appendix 1.8 Emergency Management of Severe Acute Malnutrition Guideline

1 Does the child have any of these features?

Marasmus/severe wasting

- Old person's face
- Irritable
- Visible wasting (buttocks, upper arms) and low weight

Kwashiorkor

- apathy
- oedema of legs, arms, face (pitting oedema both feet)
- Pale, spare hair, weak roots
- Pale, thin, peeling skin
- Hepatomegaly

YES

2 Does the child have SAM?

To be diagnosed with SAM the child must have:

✓ **Severe wasting**

- Measure the mid upper arm circumference (MUAC) <11.5cm or
- weight for height/length <-3SD

OR

✓ **Oedema of both feet**

YES

3 **IMMEDIATELY GIVE A FEED OR ORAL/NG GLUCOSE**

Does the child have complicated SAM?

Complicated SAM:

✓ SAM with a medical complication OR

✓ SAM with no appetite

YES

4 **Complicated SAM**

ALL CHILDREN WITH COMPLICATED SAM MUST BE ADMITTED.

Don't forget your ABCD assessment.

ALL children with complicated SAM need

- IV antibiotics
  - First line:
    - Ampicillin 50mg/kg TDS IV
      And
    - Gentamicin 7.5mg/kg/IV OD

Start IV antibiotics for 2 days then reassess and consider switching to oral amoxicillin

- Treat hypoglycemia (RBS <3mmol/L).
  - Conscious child: oral sugar feed with 50mls of D10% or 1 teaspoon of sugar mixed in 3 tablespoons of clean water
  - Unconscious child: 5mls/kg D10%
- Hypothermia is associated with low sugar and infections.
  - Keep the children warm
- If the child has diarrhoea give them PO or NG ReSoMal.
  - Step 1: 5mls/kg ever 30 mins for 2 hours
  - Step 2: 5-10mls/kg over 1 hour for 4-10 hours
- Start F75 in step 2 or as soon as available and alternate with ReSoMal

