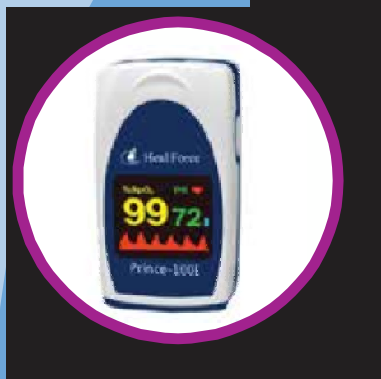
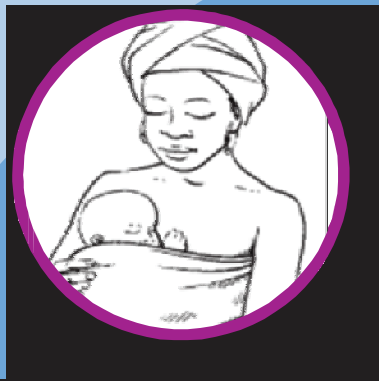




Emergency Triage Assessment and Treatment - Plus (ETAT+)



Modules For
Participants

Emergency Triage Assessment and Treatment - Plus (ETAT+)

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TABLE OF CONTENTS

PREFACE	11
INTRODUCTION	13
MODULE OBJECTIVES:	14

MODULE 1

UNIT 1.1 THE CONCEPT OF ETAT+	14
Unit Outline	14
1.1.1 Unit Introduction	14
1.1.2 Unit Objectives	14
1.1.3 ETAT+ Course Vision, Mission and Values	15
1.1.4 Principles of ETAT+	15
1.1.5 Summary	16
1.1.6 Review questions	17
1.1.7 References	17
UNIT 1.2 ESSENTIAL SIGNS AND SYMPTOMS OF SERIOUS CHILDHOOD ILLNESSES.....	18
Unit Outline	18
1.2.2 Unit Objectives	18
1.2.3 Criteria of WHO Essential Signs and Symptoms	18
1.2.4 Essential symptoms of common childhood illnesses	19
1.2.5 Essential signs of childhood illnesses	22
1.2.6 Summary	31
1.2.7 References	31
1.2.8 Review questions.....	31

MODULE 2

MODULE INTRODUCTION	33
MODULE OBJECTIVES	33
UNIT 1: TRIAGE OF SICK CHILDREN	34
Unit Outline	34
2.1.1 Unit Introduction	34
2.1.2 Unit Objectives.....	34
2.1.3 The triage process	35

2.1.4 Summary	38
2.1.5 Review questions	39

UNIT 2:ABC APPROACH TO THE MANAGEMENT OF THE COLLAPSED CHILD.....	40
Unit Outline	40
2.2.1 Unit Introduction	40
2.2.2 Unit Objectives.....	40
2.2.3 Definition and pathophysiology of cardiopulmonary collapse	40
2.2.4 Important factors for success in resuscitation	43
2.2.5 The equipment and resources required for resuscitation in paediatric emergency units	44
2.2.6 The structured ABC approach to the resuscitation of the collapsed child..	45
2.2.7 Summary	53
2.2.8 Review questions	54
2.2.9 References	54

UNIT 3: ABCD APPROACH TO THE MANAGEMENT OF THE CHILD WITH SIGNS OF LIFE (NON-COLLAPSED CHILD)	55
Unit Outline	55
2.3.1 Unit Introduction	55
2.3.2 Unit Objectives.....	55
2.3.3 Background and Rationale	55
2.3.4 Recognizing the Seriously Ill Child	57
2.3.5 Rapid Assessment of the seriously sick Non Collapsed Child	64
2.3.6 Summary	67
2.3.7 Review questions	67
2.3.8 References	67

UNIT 4: STRUCTURED PAEDIATRIC ADMISSION RECORDS	68
Unit Outline	68
2.4.1 Unit Introduction	68
2.4.2 Objectives	68
2.4.3 Importance of the Structured Forms for Medical Documentation.....	69
2.4.4 Symptoms included in the Paediatric Admission Record	69
2.4.5 Elements of the Paediatric Admission Record	71
2.4.6 Strengths and Limitations of Structured Tools for Documentation.....	77

2.4.7 Summary	79
2.4.8 Review questions	80
2.4.9 References	80

MODULE 3

MODULE INTRODUCTION	82
MODULE OBJECTIVES	82
UNIT 3.1 MANAGING AN INFANT OR CHILD WITH RESPIRATORY DISTRESS	83
Unit Outline:	83
3.1.1 Unit Introduction	83
3.1.2 Unit Objectives.....	83
3.1.3 Causes of respiratory distress.	84
3.1.4 The ABCD approach to assessment of respiratory distress	84
3.1.5 Recognizing, classifying and managing a child with pneumonia who is HIV negative.	87
3.1.6 Recognizing, classifying and managing a child with wheeze or asthma...	89
3.1.7 Causes of treatment failure	95
3.1.8 Summary	95
3.1.9 Review questions	96
3.1.10 References	96
 MODULE 3: UNIT 2: ACUTE DIARRHOEA AND DEHYDRATION	97
Unit Outline	97
3.2.1 Unit Introduction	97
3.2.2 Unit Objectives.....	97
3.2.3 Definition of acute diarrhoea and dehydration	98
3.2.4 Classification of the level of dehydration	98
3.2.5 Choice of fluid therapy in dehydration:	102
3.2.6 Treatment of different levels of dehydration:	105
3.2.7 Use of zinc in diarrhoea	109
3.2.8 Treatment of dysentery	110
3.2.9 Summary	111
3.2.10 Review Questions:	111
3.2.11 References	112

INTRODUCTION	114
MODULE OBJECTIVES	114
UNIT 4.1: MANAGEMENT OF THE CHILD WITH HYPOGLYCEMIA	115
Unit Outline	115
4.1.1 Introduction	115
4.1.2 Unit Objectives.....	115
4.1.3 Definition of Hypoglycaemia	115
4.1.4 Clinical signs associated with hypoglycaemia.....	116
4.1.5 Treatment of hypoglycaemia.....	117
4.1.6 Summary	121
4.1.7 Review questions	121
4.1.8 References and Further Reading	121
UNIT 4.2 MANAGING CONVULSIONS IN CHILDREN	122
Unit Outline	122
4.2.1 Introduction	122
4.2.2 Unit Objectives.....	122
4.2.3 ABCD approach of managing a child with convulsions	122
4.2.4 Rational use of anticonvulsants in a convulsing child	125
4.2.5 Properties of commonly available anticonvulsant drugs – diazepam and phenobarbitone.....	127
4.2.6 Summary	131
4.2.7 Review Questions	131
4.2.8 References	132
UNIT 4.3 MANAGEMENT OF THE CHILD WITH MENINGITIS	133
4.3.1 Unit Introduction	133
4.3.2 Objectives	133
4.3.3 Aetiology of acute bacterial meningitis in children	133
4.3.4 Clinical signs of acute bacterial meningitis.....	134
4.3.5 Indications for lumbar puncture (LP) and interpretation of LP results.....	135
4.3.6 Management of acute bacterial meningitis in children older than one month.....	138
4.3.7 Summary	139
4.3.8 Review Questions	139
4.3.9 References	140

UNIT 4.4 MANAGEMENT OF THE CHILD WITH SEVERE MALARIA	141
Unit Outline	141
4.4.1 Unit Introduction	141
4.4.2 Unit Objectives.....	141
4.4.3 Epidemiology of malaria	142
4.4.4: Other forms of severe malaria	142
4.4.5 Management of severe malaria	145
4.4.6 Summary	147
4.4.7 Review Questions	147
4.4.8 References	147

INTRODUCTION	149
UNIT OBJECTIVES	149
UNIT 5.1: NEWBORN RESUSCITATION	150
Unit Outline	150
5.1.1 Introduction	150
5.1.2 Objectives.....	150
5.1.3 Background to newborn resuscitation	150
5.1.4 Newborns and warmth.	151
5.1.5 Newborn Resuscitation Equipment	151
5.1.6 Structured approach to newborn resuscitation	154
5.1.7 Meconium in newborn resuscitation	157
5.1.8 Summary	159
5.1.9 Review questions.....	160
5.1.10 References and Material for Further Reading	160
UNIT 5.2: NEONATAL SEPSIS AND COMMONLY USED DRUGS	161
Unit Outline	161
5.2.1 Introduction	161
5.2.2 Objectives.....	161
5.2.3 Signs and symptoms of neonatal sepsis	161
5.2.4 Antibiotic treatment of neonatal sepsis	163
5.2.5 Other commonly used drugs.....	166
5.2.6 Summary	167
5.2.7 Review questions	168
5.2.8 References	168

UNIT 5.3: NEONATAL JAUNDICE	169
Unit Outline	169
5.3.1 Introduction	169
5.3.2 Objectives.....	169
5.3.3 Indications for treating neonatal jaundice	169
5.3.4 Phototherapy	171
5.3.5 Summary	173
5.3.6 Review questions.....	173
5.3.7 References and Material for Further Reading	173
UNIT 5.4: MANAGEMENT OF LOW BIRTH WEIGHT INFANTS	174
Unit Outline	174
5.4.1 Introduction	174
5.4.2 Objectives.....	174
5.4.3 Standards of care	174
5.4.4 Warmth	175
5.4.5 Kangaroo mother care	176
5.4.6 Feeding and fluids	177
5.4.7 Summary	185
5.4.8 Review questions	185
5.4.9 References	185
<hr/>	
MODULE INTRODUCTION	187
MODULE OBJECTIVES	187
UNIT 6.1: RECOGNITION OF SEVERE ACUTE MALNUTRITION	188
Unit Outline	188
6.1.1 Introduction.....	188
6.1.2 Unit Objectives	188
6.1.3 Definition of severe acute malnutrition	188
6.1.4 Clinical diagnosis	196
6.1.5 Summary	201
6.1.6 Review question	201
6.1.7 References	202

UNIT 2: INITIAL MANAGEMENT OF A CHILD WITH SEVERE ACUTE MALNUTRITION.....	203
Unit Outline	203
6.2.1. Introduction.....	203
6.2.2 Unit objectives	203
6.2.3 The altered physiology of the child with severe acute malnutrition.....	203
6.2.4 The (10) step approach to management of severe acute malnutrition (SAM).....	205
6.2.5 Summary	211
6.2.6 Review questions	211
6.2.7 References	212

UNIT 3 NUTRITIONAL TREATMENT OF A SEVERELY MALNOURISHED CHILD..213

Unit Outline	213
6.3.1 Introduction.....	213
6.3.2 Unit Objectives	213
6.3.3 Starting the initial feeds –F75	213
6.3.4 Catch up Growth (Recovery Phase)	215
6.3.5 Rehabilitation and Monitoring	217
6.3.6 When to discharge	219
6.3.7 Summary	220
6.3.8 Review question	220
6.3.9 Reference	220

MODULE INTRODUCTION	222
MODULE OBJECTIVES	222
UNIT 7.1: THE RIGHTS OF THE CHILD	223
Unit Outline	223
7.1.1 Introduction	223
7.1.2 Objectives.....	223
7.1.3 Legislative Framework for the Rights of Children	223
7.1.4 Summary	228
7.1.5 Review questions.....	228
7.1.6 References	228

UNIT 7.2: STANDARDS OF CARE FOR CHILDREN	229
Unit Outline	229
7.2.1 Introduction	229
7.2.2 Objectives.....	229
7.2.3 The Standards of Care for Children	229
7.2.4 When to Admit and Discharge Children	237
7.2.5 Summary	239
7.2.6 Review questions	239
7.2.7 References	239

Preface

ETAT+ is an acronym for Emergency Triage Assessment and Treatment plus admission care of new-borns and children in the first 48 hours.

The ETAT+ is modified from the World Health Organisation's ETAT programme. The ETAT+ modification was done by Kenyan experts in collaboration with the Ministry of Health, KEMRI- Wellcome Trust, University of Nairobi, MTRH and the Kenya Paediatric Association and first launched in 2005.

This is a course aimed at giving all health workers (nurses, clinical officers, doctors – and even nutritionists, laboratory technicians and pharmacists for part of it) the appropriate skills and knowledge in providing healthcare for sick children in a low to middle income resource setting.

The ETAT+ course covers the following areas:

1. Outpatient triage for sick young infants and children.
2. Emergency care including technologically appropriate life support for infants, children and the newborn.
3. Evidence-based, immediate and admission care for children with hypoglycaemia, convulsions, dehydration, malaria, severe anaemia, meningitis, pneumonia, asthma,
4. severe malnutrition, neonatal sepsis and care of the preterm infant

The ETAT+ programme is adapted from the World Health Organisation publication on Hospital Care for Children: Pocket book of Hospital Care for Children: Guidelines for management of common illnesses. In Kenya, these guidelines have been adopted by the Ministry of Health, and summarised in the pocket book dubbed; Basic Paediatric Protocols

ETAT+ will enable you provide quality care to sick children based on best practices adapted by WHO and Government of Kenya, Ministry of Health guidelines. The ETAT Plus guidelines are based on the best evidence available and not on expert opinion. It focuses on basic, effective care for common problems, things that all facility-based health workers should be able to manage. It is not a comprehensive course for paediatrics or neonatal care. Health workers should always be on the lookout for important but less common problems. As soon as possible they should seek the best available advice on managing a severely ill child or new-born.

MODULE 1

Introduction to Emergency
Triage Assessment
and Treatment Plus Admission Care of
The Severely Ill Child and
Newborn (ETAT+)

MODULE INTRODUCTION

In this module, we will discuss how and why ETAT+ training was developed and the use of essential signs and symptoms as defined by World Health Organization (WHO).


This module is covered in two units as follows:

Unit 1.1: Concept of ETAT+

Unit 1.2: Essential signs and symptoms of serious common childhood illnesses

Lets' go through the objectives of the module

MODULE OBJECTIVES:

 A target icon consisting of concentric circles with a central bullseye and a small arrow pointing towards the center.	<p>By the end of the module you should be able to:</p> <ol style="list-style-type: none">i. Describe the Concept of ETAT+.ii. Discuss the essential signs and symptoms in common childhood illnesses.
---	--

UNIT 1.1: THE CONCEPT OF ETAT+

Unit Outline

- 1.1.1 Unit Introduction
- 1.1.2 Unit Objectives
- 1.1.3 Vision, mission and values of ETAT+
- 1.1.4 Principles of ETAT+
- 1.1.5 Summary
- 1.1.6 Review questions
- 1.1.6 References

1.1.1 Unit Introduction

Timely identification and management of common childhood emergencies and illnesses such as respiratory infections, diarrheal illnesses, malaria, meningitis, and acute malnutrition is often seen as a challenge to many health care workers.

This unit will cover the definition of ETAT+ and direct you to the source of the materials used. We will also outline the vision, mission and values of ETAT+ and the principles of ETAT+ using the ABC approach to management of childhood illnesses.

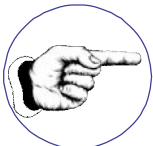
Let us start by going through the objectives of this unit,

1.1.2 Unit Objectives



By the end of the unit you should be able to:

1. Outline the vision, mission and values of ETAT+.
2. Outline the principles of ETAT+.

**Take note 1.1.1**

You have been provided with:

1. Pocket book of Hospital Care for Children: Guidelines for management of common illnesses.
2. MOH, Republic of Kenya; Basic Paediatric Protocols.

The image of the two reference materials is presented in Figure 1.1.1

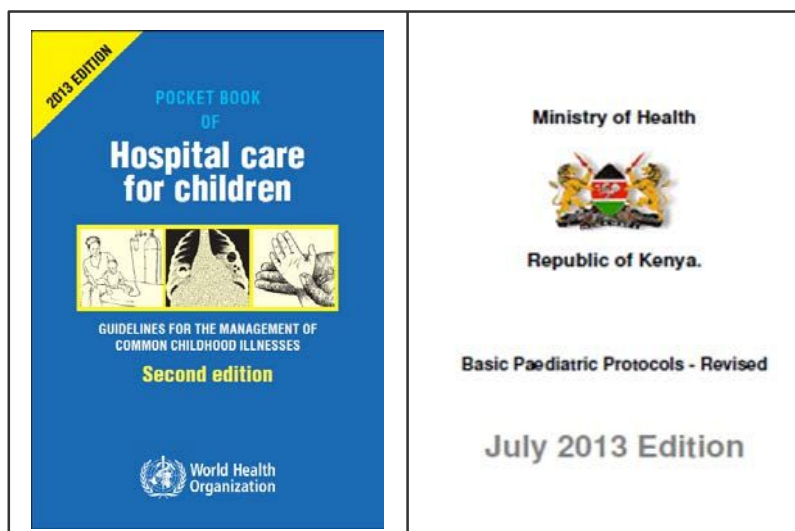


Figure 1.1.1: The WHO pocket guide and Basic Paediatric Protocols

1.1.3 ETAT+ Course Vision, Mission and Values

Vision

To improve new-born and child survival in resource-limited settings

Mission

To improve survival of newborns and children through the delivery of quality care through evidence based best clinical practice in resource limited settings.

Values

Commitment to continuous efforts to provide high quality care through:

- i. Evidence based clinical practice
- ii. Optimising the organisation and delivery of care
- iii. Teamwork based on mutual respect
- iv. Continuous learning
- v. Leadership and mentorship

1.1.4 Principles of ETAT+

The ETAT+ programme is about more than identifying and treating sick newborns and children. It recognises that facilities, health workers and even patients and carers will often need to work

together so that they organise themselves as best they can with the resources they have to optimise the care they provide. Care only improves when new knowledge is turned into effective action – and this will require effort, teamwork and a willingness to develop local solutions. At its core, the ETAT+ programme gives a structure for a rapid and comprehensive approach to initial assessment and intervention based on the acronym “ABC” This systematic approach to assessing a sick infant or child aims to promote recognition and management of conditions that are acutely life threatening.

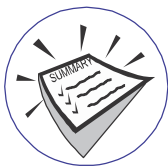
In this course, we will discuss the triage and treatment of childhood illnesses based on the four “ABC” approaches outlined below.

- i. The ABCD approach to triage.
- ii. The ABC approach to basic life support (BLS) of a collapsed infant or child.
- iii. The ABCD approach to provision of emergency care when there are signs of life in a neonate, infant or child.
- iv. The ABC approach for newborn resuscitation.

It is important that by the end of the course you will understand and be skilled in applying all four approaches. You will also go through management of specific common childhood and neonatal illnesses throughout this course and use simplified algorithms and job aids to make focused decisions on diagnosis, and management of these illnesses.

A time has been set aside during the 2 day practical sessions for you to practice these skills, under the guidance of your ETAT+ facilitators.

1.1.5 Summary



In this unit we have learnt:

- ÿ The vision, mission and values of ETAT plus programme.
- ÿ We have learnt that the ETAT plus programme providers learners with an evidence based structured approach of offering acute care for sick neonates, infants and children. It emphasises the use of evidence based clinical practice guidelines, team work and intergrated approach of common childhood illnesses. The guidelines used are part of the Ministry of Health –Kenya Basic paediatric protocols adapted from the WHO guidelines.
- ÿ We have also seen that ETAT plus enables facilities, health workers, patients and carers to work together and organise the available resources to optimise the care provided to children.

1.1.6 Review questions



1. Describe what you now understand by the concept of ETAT+.
2. List the approach to 4 ABC approaches you will use in ETAT+.

1.7 References



1. World health Organization; 2013 Hospital Care for Children; Guidelines for management of common illnesses with limited resources.
2. Ministry of Health-Kenya; 2016; Basic Paediatric Protocols.

UNIT 1.2: ESSENTIAL SIGNS AND SYMPTOMS OF SERIOUS CHILDHOOD ILLNESSES

Unit Outline

- 1.1.1 Unit Introduction
- 1.2.2 Unit Objectives
- 1.2.3 Criteria of WHO essential signs and symptoms
- 1.2.4 Essential symptoms of common childhood illnesses.
- 1.2.5 Summary
- 1.2.6 Review questions
- 1.2.7 References

1.2.1 Unit Introduction

In this unit, we will focus on the most reliable symptoms and signs used in the recognition of severely ill infants and children; later in the course you will apply this knowledge in managing various common childhood illnesses. The core clinical symptoms and signs described represent the best, minimum set required to assess newborns and children. Carefully documenting a complete history and examination including other relevant symptoms and signs to the best of one's ability is a critical part of good clinical practice but one that cannot be covered in this course.

1.2.2 Unit Objectives



By the end of the unit you should be able to:

- i. Outline the criteria of WHO essential signs and symptoms.
- ii Describe the essential symptoms of common childhood and neonatal illnesses.

Let us outline the criteria of essential signs as described by the World Health Organization (WHO).

1.2.3 Criteria of WHO Essential Signs and Symptoms

The WHO describes essential signs and symptoms as the most reliable ones that meet the following criteria:

- ÿ Observed commonly in serious common childhood illnesses.
- ÿ Used in assessment of the nature and the severity of illnesses to indicate risk of death, monitor clinical progress and differentiate diseases.
- ÿ Easy for everyone to observe and learn and use reliably.

1.2.4 Essential symptoms of common childhood illnesses

You may have noticed in your clinical practice that sick neonates, infants or children present with various symptoms and signs. Some of these are considered more reliable than others in the recognition, classification and management of various illnesses.

Let us start off by defining symptoms (presenting complaints) of common illnesses in infants and children but before we proceed, carry out activity 1.2.1.



Activity 1.2.1

Enumerate symptoms that you would consider important when managing a seriously sick infant or child.

Think about the illnesses that most commonly cause admission to hospital and death to help you with this.

Good try, we will describe the World Health Organization (WHO) essential symptoms, at the end of this section, compare your list of symptoms with the list discussed and take note of the ones you may have missed.

Cough: If the child has history of cough it is necessary to ask the duration of the cough. Why is that so?

Well done! A history of cough for more than 2 weeks may indicate presence of other illnesses besides upper respiratory tract infections or acute pneumonia. This will be discussed further in module 3 of this course.

Difficulty breathing: May or may not accompany a cough, do you know what it indicates? Good! Difficulty breathing usually indicates respiratory distress, which may inform you that the infant or child could be severely ill.

Would you be worried if a mother told you that her little one has not been feeding well?

Difficulty feeding is an essential symptom that indicates that the infant or child is too sick to feed; this includes asking about the ability to breastfeed for neonates and infants. Note though that this is slightly different from the complaint of 'poor appetite', it is focussed more on difficulty actually taking feeds because of problems such as breathlessness, lethargy or even weakness, irritability or even altered consciousness.

Diarrhoea: Any time you manage an infant or children always establish the presence or absence of diarrhoea, the frequency (number of times) per day, and duration (number of days)

of the illness. What is diarrhoea? A diarrhoea stool is defined as a stool that is liquid enough that if it was poured into a cup or bowl it would take the shape of the container and have a flat surface – like very thin porridge! We say a child has true diarrhoea if they have 3 or more of such diarrhoeal stools in 24 hours. It is actually important to write down the number of such stools in 24 hours as whether this is going up or down is a way to check progress.