SCREEN FOR HIV AND TB

NO

4 Uncomplicated SAM

✓ SAM with NO medical complication

✓ SAM but child has appetite

Children with uncomplicated SAM can be managed as outpatients

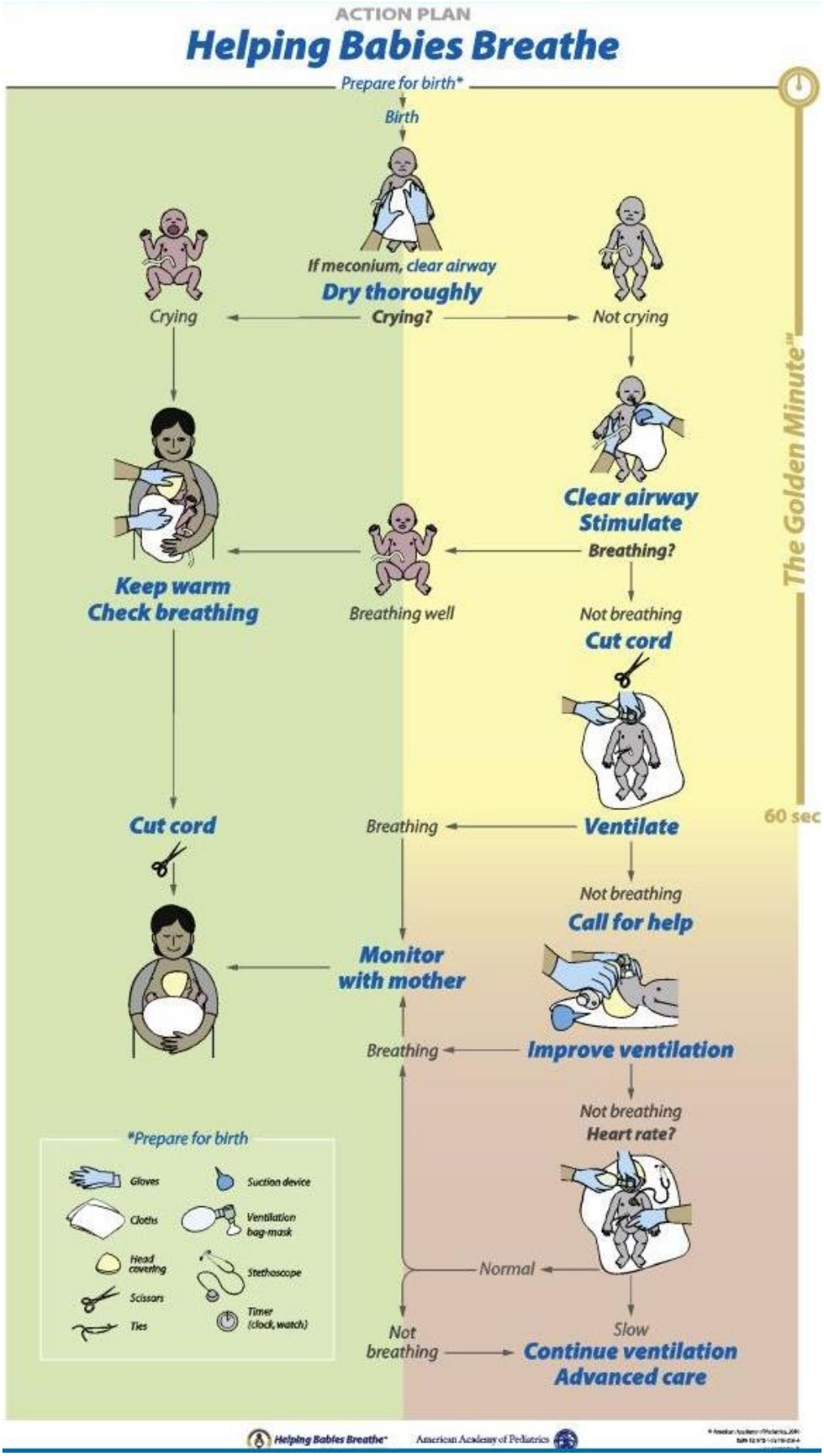
Start oral antibiotics for 5 days

- Amoxicillin

Patient should be started on ready to use therapeutic food

SCREEN FOR HIV AND TB

Appendix 1.9 Neonatal Resuscitation Guideline



Appendix 1.10: Neonatal Sepsis Guideline

Early Detection in Hospital

All babies in hospital should be observed at least every 6 hours

Review should include: full set of vitals; review of cord; review of activity and breastfeeding

Treatment of Suspected Neonatal Sepsis

If you notice any of the danger signs:

- fast breathing (>60bpm)
- respiratory distress
- grunting
- central cyanosis
- lethargy
- poor feeding
- temperature <35.5 or >38
- pus from cord
- redness spreading from cord
- history of convulsions
- bulging fontanelle

TREAT FOR SEPSIS

A/B

Assess breathing and measure SpO_2

If there is respiratory distress, or SpO_2 is <90%: **Give supplementary oxygen**

If severe respiratory distress: **consider CPAP**

C

If the baby has severe respiratory distress: **Give maintenance IV fluid appropriate to the age and weight of the baby**

If unable to feed and no respiratory distress: **Start NG feeds**

If the baby has severe pallor: **consider transfusion**

If the baby is jaundiced: **start phototherapy**

If baby born at home, or Vit K not given in maternity: **Give Vitamin K**

C

Assess for convulsions and signs of hypoglycaemia (lethargy, not feeding, not crying) and measure blood glucose level if possible

If hypoglycaemia clinically suspected, or blood sugar level under 2.2 mmol/L: **give dextrose 10% 2ml/kg IV bolus**

If the baby is clinically stable: **consider performing LP**

GIVE AMPICILLIN AND GENTAMICIN

CONTINUE TREATMENT FOR AT LEAST ONE WEEK

Ampicillin Doses

Age	Dose	Frequency
<7 days	50mg/kg	Twice a day
7-28 days	50mg/kg	Three times a day
29 days +	50mg/kg	Four times a day

Gentamicin Doses

Age	Weight	Dose	Frequency
<7 days	<2kg	3mg/kg	Once a day
	>2kg	5mg/kg	Once a day
7 days +		7.5mg/kg	Once a day

When to start ceftriaxone

- If there is no improvement after 48 hours treatment with amoxicillin + gentamicin

GIVE CEFTRIAXONE 100MG/KG ONCE A DAY

AIM TO CONTINUE FOR THREE WEEKS

Appendix 1.11:
Kangaroo Mother Care Guideline

Stabilise Baby:

- Oxygen/CPAP for respiratory distress
- IV fluids where there are feeding problems
- Correct blood sugar level <2.2mmol/L
- Give antibiotics for suspected sepsis

WHEN BABY STABLE

Weigh Baby

- <2kg
- >2kg → CONVENTIONAL CARE

- Is the baby NOT breathing well?
- Does the baby have severe respiratory distress?
- Is the baby having only IV fluid?
- Is the mother too unwell to provide kangaroo mother care?