Presence of diarrhoea for more than 14 days may not be a simple infection and will require a different approach to treatment – this is called persistent diarrhoea.



In text Question 1.2.1

- i. Is a history of bloody diarrhoea significant?
Prove reasons for your answer in (i) above

Good try!

Presence of blood in the stool is a significant finding that would change your approach to treatment; you should treat with antibiotics for dysentery (a specific bacterial infection – non-bloody diarrhoea can be caused by bacteria but these do not need an antibiotic). If there is blood in the stool you also need to think of other diagnoses such as intussusceptions in infants and younger children!

Vomiting everything: When attending to sick infants or children reported to be vomiting, always establish if they are vomiting everything.

This means that every feed ingested is vomited and not a single episode of large amounts of vomitus. In other words if the child is vomiting each time they feed, this is considered more significant than vomiting a large amount after feeding several times

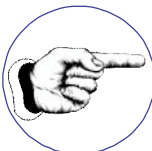
History of convulsions or sudden jerky body movements, worrisome to the caregiver (and I am sure to you too!). What should you try to find out about them?

Convulsions and partial or focal convulsions (fits): Should be investigated in detail. It is important to ask the caregiver to describe or demonstrate the observed movements to establish that a true convulsion occurred and to determine the type of convulsion i.e. generalized or partial, and how often they occur.

Generalized convulsions involve the whole body and are always associated with loss of consciousness during the convulsion. Commonly in children (but not infants aged less than 6 months) these are associated with an acute febrile illness. Remember though that these 'febrile convulsions' are typically short (less than 5 minutes) and that the child should regain full

consciousness within one hour. If the convulsions are long or full consciousness does not return do not dismiss these as 'simple febrile convulsions'.

Partial or focal fits are convulsions that involve only part of the body for example one side of the body, an arm, a leg, or one side of the face. If the convulsion starts in one part of the body and then spreads to the whole body with loss of consciousness this is a generalised convulsion not a partial convulsion.

	<p>Take note 1.2.1</p> <p>For now, the emphasis is that you must establish the presence or absence, frequency and type of convulsion.</p> <p>We will revisit convulsions in infants and children in module 4 and discuss it in further detail.</p>
---	---

You may have noticed that small babies behave differently when they are sick. It is with this regard that some additional essential symptoms should be used to recognize severe illness in infants who are less than 2 months old.

ÿ Essential symptoms in infants aged less than 2 months

Abnormal movements: This is mainly the mother's assessment that strength or frequency of movements of some body parts are reduced increased or have an odd pattern of movement e.g. Arching of the back (opisthotonus), smacking of lips, and jerky movements of legs, arms or eyes.

High pitched cry: This is an abnormal cry to the mother and is usually associated with irritability.

Apnoea: This is the cessation of breathing for more than 10 seconds that requires stimulation to re-establish breathing – it is especially relevant in the first days of life.

Pus and cellulitis at the umbilicus: The umbilicus may be dirty but evidence of inflammation of the skin (redness and warmth) around the cord stump and discharge of pus may signify serious infection.

Before we proceed to discuss essential signs of childhood illnesses, carry out activity 1.2.1 again and compare to your first list.



Activity 1.2.1

Enumerate symptoms that you would consider important when managing a sick infant or child.

1.2.5 Essential signs of childhood illnesses

Having defined the essential symptoms, we will now concentrate on the essential signs that you would look for when examining a sick child.

The sick child should be examined systematically using the ABCD approach.



In text Question 1.2.2

Do you know what ABCD stands for in managing sick infants or children?

Well done!

It stands for: **A**irway, **B**reathing, **C**irculation and **D**isability.

Let us go through the essential signs assessed based on the ABCD approach.

i. Airway (A):

When examining a sick infant or child you must establish that the airway is patent i.e. the nose and mouth are clear of any object and secretions and are in the optimal position for gas exchange.

If the patient is not alert, the patient's airway may be at risk of obstruction and may need to be maintained in a position that keeps it clear (patent). Methods of ensuring airway opening/patency will be described in greater detail in module 2.

Stridor is an important inspiratory sound that may be heard when the upper airway is obstructed.

In a child with altered consciousness the airway can sometimes be at risk because the infant or child does not clear the secretions by coughing or swallowing. This can result in hearing a crackling or bubbling sound as the child breathes.

Once you are sure that the airway is patent, you can now assess the breathing.

ii. **Breathing (B):**

In an emergency we only try and get a quick estimate of the rate of breathing by **observing** the respiratory rate in about 10 seconds to determine if it is very slow, very fast or not remarkable.

To make a proper assessment of breathing in a child who does not need emergency care or after the emergency is dealt with then it is very important to measure the respiratory rate (RR) accurately. This will help you tell if the rate of breathing is normal, too fast or too slow. To do this you must now count it for 1 minute. Neonates and infants tend to have a faster respiratory rate and so the normal rate changes with the age of the child.

The following are the upper limits of respiratory rate in different age groups.

- RR of more than or equal to 60/min in an infant less than 2 months old.
- RR of more than or equal to 50/min in an infant 2-11 months old.
- RR of more than or equal to 40/min in a child 12 months – 59 months



Activity 1.2.1

List 8 signs you would use to assess the adequacy of breathing.

Good try!

Did you mention the following?

Central cyanosis: which is the blue discolouration of mucus membranes e.g. the gums and the tongue. Cyanosis is an indication of very severe pneumonia (or rarely Congenital Heart Disease or other problem).

Grunting: This is an abnormal expiratory sound that may occur in severe chest disease. It is much more common in sick infants than older children.

Head nodding/bobbing

This is the result of use of accessory muscles of the neck (sternocleidomastoid muscles) to increase airflow in to the lungs. Head nodding is a sign of increased work of breathing

Lower chest wall in-drawing: which is the inward movement of the bony structure of the lower chest wall (rib margin) with inspiration- the area where the diaphragm is attached to the ribs.

You will notice that throughout this course we will use lower chest wall in-drawing as an essential sign because it is more specific than “Inter-costal in-drawing (or recession).” This literally means that the soft tissue between the ribs without involvement of the bony structure of the chest wall may be sucked in when breathing in.

Acidotic (or deep) breathing: This is the type of breathing seen in a patient with diabetic ketoacidosis or the type of breathing you would have after completing a 400 meters race! It can be described as deep breathing and apparent with every breath. This is not the same as the occasional deep sighing that is sometimes observed in an unconscious patient.

At this point your stethoscope will come in handy to identify the next two essential signs and these are:

Wheeze: This is musical note which can be heard as the child breathes out and on auscultation are described as rhonchi – although we will use the simpler term wheeze for both.

Crackles: These are also known as crepitations and are best heard using a stethoscope as the child breathes in. If possible re-assess immediately after a child has coughed if they disappear, it means that they were not significant.

Although not a clinical sign a key part of examining breathing in sick infants and children now is assessment using pulse oximetry. This should now be offered to all those sick enough to be admitted to hospital.

Pulse oximetry: Using a carefully applied pulse oximeter (also known as an oxygen saturation monitor) the percentage oxygen saturation of the blood (or haemoglobin) can be directly and painlessly measured in a few minutes. Normal oxygen saturations are usually 95% to 99%; we are definitely concerned if the measurement is less than 90% and the lower the reading the greater the worry – although check the reading is accurate!

Let us now shift our attention to essential signs in assessing the circulation.

iii. Circulation (C):

The pulse is the first thing you should assess in circulation. Just like in the assessment of breathing, in the emergency setting you must assess for a normal, fast or slow pulse rate (PR) for the first 5 to 10 seconds by checking a large pulse (brachial, carotid or femoral).

In this course, a pulse rate of 60 and below is considered too slow and chest compressions will be required if the infant / child is not alert.

To make a proper assessment of pulse and heart rate in a child who does not need emergency care or after the emergency is dealt with then it is very important to measure the pulse or heart rate (HR) accurately. To do this, you must then continue to count it for 1 minute.

The Peripheral pulses: The peripheral pulse (radial) should also be assessed because a weak (hard to feel) or even absent pulse is an emergency sign as you will see in module 3. You would normally compare the large pulse with the peripheral pulses (radial pulses) to determine if the peripheral pulses are weak or absent.

Temperature of extremities: Why should you feel the extremities for coldness or warmth?

Good! Cold extremities are also a sign of circulatory impairment. However, you need to consider the environmental temperature to correctly interpret if the extremities are truly cold. Feel both the upper and the lower extremities, starting distally and going upwards till you get a clear line of demarcation of coldness/warmth. You will note this on the patient's chart.

Capillary refilling: This is a sign that can easily be done by anyone and involves pressing a finger/toe pulp gently for 5 seconds to empty the capillaries of blood (make the skin being pressed pale or white). When the pressure is released the time in seconds it takes for a normal pink colour to return is observed and recorded. A normal capillary refill time (CRT) is < 3 seconds. Figure 1.2.1 illustrates how to assess for capillary refill time.

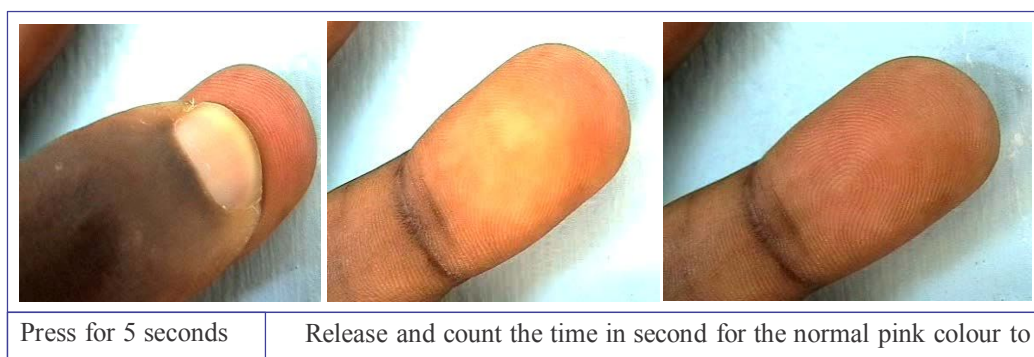


Figure: 1.2.1. Assessing capillary refill time

Pallor: Pallor is commonly due to anaemia and may range from mild to severe pallor in severe anaemia. You can compare colour of the palm with yours or the mother's palm. It should be classified as obviously severe (+++); mild or moderate (+) or not present (-).

Notice that we avoid using (++) as it is most important to make a decision on whether the pallor is an urgent concern or a concern to be managed but not as an emergency.

If you found severe anaemia (+++) it would mean that you would need to act now and act fast!

Figure 1.2.2 (a) and (b) illustrates assessment of palms for pallor.



a)



b)

Figure 1.2.2: Assessing palmar pallor

Let us now look at signs that would help you assess for dehydration. We include signs for dehydration as part of the 'C' or circulation assessment because the loss of fluid in dehydration causes circulatory problems.

Sunken eyes: The eyes of a dehydrated child may look sunken. Some children have eyes that look like they are sunken normally. If in doubt, ask the caregiver of the child if the eyes look more sunken than usual or not. Figure 1.2.3 shows a child with sunken eyes.



Figure 1.2.3: Sunken eyes

Skin pinch (Skin turgor): Pinch up a fold of skin of the abdomen (halfway between the umbilicus and flank) for one second to create a large fold/tent, then release and observe the fold disappear until the skin is completely back to its normal shape while counting seconds. Normal skin return is rapid – often so rapid it is hard to count to one. If the fold/tent of skin returns more slowly the record the number of seconds it takes. We classify the time for the skin to return to normal as 'immediate', 1 to 2 seconds or 2 or more 2 seconds. Figure 1.2.4 shows how to assess skin pinch.