If any answer is yes, the baby is not stable for KMC

Yes → BABY NOT STABLE → CONVENTIONAL CARE

No → BABY STABLE → **Commence Kangaroo Mother Care**

REASSESS: IS BABY NOW STABLE?

- Yes → Commence Kangaroo Mother Care
- No → CONVENTIONAL CARE

1

- Explain to the mother what is kangaroo care, and the benefits for her baby
- Explain that kangaroo care should be given as near to continuously as possible
- Teach the mother to observe for apnoea and signs of serious illness

2

- Dress the baby in hat, diaper, and socks
- Position the baby between the mother's breasts, using lappa wound around the body to keep the baby in position
- Teach the mother how to move the baby in and out of the lappa
- Begin with a shorter session of kangaroo care (at least one hour) then increase gradually until it is given as near to continuously as possible

3

- The baby can remain in the kangaroo position whilst the mother is sleeping: the mother should be positioned at around 15 degrees from flat
- Twins CAN be given kangaroo care: they should be placed on either side of the chest
- Weigh baby daily; monitor feeding and weight gain

Discharge when:

- The baby is exclusively breastfeeding
- The baby has gained weight every day for the last three days
- The weight is at least 1.5kg
- There are no concerns about sepsis
- The mother is confident in looking after her baby

Appendix 2: Common drug doses

Drug	Dose	Route	Frequency	Comment
Adrenaline 1:1000	<6yrs 0.15mls >6yrs 0.3mls >12yrs 0.5mls	IM		Anaphylaxis
Adrenaline 1:10,000	0.1mls/kg	IV		Cardiac arrest
Ampicillin	50mg/kg	IV/IM	QID	First line for pneumonia
Artemether	Loading dose: 3.2mg/kg Maintenance dose: 1.6mg/kg	IM	OD	Second line for severe malaria if artesunate not available
Artesunate	<20kg 3mg/kg >20kg 2.4mg/kg	IV	12hrly-OD/Daily	First line for severe malaria
Ceftriaxone	50mg/kg Or 100mg/kg	IV IV	BD OD	First line for meningitis: >1 months
Ceftriaxone	80mg/kg	IV	OD/Daily	Second line for pneumonia
Dexamethasone	0.6mg/kg	PO		First line for croup
Dextrose 10%	5mls/kg	IV	PRN	Hypoglycaemia
Diazepam	0.05ml/kg 0.25mg/kg	IV		First line for convulsion Can be repeated after 10 minutes
Diazepam	0.1mls/kg	PR		First line for convulsion Can be repeated after 10 minutes
Gentamicin	7.5mg/kg	IV	OD/Daily	First line for pneumonia
Hydrocortisone	1mth-1yrs 25mg 1-6yrs 50mg 6yrs+ 100mg	IV/IM	TDS	For severe asthma and anaphylaxis
Paracetamol	15mg/kg	PO	QID	Pain, fever
Phenobarbital	15mg/kg	IV/IM	Loading dose over 15min	Second line for convulsion
Phenytoin	15mg/kg	IV	Loading dose over 1 hr	Second line for convulsion

Appendix 3 Common Neonatal drug doses

Drug	Dose	Route	Frequency	Comment
Ampicillin	First week of life: 50mg/kg Weeks 2-4 of life: 50mg/kg	IV/IM IV/IM	BD TDS	First line for serious bacterial infection in combination with gentamicin
Ceftriaxone	100mg/kg	IV	OD	Pus draining from eyes Meningitis
Dextrose 10%	2ml/kg	IV		Hypoglycaemia Blood sugar <2.2
Gentamicin	First week of life: • Low birth weight infant: 3mg/kg • Normal birth weight: 5mg/kg Weeks 2-4 of life: 7.5mg/kg	IV/IM IV/IM IV/IM	OD OD OD	First line for serious bacterial infection in combination with ampicillin
Phenobarbital	Loading dose: 20mg/kg Maintenance dose: 5mg/kg	IV/IM PO	Give loading dose over 15 minutes OD	First line for convulsions 24 hours after the loading dose is given, the maintenance dose should be started for 2 days