Figure 1.2.4: Demonstrating skin pinch.



In text Question 1.2.3

In which conditions are sunken eyes and prolonged skin turgor not used reliably to assess for dehydration

Well done! Severe acute malnutrition where the infant or child is severely wasted would make it difficult to assess dehydration using sunken eyes and skin turgor.

iv. Disability (D):

When we assess disability, it means we are assessing for a change in the level of consciousness. In this course we will use the AVPU scale for assessment of disability. AVPU stands for; **A**lert, **V**erbal, **P**ain and **U**nresponsive. Let us now describe this in details.

A = **A**lert and responsive. This score is given to an infant or child aware of the surrounding environment. The easiest way to confirm this is to check the infant/child can make eye contact – clearly look at you or its carer and often track any movements.



Figure 1.2.5: Alert infant

V = (response to) voice or verbal instructions or sound. This score is given to a child who is not alert but responds to **V**oice or **V**erbal instructions, e.g. turns head to mother's call.

P = (response to pain) this score is given to a child who is not alert, not responding appropriately to voice but responds to **P**ain appropriately. It is important to assess the response to pain carefully. The way ETAT+ teaches is to gradually increase the pressure, using a knuckle of a finger, on the bony part of the infant/child sternum (breastbone). A child who can respond

appropriately to pain should reach across with their hand and try and push your finger/hand away. You are testing they know where the pain is (localising the pain) and that they can deliberately try and remove it. Just bending the arms without purpose is NOT an appropriate response. This appropriate localizing and motor response to a painful stimulus would be scored as **P**.

U = failure of an infant or child to elicit any of the responses described above is deemed as Unresponsive or Unconscious and scored as **U**.

Take a look a figure 1.2.6. Can you tell the level of consciousness of this infant?



Figure 1.2.6: Altered consciousness

Good try! You must use the AVPU scale to score the infant.



In text Question 1.2.4

Is the AVPU scale a reliable method of assessing conscious level in infants?

The AVPU scale is harder to use in infants. It is known that infants aged less than 9 months of age may not reliably localise a painful stimulus – they may simply decide to cry vigorously and move their arms and legs without a real effort to push the cause of the pain away! If an infant younger than 9 months makes this vigorous response to pain you should score them at **P**. Unfortunately in very young infants and especially the newborn it is even harder to assess conscious level whatever the scale being used. In these cases signs that go beyond the teaching in the ETAT+ course can be useful.

Signs that are useful for a more general assessment of disability in infants and children include:

Ability to drink or feed/ Inability to suck: You should actually observe the infant or child trying to feed by offering a cup of fluid or observe ability to breastfeed or presence of the rooting reflex in neonates.

Bulging fontanelle: The fullness of the fontanelle should be examined with the infant lying down at rest (i.e. not crying). A full or bulging fontanel indicates raised intracranial pressure. This may be seen in infants with meningitis.

Stiff neck: if a child is conscious and alert, ask the child to flex the neck, which should move freely. If the child is semi-conscious or unconscious, lay the child in supine position and gently flex the neck bringing the head onto the chest. Resistance to this movement occurs if the neck is stiff.

Signs that are useful for a more general assessment of disability in young infants (< 2months) include:

Reduced tone / movement (Floppy): This can be checked by carefully observing whether the young infant makes any spontaneous movements or the strength of movements in response to any stimulation (such as being placed on a bed). More specifically this can be checked by looking for 'head lag'.

Head lag – after laying an infant on its back on a clean, flat surface, raise the chest of the baby by lifting the shoulders. As you raise the shoulders observe whether the baby is able to raise its head to keep it 'in line' with the chest. Baby's whose head remains touching the table/bed as you lift the shoulders with no effort at raising the head have 'head lag' and reduced tone

Apart from signs that can be used to assess ABCD, other essential signs include the following.

General condition / nutrition essential signs:

Finally, let us look at some signs that are seen in the general condition of the child.

Jaundice: yellow colouration of eyes and mucous membranes. – In neonates classify as severe (+++) if the sole of the foot is obviously yellow when observed after slight pressure has been used to blanch the skin.

Mid Upper Arm Circumference (MUAC): MUAC is measured using a tape around the left upper arm. MUAC is the best quick way to assess for severe acute malnutrition. It will be discussed more Module 6.

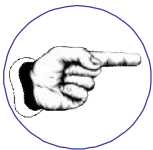
Visible severe wasting: It is better to use MUAC to assess severe acute malnutrition but in an emergency examine the large groups of muscles such as buttocks, shoulders, arms and legs to look for wasting. Figure 1.2.7 shows a child with severe wasting.

Oedema – and oedema of Kwashiorkor: To check for oedema the best place to look is over the top of the foot or over the lower shin. Check for any mild oedema – that may not be immediately obvious – by pressing the skin down firmly over the bony part of the top of the foot for 5 seconds and then releasing the pressure. If a dip or pit remains in the skin and tissues where you had pressed skin that slowly resolves this is a sign of oedema. Check how extensive the oedema is – does it go above the knee? Does it include a puffy face? In Kwashiorkor there are usually changes to the hair (thin, brittle and loss of curl / colour) and flaky 'paint' skin.



Figure 1.2.7 severe wasting

We have described the essential signs and symptoms as defined by WHO that you can use when assessing for common childhood illnesses. You will repeatedly come across these symptoms and signs as you go through the course and these will guide you in recognizing illnesses and classifying the severity of the illnesses based on their presence or absence.




Take note 1.2.2


Other clinical signs and symptoms are important in making a clinical diagnosis and a full history and examination should always be carefully documented.

Here, we have focused on observing essential signs and symptoms that you would need to respond rapidly to a potential cause of severe disease or even death.


Now let us see how we can effectively use some of these essential signs and symptoms to answer the questions in scenario 1.2.1.

	<p>Scenario 1.2.1 A 4 year old child presents at your health facility with history of cough, very high fever and poor feeding for 3 days.</p> <ol style="list-style-type: none"> what more would you like to know about the cough? what other symptoms would you be interested in. List down 6 signs you would assess if this child was alert but had a Respiratory Rate of 65 breaths per minute.
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1.2.6 Summary

	<p>In this unit we have</p> <ul style="list-style-type: none"> • Outlined the criteria of the WHO essential signs and symptoms which are reliable, easy to observe, common in serious childhood illnesses. They can be used to assess the nature and the severity of illnesses. These signs and symptoms were further described and grouped as common childhood and neonatal illnesses used in ETAT+
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1.2.7 Review Questions

	<ol style="list-style-type: none"> Write down the WHO criteria used to describe essential signs and symptoms. List essential symptoms you would use in assessing infants aged less than 2 months. What essential signs are used to assess circulation?
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1.2.8 References

	<ol style="list-style-type: none"> WHO guidelines 2010; maternal, new-born, child and adolescent health http://www.who.int/maternal_child_adolescent/en/ Kenya Clinical Guidelines, 2013; http://www.idoc-africa.org World health Organization; 2013; Hospital Care for Children; Guidelines for management of common illnesses with limited resources Ministry of Health-Kenya; 2016; Basic Paediatric Protocols.
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MODULE 2

Triage and Emergency Care

MODULE INTRODUCTION

Greetings! Welcome to Module 2.

This module will introduce you to the concepts of using structured approaches to quickly identify and stabilize sick children presenting to your hospital. We will consider the use of these 'A-B-C Approaches' in triage, resuscitating the child who has suffered cardiopulmonary collapse and in managing the sick child with signs of life. We will also consider how we can use Standard Admission Record Forms to document essential clinical findings.

The module is divided into the following units:

UNIT 2.1: Triage of Sick Children

UNIT 2.2: ABC approach to the management of the Collapse Child

UNIT 2.3: ABC approach to the management of the Non Collapsed Child

UNIT 2.4: Use of Standard Admission Records



MODULE OBJECTIVES

By the end of the module you will be able to,

- i. Describe the process of Triage of Sick Children
- ii. Describe the structured approach to the management of the Child with Cardiopulmonary Collapse (the Collapsed Child)
- iii. Describe the structured approach to the management of the Child with signs of life (the Non- Collapsed Child)
- iv. Illustrate the use of Standard Admission Record

UNIT 1: TRIAGE OF SICK CHILDREN

Unit Outline

- 2.2.1 Unit Introduction
- 2.2.2 Unit Objectives
- 2.2.3 The Triage process
- 2.2.4 Summary
- 2.2.5 Review questions
- 2.2.6 References

2.1.1 Unit Introduction

This unit will cover the definition of triage and describe the triage process.

**2.1.2 Unit Objectives**

By the end of the Unit you should be able to;

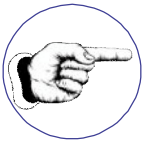
- i. Define triage
- ii. Describe the /process of triage of sick children.

If you work in a busy health facility, sometimes you may have many sick children waiting for care in the waiting bay/area. The very sick ones may die or worsen if they are kept waiting for long hours without being recognized and offered emergency care. Research has shown that of all the paediatric deaths in our hospitals, over 50% will occur in the first 24 hours of admission. This indicates that many children arrive when they are already very ill – they need rapid attention.

The term 'triage' simply means “sorting out”. Triage is the process of rapidly screening sick children upon arrival at the hospital according to the severity of their condition.

While doing triage, all sick children should be rapidly classified either as:

- i. Having an emergency sign(s) which requires immediate emergency treatment;
- ii. Having a priority sign(s) which requires placement in front of the queue for prompt assessment and treatment;
- iii. Or as a non-urgent case, which can wait for assessment and treatment later while in the queue.

	<p>Take note 2.1.1</p> <p>Why triage is important:</p> <ul style="list-style-type: none"> • Some children can die while waiting to be seen • Of all the children dying in hospital $\geq 50\%$ will die within 24 hours. • Some children can only be saved if treatment starts immediately on arrival to a hospital.
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Anyone with some basic training can do triage as it is only sorting out and NOT treating. You quickly look for some signs that will help you classify the patient as shown in figure 2.1.1.

2.1.3 The triage process

All facilities attending to sick children should have a triage system in place.

The signs used in doing triage are shown in Figure 2.1.1. The person doing triage should use the ABCD of triage and correctly classify the patient as emergency, priority or non-urgent. The very sick children with emergency signs as shown in Figure 2.1.1 are at higher risk of dying and should be attended urgently. The triage person identifies them and sends them to the emergency care area. The clinician should stop everything else and attend to the emergency patient.

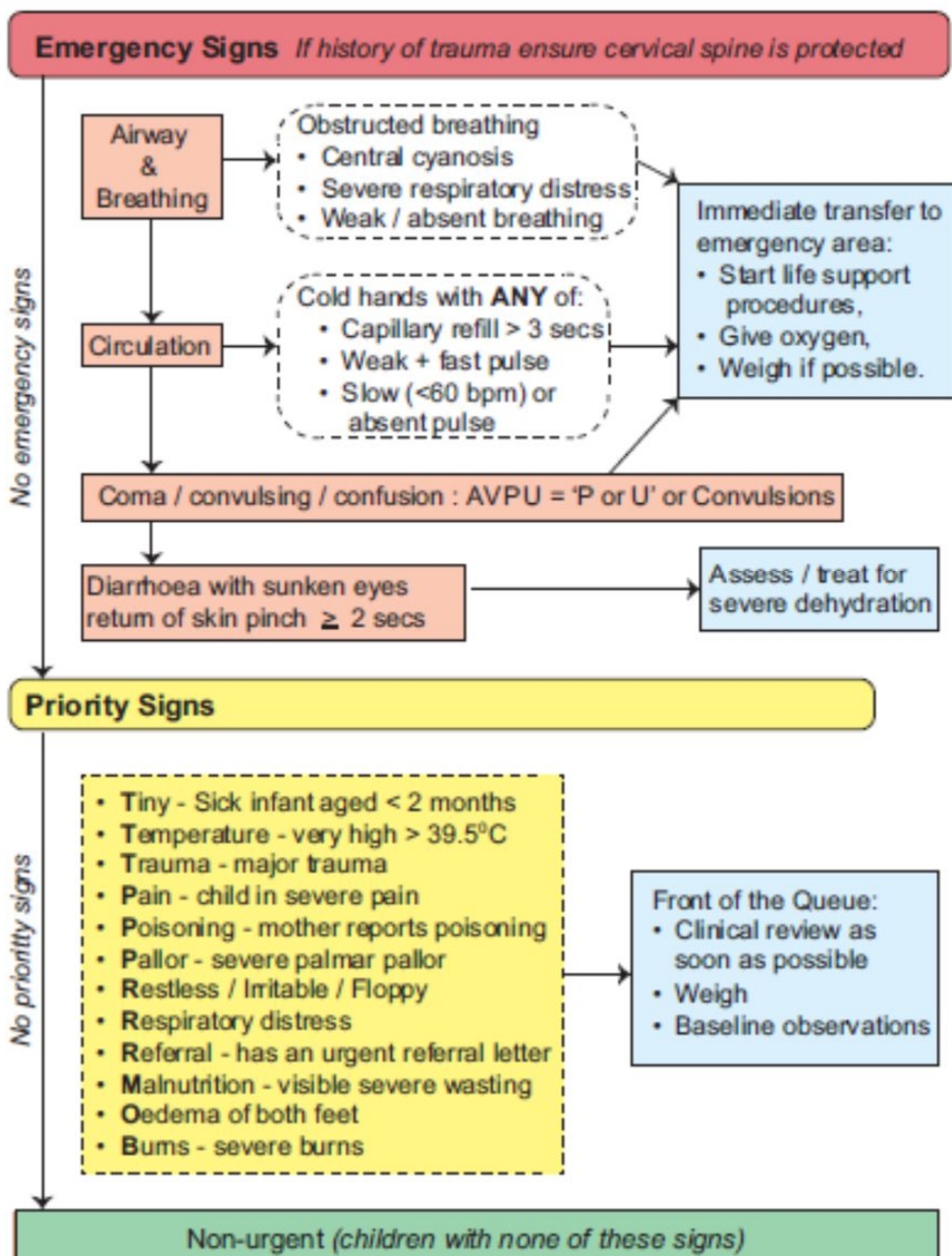
The children with priority signs may worsen and they should be put in front of the queue for the clinician to attend to. They should not be made to wait for long. The children with no emergency or priority signs are non-urgent and can wait in a queue. The priority signs in figure 2.1.1 form a mnemonic 3TPRMOB. If the waiting time is too long, the triage person should repeatedly look through the queue to check if any of them is worsening.

This sorting out of the patients can be done by the hospital staff who handles patients on arrival. In some places, this person may be the security guard, registration clerk or the nurse doing vital signs observations. The parents and other caregivers should be informed of the triage system and its importance.


The person doing triage should just direct the patient correctly as an emergency or priority or non-urgent. They are not involved in the treatment of these patients. The person doing the treatment should do their independent assessment and give the needed treatment.

Emergency Signs: Rapidly screen all sick children when they arrive at the hospital using ABCD approach. Note, here, and only in Triage, we use 'D' to refer to dehydration and disability.

Triage of sick children




Before you proceed, examine figure 2.1.1 again. Then use the information to complete the activity 2.1.1 and activity 2.1.2:

	Activity 2.1.1 What actions would you take at the boxes labelled A, B, and C?		
	6. A child of about 3 years comes to you at the triage area of the hospital casualty		
	When you Check	The Finding is:	What Action would you take?
	Airway & Breathing	No stridor No cyanosis No severe respiratory distress <i>Breathing regularly</i>	A
	Circulation 1	Warm Hands	B
Coma / Convulsions / Confusion	Child looks abnormally sleepy and is very weak	C	

Well done! Now compare your answers with the correct answers provided below:

- A. Proceed to check circulation
- B. Proceed to check other “C’s”
- C. Emergency - Immediate transfer for attention.

	Activity 2.1.2 Write down the actions you would take at the boxes labelled A,B,C,D and E.		
	When you Check	The Finding is:	What Action would you take?
	Airway & Breathing	No stridor No cyanosis No severe respiratory distress <i>Breathing regularly</i>	A
	Circulation 1	Warm Hands	B
	Coma / Convulsions / Confusion	No convulsions Looking at the mother Not obviously confused	C
	Diarrhoea/dehydration	No sunken eyes	D
	Tiny Temperature Trauma	2 years Slightly hot, not very hot <i>Right forearm fracture</i>	E

Well done! I hope your responses compare favourably with the answers below: A. Proceed to check circulation

- B. Proceed to check other "c's"
- C. Proceed to check for diarrhoea/dehydration
- D. Proceed to check for priority signs
- E. Priority Case – front of the queue to be seen as soon as possible (check weight and vital signs)

So far we have described the process of triage and attempted two activities to help you master the skill. Now you need to find out how triage is practiced in your emergency unit. Please kindly take some time to carry out assignment 2.1.1



Assignment 2.1.1

Take time to visit your paediatric emergency unit and look at how triage is done.

1. How is the triage system organised?
2. Is there someone with a duty to do triage?
3. Is the person doing triage using the same signs/symptoms as outlined in figure 2.1.1?
4. How can triage be improved in your emergency unit? Please discuss this with the team working here.

Thank you for completing the assignment. I hope you made useful observations and suggestions to help improve the process of triage in your unit. We will now summarize what we have learnt in this unit so far.



2.1.4 Summary

In this unit we have learnt that triage is sorting out only.

Upon arrival at the hospital all sick children should be rapidly screened. Those who are seriously sick should be offered emergency care. Those with priority signs should be put in front of the queue to receive prompt attention while those who are non-urgent can wait for treatment.

2.1.5 Review questions

1. Briefly describe how you would improve the process of triage in your hospital.
2. Using the ABCD approach list down the signs and symptoms that you would use to triage a patient as:
 - i. Emergency.
 - ii. Priority?
 - iii. Non-urgent?
3. What does 3TPR MOB stand for in priority signs?



2.1.6 References

1. WHO guidelines 2010 Maternal, new-born, child and adolescent health; http://www.who.int/maternal_child_adolescent/en/
2. Kenya Clinical Guidelines, 2013; <http://www.idoc-africa.org>
3. *World health Organization, 2013; Hospital Care for Children; Guidelines for management of common illnesses with limited resources*
4. Ministry of Health-Kenya; 2016; Basic Paediatric Protocols

UNIT 2: ABC APPROACH TO THE MANAGEMENT OF THE COLLAPSED CHILD


Unit Outline

- 2.2.1 Unit Introduction
- 2.2.2 Unit Objectives
- 2.2.3 Definition and pathophysiology of cardiopulmonary collapse
- 2.2.4 Important factors for success in Resuscitation
- 2.2.5 The equipment and resources required for resuscitation in paediatric emergency units
- 2.2.6 Structured ABC Approach to the Resuscitation of the collapsed Child
- 2.2.7 Summary
- 2.2.8 Review Questions
- 2.2.9 References and Further Reading

2.2.1 Unit Introduction

This unit will deal with the definition and pathophysiology of cardiopulmonary collapse and discuss the important factors to consider when preparing our hospitals for paediatric emergencies. We will also consider how we can use a structured ABCD approach to resuscitate a collapsed child.

Let us get started by outlining the unit objectives.

	<p>2.2.2 Unit Objectives</p> <p>By the end of this unit, you will be able to:</p> <ol style="list-style-type: none"> i. Explain the pathophysiology of cardiopulmonary collapse ii. Explain the important factors for success in resuscitation iii. List the equipment and resources required for resuscitation in the area in which you deal with paediatric emergencies iv. Describe the steps in the structured approach to the resuscitation of the collapsed child
---	--

I hope you will find this unit to be very useful in your day- to- day practice. First, we will begin by looking at the definition and pathophysiology of cardiopulmonary collapse.

2.2.3 Definition and pathophysiology of cardiopulmonary collapse

Cardiopulmonary collapse refers to a pre-terminal state where a child is either not breathing (apnoeic) or breathing inadequately and where the child's heart rate is less than 60 beats per

minute or absent. Children with gasping respirations or very slow breathing (abnormal breathing) are also treated as having developed cardiopulmonary collapse. More commonly, their cardiopulmonary compromise results from a gradual decline in respiratory and/or circulatory function. This results into inadequate or lack of oxygen delivery and blood flow to the vital organs (brain, heart, kidneys and lungs). Without adequate oxygen supply and blood flow to these body organs, they may stop functioning well and the patient may eventually die. This therefore means that urgent treatment should be commenced to immediately restore delivery of oxygen to the lungs and blood and to improve blood flow to these vital body organs.

Now let us see how it is specific for children.

Sick children rarely undergo sudden cardiopulmonary collapse. Unlike adults, children collapse because of lack of oxygen to vital organs or lack of blood flow to vital organs. Heart attacks in children are incredibly rare unless they have a pre-existing heart condition.

Initially, the body may compensate for the decline in oxygen delivery or blood flow to the vital organs by working extra hard to increase both the respiratory and heart rates. This temporary mechanism is referred to as compensated respiratory and/or circulatory failure, respectively. Eventually, however, these compensatory mechanisms may be overwhelmed as the condition further deteriorates, especially if immediate treatment is not commenced. The child may then progress to a state of decompensated cardiac or pulmonary failure when the supply of oxygen to the body is less than is needed for the organs to function. Again, if there is no urgent intervention the child often rapidly progresses to cardiopulmonary arrest and may die.

This pathophysiology of cardiopulmonary collapse is summarized in figure 2.2.1.

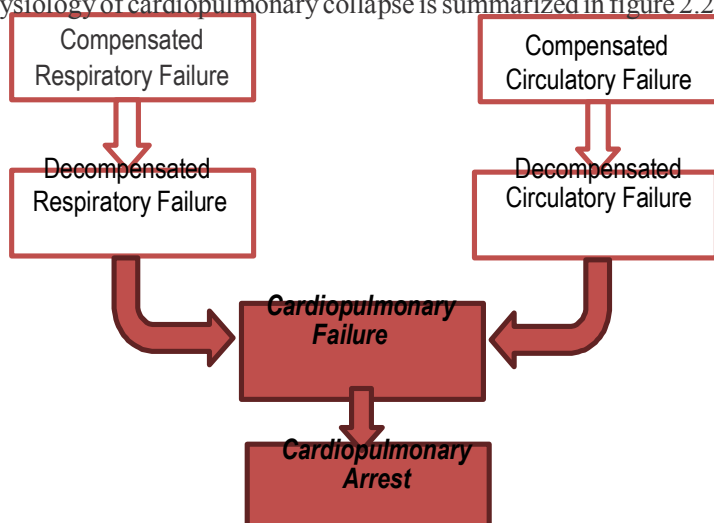



Figure 2.2.1: Progressive Deterioration to Cardiopulmonary Arrest

As we shift our attention to the causes of respiratory and cardiac failure, complete activity 2.2.1.


	<p>Activity 2.2.1</p> <p>List three common conditions that could potentially lead to respiratory failure</p>
---	---

Well done! Now, review the following information regarding the causes of respiratory failure.