Appendix 3 Emergency drug dilutions

Dilutions

Adrenaline: 1:10,000

To make adrenaline 1:10,000 from 1:1000

1ml 1:1000 + 9mls Normal saline or 5% Dextrose

Ratio 9:1

10% Dextrose

To make 10% Dextrose from 50% Dextrose

1) Add 10mls of 50% Dextrose to 90mls of 5%Dextrose to make 100mls of 10% dextrose. Ratio 9:1
2) Add one part 50% Dextrose to 4 parts sterile water to make 10% dextrose

Ringers and 5% Dextrose

(for malnourished children with shock)

Add 50mls of 50% Dextrose to 450mls of Ringers Lactate

For Diluted Diazepam

Add 2mls of diazepam to 8mls or Normal Saline to make 1ml/1mg

Appendix 4 Diazepam dosing and administration

Diazepam

IV dose:

- If diazepam is prescribed in mls then it is to be given **undiluted** as per the WHO booklet:

0.05mls/kg of **undiluted** diazepam.

- If diazepam is prescribed in mg then diazepam is to be **diluted**

  -2mls of diazepam with 8mls of normal saline to make 1mg/ml
  - when diazepam is diluted to make 10mls then the dose in mg is equal to the dose in mls

0.25mg/kg of **diluted** diazepam

PR dose:

- if no IV line present then give per rectum (PR) diazepam

0.1mls/kg of **undiluted** diazepam

Examples:

7kg child

MLS: **IV**	MLS: **PR**	MG: **IV**
0.05mls/kg	0.1mls/kg	0.25mg
0.05 x 7 = 0.35mls	0.1 x 7 = 0.7mls	0.25 x 7= 1.75mg
Give 0.35mls of **undiluted** diazepam IV	Give 0.7mls of **undiluted** diazepam per rectum	Give 1.75 mls of **diluted** diazepam IV If diazepam is diluted 1.75mg=1.75mls

	IV diluted diazepam Diazepam 10mg (2mls) diluted with 8mls of water for injection to make 10mg in 10mls concentration 0.25mg/kg		IV undiluted diazepam 10mg in 2ml solution 0.05ml/kg	PR undiluted diazepam 10mg in 2ml solution 0.1ml/kg
Weight (kg)	Dose in mg	Dose in mls	Dose in mls	Dose in mls
3	0.75mg	0.75mls	0.15mls	0.3mls
4	1mg	1ml	0.2mls	0.4mls
5	1.25mg	1.25mls	0.25mls	0.5mls
6	1.5mg	1.5mls	0.3mls	0.6mls
7	1.75mg	1.75mls	0.35mls	0.7mls
8	2mg	2mls	0.4mls	0.8mls
9	2.25mg	2.25mls	0.45mls	0.9mls
10	2.5mg	2.5mls	0.5mls	1ml
11	2.75mg	2.75mls	0.55mls	1.1mls
12	3mg	3mls	0.6mls	1.2mls
13	3.25mg	3.25mls	0.65mls	1.3mls
14	3.5mg	3.5mls	0.7mls	1.4mls
15	3.75mg	3.75mls	0.75mls	1.5mls
16	4mg	4mls	0.8mls	1.6mls
17	4.25mg	4.25mls	0.85mls	1.7mls
18	4.5mg	4.5mls	0.9mls	1.8mls
19	4.75mg	4.75mls	0.95mls	1.9mls
20	5mg	5mls	1ml	2mls
21	5.25mg	5.25mls	1.05mls	2.1mls
22	5.5mg	5.5mls	1.1mls	2.2mls
23	5.75mg	5.75mls	1.15mls	2.3mls
24	6mg	6mls	1.2mls	2.4mls
25	6.25mg	6.25mls	1.25mls	2.5mls
26	6.5mg	6.5mls	1.3mls	2.6mls
27	6.75mg	6.75mls	1.35mls	2.7mls
28	7mg	7mls	1.4mls	2.8mls
29	7.25mg	7.25mls	1.45mls	2.9mls
30	7.5mg	7.5mls	1.5mls	3mls