Causes of Respiratory Failure

Respiratory failure often results from severe illnesses affecting the respiratory system. These include severe pneumonia, asthma and bronchiolitis. These children often present to hospital with worsening respiratory distress. Occasionally, children may undergo respiratory failure from hypoventilation (breathing too slowly) in neurological illnesses (like meningitis) or following the use of sedative medications (like the common anti-seizure drugs such as diazepam). Rarely respiratory failure is caused by a severe blockage of the airway. This can be caused by some illnesses or an inhaled foreign body. Managing a critically impaired airway requires great skill and is not covered in the ETAT+ course – always look for the best help possible if faced with this situation.

Having looked at the causes of respiratory failure, please attempt activity 2.2.2

	<p>Activity 2.2.2</p> <p>List three common conditions that could potentially lead to circulatory failure in sick children</p>
---	--

Good! Now compare your answer with the following information regarding the causes of circulatory failure.

Circulatory failure may result from severe anaemia, dehydration and septic severely impaired circulation (shock). These problems are tackled in ETAT+. Other causes of circulatory failure include severe haemorrhage (often with trauma), severe burns, or anaphylaxis. Children with acquired or congenital heart diseases may also develop circulatory failure from their heart failure. These conditions are not covered in the ETAT+ course.

These children should be prioritized to receive care to avoid deterioration to the point of collapse.

Having looked at the causes of cardiorespiratory collapse, we will now turn our attention to the important factors that may ensure that our resuscitation efforts are successful.

2.2.4 Important factors for success in resuscitation

As you begin, kindly take time to answer the following question



Question 2.2.1

Explain why adequate preparation and prompt treatment is necessary in emergency situations?

Thank you for your effort. It is important to keep in mind that once cardiopulmonary compromise occurs, even with adequate resuscitation. Mortality is high in most cases. Research has shown that more than 90% of children who present to the emergency units in our hospitals with cardiopulmonary failure cannot be resuscitated successfully because they either present too late or the units are not adequately prepared and equipped to handle such emergencies promptly. Even amongst the children who may be successfully resuscitated, many of them have been shown to develop significant disabilities thereafter.

It is therefore very important to put in place adequate measures for prompt recognition and early intervention for all sick children to prevent them from progressing to cardiovascular collapse.

Please answer the following question before you proceed



Question 2.2.2

What measures can we put in place to ensure that children who suffer cardiopulmonary collapse receive prompt and adequate resuscitation?

Well done!

The key to successful resuscitation is adequate preparation and early recognition of the seriously sick child. The staff should be knowledgeable in resuscitation. The appropriate equipment and resources must be available. The environment or setting must also be conducive and safe.


There must be a structured and effective system for handling paediatric emergencies that the staff is familiar with. This system should comprise the following important aspects:

- i. Clearly identified team members and a system of coordinating their activities
- ii. A conducive and safe environment or area for resuscitation
- iii. Appropriate and adequate resuscitation equipment and resources.

In addition, it is also important for doctors, nurses and clinical officers to have the knowledge and skills to promptly recognize children with emergency signs and intervene appropriately before they deteriorate to cardiopulmonary arrest. Having looked at the measures that can help improve resuscitation outcomes, let us now enumerate the equipment required in emergency units.

2.2.5 The equipment and resources required for resuscitation in paediatric emergency units

As we prepare to talk about the equipment and resources required for resuscitation, please take some time to complete the following assignment.

	<p>Assignment 2.2.1</p> <p>Take some time to visit your paediatric emergency unit and identify and list the equipment and resources available for resuscitation of children in your unit. Remember, children come in a variety of sizes! Is your unit organised and equipped to deal with a 5 kg infant, a 15kg child and others?</p>
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Thank you for making an effort to visit your department to collect that important information. You may now compare your list with the one provided on table 2.2.1 and see what equipment or resources you may be missing and possibly bring it to the attention of the unit in-charge.

Table 2.2.1 Equipment and resources required for resuscitation

Domain	Equipment/ resources required
Airway	Suction tubes/catheters – should be rigid, large bore suction devices (Yankauer type) and FG 14 or larger flexible suction tubes Guedel airways – these should be a full range of sizes (are there guidelines on how to choose the correct size?)
Breathing	Bag Valve Mask (BVM) devices ,500 ml, 1750 ml that are in working order with different face masks (sizes 0,1,2,3); oxygen source and delivery high flow oxygen 10 L/min system, nasal catheters/prongs, , oxygen face -masks (with and without reservoir bags), salbutamol nebuliser or MDI with mask/spacer, stethoscope
Circulation	IV giving sets, syringes (including 20 cc), paediatric cannulae, intraosseous needles, IV fluids (Ringer’s lactate), adrenaline, sample bottles
Disability	10% dextrose
Others	Resuscitation table/resuscitaire, warming devices for babies getting emergency care, NG tubes (FG 6,8,10,12), weighing scales, gloves , sharps containers, alcohol hand rub (or soap and water) Easily accessible guidelines, walls charts

So far we have looked at the definition and pathophysiology of cardiopulmonary collapse, the important considerations for success in resuscitation and the required equipment and resources. We will now discuss the structured ABC approach to the resuscitation of a collapsed child.

2.2.6 The structured ABC approach to the resuscitation of the collapsed child

The resuscitation of the collapsed child follows a structured approach as shown in the simple algorithm in figure 2.2.2



Figure 2.2.2: The ABC approach to the collapsed child

We will now discuss each of the above steps individually. Usually either you have observed a patient collapse or have been called to see a patient who has collapsed as the entry point to using this ABC.

1. Safety, Stimulate and Shout for Help:

First, it is important to ensure *safety*. To adequately assess this, you should ask yourself:

- ÿ Am I safe? *Personal safety* includes wearing gloves and ensuring that you are protected from sharps and potentially infective body fluids
- ÿ Is the patient safe? *Patient Safety* involves transferring the patient to an appropriate setting, a clean firm flat surface for resuscitation, free from contamination or sharp objects.

The next consideration is providing *stimulation*. Here, you should ask yourself:

- ÿ Is the patient responsive to stimulation? To establish this, try to arouse the patient by calling out their name (*vocal stimulation*) and/or gently tapping them on the shoulders (*tactile stimulation*)

If the child does not respond to your stimulation, you should then *shout for help from your colleagues or other health care workers* because you will need their assistance during resuscitation

After considering safety, stimulation and the need to shout for help, you can now progress to manage the Airway, Breathing and Circulation in that order.

We will begin by focussing on the assessment and management of the Airway.

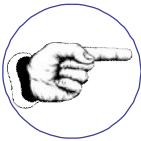
2. Airway Assessment and Management

When doing assessment of the airway you should ask yourself:

- Is the airway *clear or obstructed*?
- Is it correctly positioned?

To answer the first question, begin by looking in the child's mouth to see whether there is any removable foreign body or secretions.

If you find a foreign body, go ahead and remove it gently. If there are secretions these should be cleared with an appropriate suction device.



Take note 2.2.1

Deep or blind Suctioning is unnecessary and even dangerous. It could cause additional airway trauma and reduce the heart rate.

To answer the second question, you need to correctly position the airway using the head tilt chin lift manoeuvre to either the neutral or sniffing position, depending on the age of the patient. For infants younger than one year, this manoeuvre should be used to position their airway into a **neutral position** where the nose and mouth are at a plane parallel to the resuscitation table. The correct neutral position is illustrated in Figure 2.2.3



Figure 2.2.3 Head Tilt Chin Lift Manoeuvre to Neutral Position

In children older than one year, this manoeuvre should be used to position the airway into a **sniffing position**; with the chin being raised above the nose. The correct sniffing position is illustrated in Figure 2.2.3.



Figure 2.2.4: Head Tilt Chin Lift Manoeuvre to Sniffing Position

Both the neutral and sniffing positions will be demonstrated when you do your practical later for a better understanding. We will now turn our attention to the assessment of breathing and its management.

3. Assessment and Management of the Breathing

To assess for breathing, we need to ask, 'Is the child breathing?'

To adequately assess for breathing, we need to *look*, *listen* and *feel* for breathing for 5-10 seconds.

- i. Look for the rise and fall of the chest with each breath
- ii. Listen for the presence of the breath sounds
- iii. Feel for the presence of the warmth of the child's breath on your cheek

This assessment can be performed by closely listening at the child's nose and mouth, while feeling for air movement, as we look at their chest. The correct position for assessment is illustrated in Figure 2.2.5.

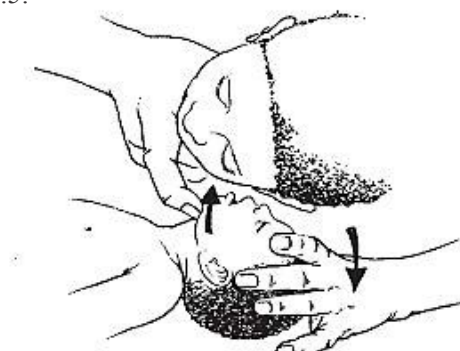
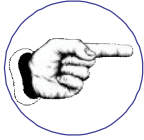


Figure 2.2.5: Look, Listen and Feel for Breathing

If the child is not breathing or only taking a few breaths a minute, it is important to ventilate the child using a functioning self-inflating BVM device and a correctly fitting face mask.



Take note 2.2.2

Gasping is NOT adequate breathing and the child needs to be ventilated using a BVM device.

To check whether the BVM device is working properly, block off the patient's connection with your thumb and compress the bag attempting to push the air out of the bag to see whether it empties easily. A functional bag will not empty easily, but would retain the air with gentle compression. If the air empties too easily, then the bag is probably leaking. Bag mask devices with pressure valves are designed to release air at the valves if pressed too hard.

The correct mask should then be identified and attached to the BVM Device. An ideal mask for resuscitation should be a clear mask that covers both the nose and mouth. It should not go below the chin or have the mask rim across or above the level of the eyes. Using a mask that is either too large or too small makes it difficult to achieve an adequate seal to deliver the ventilation breaths. The correct mask size is illustrated in Figure 2.2.6.

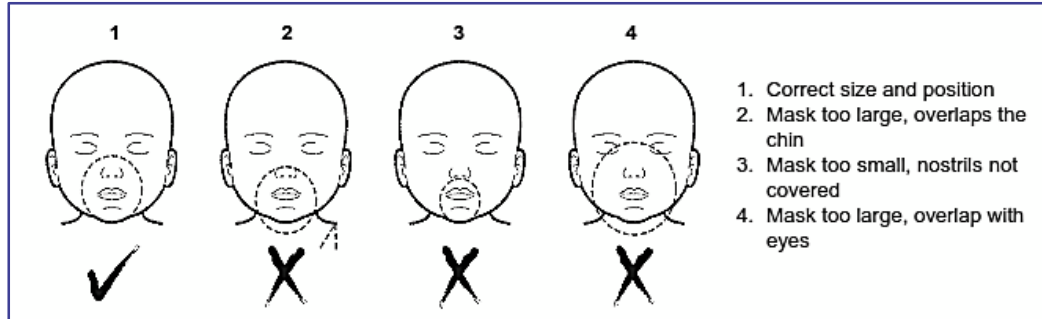


Figure 2.2.6: Correct Sizing of the Masks for Ventilation

Once you have chosen the correct mask size, then go ahead and administer *5 rescue breaths*, with each breath lasting 1 – 2 seconds. Learning how to hold the bag valve mask device to maintain a seal is very important. This will be taught in the practical classes but if you have a chance to practice on a manikin in your facility then do so. Delivering the breaths at the appropriate speed ensures adequate pressure to inflate the chest and prevents stomach distension. It is very important that you see the chest rise as you give the ventilations. The rescue breaths should be delivered in the position illustrated in Figure 2.2.7 and you will notice the 'C' (or 'E') grip being used.



Figure 2.2.7: Ventilating a Baby with a Self-Inflating Bag Valve Mask Device

Once, the rescue breaths have been administered, you need to assess and manage the circulation.

4. Assessment and Management of the Circulation:

The first step involves assessing the child for the presence and character of a large pulse. This is assessed in different areas according to the child's age.

In children, aged below 1 year, the large pulse is assessed at the brachial pulse. This is found on the inner aspect of the arm, slightly above the elbow joint as illustrated in Figure 2.2.8



Figure 2.2.8: Assessing the Brachial Pulse

In children, older than 1 year, the carotid pulse is assessed by palpating below the angle of the jaw, in the ridge between the larynx and the sternocleidomastoid muscle.

The large pulse should be palpated for 5 – 10 seconds to determine its presence. If the pulse is *absent or estimated to be less than 60 beats per minute (1 per second)*, then you need to administer chest compressions.

The correct position for chest compressions is in the midline one finger breath above the xiphisternum, as illustrated in Figure 2.2.9.

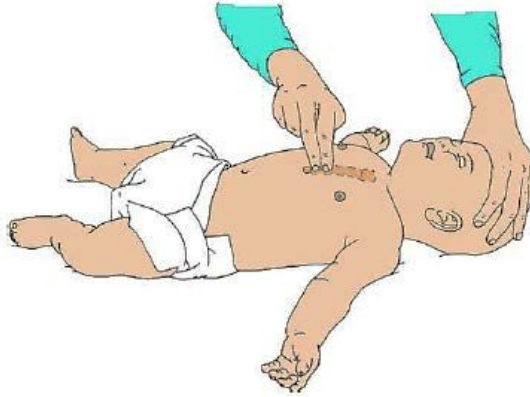


Figure 2.2.9: Chest Compressions administered by a Single Rescuer

Once the landmark is identified, cardiopulmonary resuscitation (CPR) should be commenced at the rate of 15 chest compressions to 2 ventilation breaths, for a total of 6-7- cycles in a minute. The patient should be reassessed every 2-3 minutes to see if there is any improvement or if management should be changed.

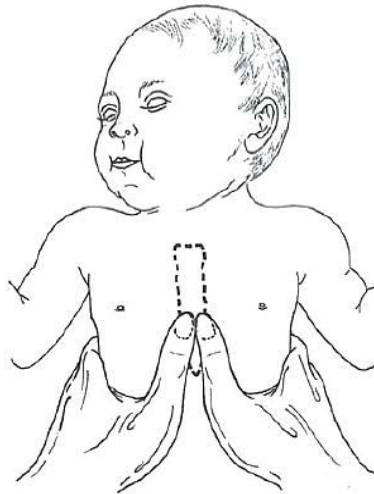


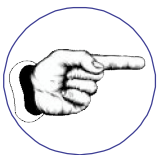
Figure 2.2.10: Optimal Site for Chest Compressions by two Rescuers

5. Reassessment

After going through the CPR for 2 -3 min, we will now reassess the child. The steps of reassessment are as follows.

1. Look into the airway again, for the presence of Secretions or Foreign Material. If present, these should be removed by gentle suction

2. Look, Listen and Feel for Breathing while also palpating for the Large Pulse.
 - a. If child is breathing regularly and the pulse is more than 60 beats per minute then start the child on oxygen
 - b. If the child's breathing is inadequate (weak and slow with rate 12-20 or less depending on age, or intermittent gasping), but the circulation is normal (heart rate is more than 60/min) you continue to only ventilate the baby (without chest compressions) at 30 breaths per minute.
 - c. If the child's breathing is inadequate (weak and slow with rate 15-20 or less depending on age, or intermittent gasping) and the circulation is also inadequate (heart rate is less than 60/min) then you must continue to offer CPR with reassessments every 2-3 minutes.

**Take note 2.3**

Keep calling for help – providing effective ventilation and compressions is much better done with two people. Adrenaline may be considered at the dose of 0.1ml/kg of 1 in 10000 solution. Adrenaline should only be administered if you have at least 3 rescuers – then one can focus on preparing and giving the adrenaline without interrupting the CPR. Additionally, IV bolus fluid therapy may be given to correct hypovoleamic shock caused by dehydration; and 10% dextrose at 5 mls/kg for Hypoglycaemia

The ABC Approach is summarized in the following algorithm.

Infant / Child Basic Life Support – Cardio-respiratory collapse.

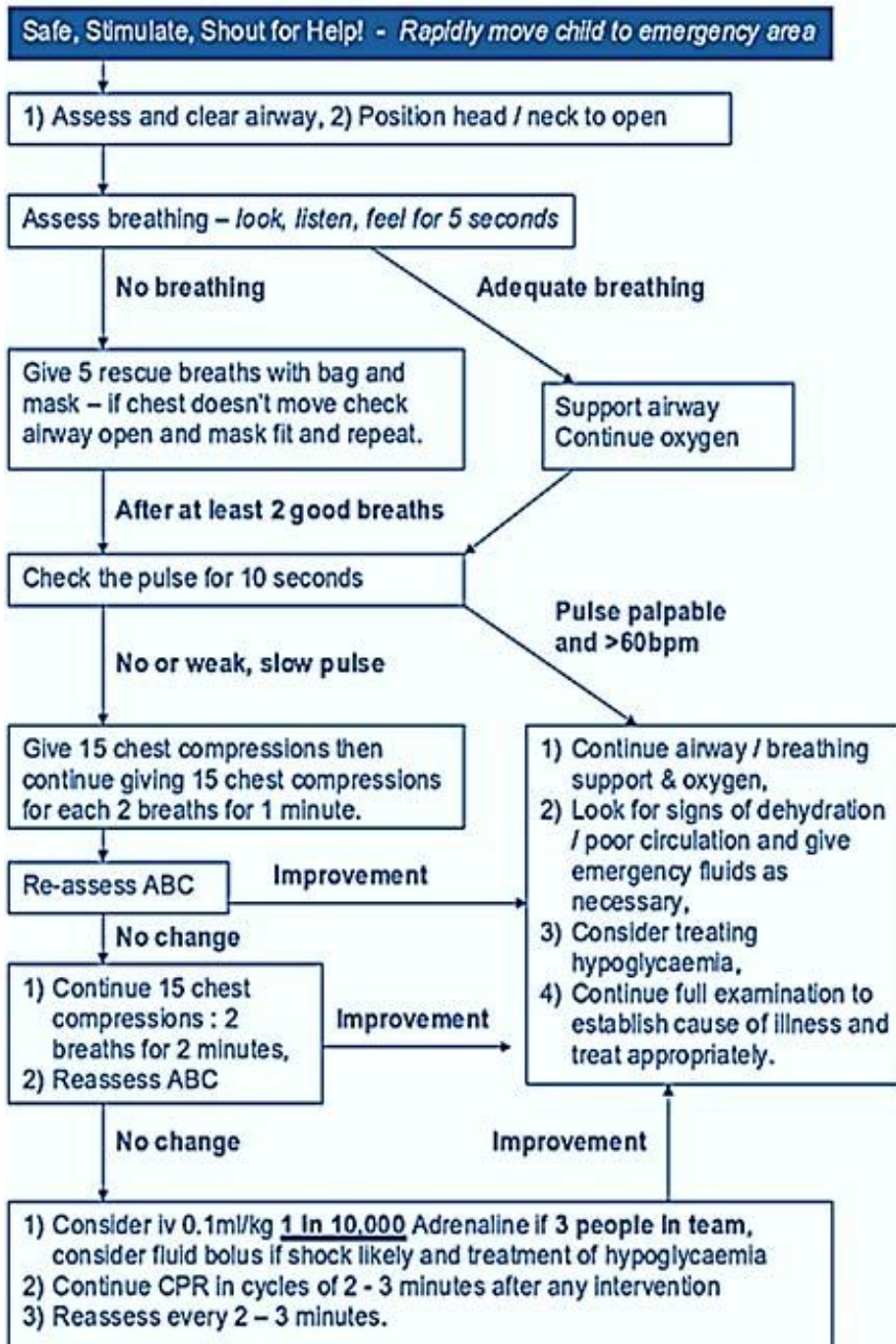


Figure 2.2.11 – ABC Algorithm for the Collapsed Child

Congratulations, for completing this unit. Now take some time to complete the following review exercise

Scenario 2.2.1

Consider the following case study and answer the questions that follow:

A one-year old boy named Jack is carried into the outpatient department in his mother's arms. He is reported to have had cough and fast laboured breathing over the last 3 days. The mother also reports that Jack was unable to breastfeed owing to his breathlessness the previous day. Today, his mother says he has been drowsy and could not be aroused for the last 2 hours. She also reports that she noted that the child was not breathing on arrival to hospital. The child is brought in to emergency room for resuscitation care.

1. What signs and symptoms point to cardiopulmonary collapse in this child?
2. List 3 possible causes of cardiorespiratory failure in this child?
3. List the equipment and resources that you will require in the resuscitation of this child?
4. What sequential steps will you take to assess and resuscitate this child?

We have come to the end of the unit, now go through the summary



2.2.7 Summary

This unit, we have learned that;

1. Cardiopulmonary collapse is often the final result of the gradual decline in respiratory and circulatory function.
2. To increase the effectiveness in managing sick children, we must try to prevent children from collapsing by intervening before the collapse and be adequately prepared to resuscitate them
3. All paediatric care settings must have the necessary equipment to resuscitate the children under their care
4. Following a stepwise ABC approach to the resuscitation of the collapsed child with frequent reassessments every 2 -3 minutes may increase your chances of success.

2.2.8 Review questions

1. Define and explain the pathophysiology of cardiopulmonary collapse.
2. List the factors that can predispose to cardiopulmonary collapse?
3. Briefly explain why it is important for hospitals to be adequately prepared for paediatric emergencies
4. List the equipment and resources required for resuscitation?
5. Describe the structured approach for resuscitating a collapsed child?



2.2.9 References

1. **World Health Organization (2013).** Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. WHO.
2. **Ministry of Health (2016).** Basic Paediatric Protocols – Revised Protocols. Ministry of Health: Kenya.
3. **World Health Organization (2005).** Emergency Triage Assessment and Treatment – Manual for Participants. WHO.

UNIT 3: ABCD APPROACH TO THE MANAGEMENT OF THE CHILD WITH SIGNS OF LIFE (NON-COLLAPSED CHILD)


Unit Outline

- 2.3.1 Introduction
- 2.3.2 Unit Objectives
- 2.3.3 Background and Rationale
- 2.3.4 Recognizing the Seriously Ill Child
- 2.3.5 Rapid Assessment of the Seriously Sick Non Collapsed Child
- 2.3.6 Summary
- 2.3.7 Review Questions
- 2.3.8 References and further reading

2.3.1 Unit Introduction

Greetings!

Welcome to Unit 3 of this module. This unit will help you to learn a simplified and structured ABCD approach to assessing and instituting lifesaving treatment in a child with signs of life.

	<p>2.3.2 Unit Objectives</p> <p>By the end of this unit, you will be able to:</p> <ol style="list-style-type: none"> i. Explain the rationale of having a rapid assessment for <i>every</i> sick child on presentation to hospital ii. Recognize the seriously ill child using simple signs and symptoms. iii. Describe the sequence of assessment and the required interventions in the structured ABCD approach of the non-collapsed child.
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2.3.3 Background and Rationale

Before we start take some time to answer the following question:

	<p>Question 2.3.1</p> <p>How do sick children progressively develop cardiopulmonary collapse and arrest?</p>
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Well Done!

As we discussed in Unit 2.2 children suffer cardiopulmonary collapse following a gradual decline in either cardiac or pulmonary function when the particular causes such as severe dehydration, severe pneumonia or severe infection are not recognized early and treated immediately. By the time a child collapses, only emergency resuscitative measures may help save their lives. However, if these emergency measures are instituted late when the child's condition has severely deteriorated, then these may not be successful and the child may die.

Therefore, much effort should be directed at prevention or early identification and treatment of the causes of cardiopulmonary compromise in order to prevent these children from progressing to cardiopulmonary failure or arrest.

In addition, it is widely recognized that majority of the deaths that occur amongst children presenting to hospitals in Africa, occur within the first 24 hours of arrival to the hospital. Fortunately, most of these deaths result from preventable causes. This means that if the appropriate treatment is given in the first few minutes of a child's arrival to the hospital then it is possible to prevent death and reduce the mortality rates of children in our hospitals.

Could you please take some time to answer the following question before we proceed?

	<p>Question 2.3.2</p> <p>What is the most important factor for saving lives amongst critically ill children presenting to our hospitals as was discussed in Module 2, unit 2?</p>
---	--

Well done! *Prevention of further deterioration* of the critically sick child through immediate recognition and intervention is the most important factor if we are to reduce deaths from common childhood illnesses.

This can be done if we follow a structured approach to assessment and intervention in these children. We manage this by using the ABCD approach.

The main aim of the ABCD assessment of a child with signs of life is to make the child as stable as possible by intervening appropriately, *before* taking a full history and clinical examination. The ABCD assessment is therefore conducted to recognize and immediately correct emergency signs which are a threat to life.

Since the assessment comprises a series of simple steps it can be performed by *any* healthcare worker with basic training in resuscitation. This increases the chances that sick children will receive lifesaving emergency treatment early enough to prevent them from deteriorating and dying.

Let us now consider how we recognize a sick child who requires urgent treatment using the structured ABCD approach to the Non-Collapsed Child.

2.3.4 Recognizing the Seriously Ill Child

To be able to recognize the seriously ill child you need to identify the emergency signs which point to problems either in the Airway, Breathing, Circulation and/or Disability (Level of Consciousness).

Before we start using the ABCD approach in these children, however, we need to check:

- i. Are we prepared to provide emergency care – always check where you are working that the right equipment and resources are available
- ii. Has the child collapsed or are there clear signs of life – you may need to observe and stimulate to check for clear signs of life
- iii. Do you need help?
- iv. Have you considered your safety and that of the child

If you identify clear signs of life and are adequately prepared then start the ABCD. The ABCD aimed at the severely ill child with clear signs of life can be used for infants / children who are still alert while they remain seated with their mother / carer if this will keep them most calm and minimise distress. If they are not alert then transfer the child to an examination bed / couch.

1. Signs that point to Airway Problems

First we will consider signs related to the airway. However, before, we continue, please carry out activity 2.3.2



Activity 2.3.2

List down at least two signs that point to a problem with the airway

Well done! You can now look at the following information and compare it with your answer:

The main sign that points to a problem with the airway in the child with signs of life is the presence of noisy breathing. Assessment of the airway should therefore involve listening to sounds such as stridor and/or bubbling/crackling (gargling) sounds (sounds of excessive secretions at the back of the throat). Remember this should not take more than 10 seconds.

In the child who is alert and sitting with the carer then to check the airway simply stand with your head close to the child's and listen carefully – do not try to force the mouth open to look inside. If there is severe stridor or sounds of obstruction you may need to call for expert help

while enquiring about possible inhalation. It is not appropriate to try suction in a child who is alert.

The child who is unresponsive or has reduced level of consciousness should be placed on a resuscitation table/couch for further assessment and treatment. The mouth should be opened gently and examined for the presence of secretions or foreign body. Presence of these signs requires urgent intervention to clear the airway. The airway may also need to be positioned either in a neutral (infants below one year) or sniffing (children above one year) position to make sure it remains clear.

Additionally, the maintenance of the airway may involve the use of the oropharyngeal (Guedel) Airways that prevent the tongue from falling back and obstructing the airway in the unconscious child. Figure 2.3.1 shows the different sizes of oropharyngeal airways. These should only be used where there is reduced consciousness.



Figure 2.3.1: Oropharyngeal Airways (Guedel Airways)

Before using the oropharyngeal airway, it is important to choose the correct size.

To get the right size, use the device itself as a measure. When you place it on the patient's cheek with the flange parallel to his front teeth, the tip of the oropharyngeal airway should reach no further than the angle of the jaw. If the airway is too long, it could obstruct breathing by displacing the tongue against the oropharynx. If it's too short, it won't be able to hold the tongue away from the pharynx, and patency won't be restored. Figure 2.3.2 shows the correct sizing of the oropharyngeal airway

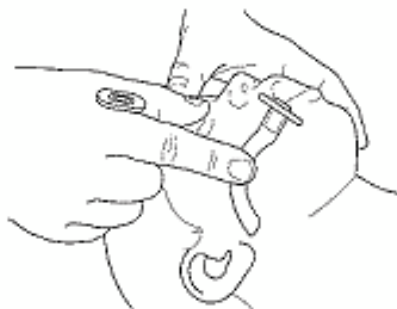



Figure 2.3.2: Sizing the Oropharyngeal Airway for Placement

2. Signs that point to Inadequate Breathing

Next, let us consider the signs that point to breathing problems. Before we proceed, kindly complete activity 2.3.3.

	<p>Activity 2.3.3</p> <p>List five signs that point to breathing problems or indicate respiratory distress</p>
---	---

Well Done, The following signs point to inadequate respiration:

- Central Cyanosis
- Respiratory rate:
 - Very Fast or Very Slow Respiratory rates for age
- Increased respiratory Effort
 - Grunting?
 - Head nodding / bobbing?
 - Lower chest wall indrawing?
 - Deep / acidotic breathing?
 - Symmetrical movement?
- Wheezing or crackles
 - Oxygen Saturation Pulse oximetry reading of <90%

Amongst these, some signs indicate severe respiratory distress and may be signs of impending respiratory failure. These include *central cyanosis, deep acidotic breathing, grunting and head nodding*.

Additionally, if any of the signs is accompanied by a reduction in the child's level of consciousness or a reduction in the child's ability to feed, then the respiratory distress is considered to be severe.

Presence of one or a combination of any of these signs indicates that the child may be *hypoxemic* and therefore needs treatment with oxygen. Using pulse oximetry will actually allow you to measure the blood oxygen saturation and is the best way to make decisions on using oxygen as well as monitor whether the treatment is effective.

Immediate bronchodilator therapy may also be required when wheezing is noted when it is accompanied by respiratory distress.

Having mentioned the signs of inadequate breathing, let us now highlight the signs of inadequate circulation

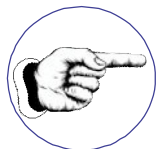
3. Signs of Inadequate Circulation:

Simple clinical signs can be very helpful in rapidly assessing the circulatory system. One should look out for the following signs that indicate an inadequate circulation:

- ÿ Cold hands and feet (taking into account environmental or ambient temperatures) The temperature gradient of the extremities (how far the coldness of the upper limbs and lower limbs extends upward to the elbow/knee or shoulder/hip)
- ÿ The presence / absence and character of the central pulse (brachial or carotid pulse)
- ÿ The presence and strength of the peripheral pulse should also be assessed to determine if it is weak, absent or strong.
- ÿ Pulse rate- to determine if it is too fast (>180/min in a child less than 1 year, and >160/min in a child more than one year) or too slow (<60 /minute).
- ÿ Capillary refill time to determine if the refilling is prolonged >3 sec when the child is in a warm environment. Note it is best to count and record the actual refilling time in seconds as this can help you see if a child is getting better or worse.
- ÿ Blood pressure should also be measured – although this is not commonly done in many of our facilities in children it should be done, and done accurately in seriously ill children. In the ETAT+ guidelines and practical we do not refer to blood pressure – but this is for practical reasons not because it is unimportant!

Presence of any one of these signs suggests an inadequate circulation. If any one of these signs is present, remember to also assess for:

- a) Skin turgor to determine if it takes longer than 2 seconds.
- b) Ability to drink (should be demonstrated as a sign by the health care worker - involves actually visualizing the child drinking or breastfeeding)
- c) Sunken eyes (Are the eyes sunken according to the mother?)

**Take note 2.3.1**

The environment and the ambient temperature can affect both the temperature of the hands as well as the return of capillary refill. It is therefore an important consideration in assessing the adequacy of the circulation.

In addition, presence of these signs in combination may point to serious and potentially life threatening circulatory problems.

Before we proceed please complete activity 2.3.4

	Activity 2.3.4 Match the diagnosis in column A with the group of symptoms in column B	
	Column A: ☐ Severely impaired circulation with no diarrhoea / dehydration ☐ Severe Dehydration ☐ Severe Anaemia	Column B: ☐ Severe Pallor in a Child with respiratory distress ☐ Cold hands plus a weak/ absent pulse and capillary refill more than 3 seconds and AVPU < A (all four signs) without diarrhea or signs of dehydration ☐ Unable to drink or AVPU < A plus: sunken eyes and return of skin pinch = 2secs

Good

You can now compare your answers with the following explanations

1. Severely impaired circulation without diarrhoea / dehydration, usually in a child with a severe febrile illness– this is diagnosed when a child is noted to have cold hands *plus* a weak / absent pulse and Capillary refill > 3 secs and AVPU < A (all four signs) but there is no evidence of diarrhea / dehydration. It is important to recognize this group as their fluid management is not the same as those who have these signs together with diarrhea/dehydration. Those with diarrhea/dehydration who have these signs are

treated for hypovolaemic shock. This management will be covered in later modules.

2. Severe Dehydration – A child who is unable to drink or AVPU < A *plus*: sunken eyes and return of skin pinch =2 secs with a history of diarrhea. Often these children may have some signs of an impaired circulation (eg a slow capillary refilling) but they do not have all four signs described above that would indicate a severely impaired circulation.
3. Severe Anaemia: Severe palmar pallor with or without respiratory distress

If a severely impaired circulation is identified because a child has all four critical signs then specific fluid therapy is indicated. If there is diarrhoea/dehydration (presence of the signs sunken eyes and skin pinch of 2 or more seconds) then urgent intravenous fluid therapy is required. If there is a severely impaired circulation but no diarrhoea/dehydration then fluids are given more slowly. For severe anaemia in the presence of respiratory distress (especially characterised by acidotic breathing) indicates the need for an urgent blood transfusion.

We will now continue to disability and use of the AVPU Scale.

Disability and the AVPU Scale

In order to determine neurological disability in relation to the child's illness, use of a simplified scale to assess the level of consciousness is recommended.

Take time to answer question 2.3.3



Activity 2.3.3

Name three examples of scales which are used to assess the level of consciousness in sick children.

Good answer!

There are various scales which have been used to assess the level of consciousness in children including:

- i. Paediatric Glasgow Coma Scale
- ii. Blantyre Scale
- iii. AVPU Scale

In this unit, we will discuss the use of the AVPU scale in assessing the level of consciousness of sick children by looking at its various components:

A = **A**lert and responsive. This score is given to an infant or child aware of the surrounding environment. The easiest way to confirm this is to check the infant/child can make eye contact – clearly look at you or its carer and often track any movements.

V = (response to) voice or verbal instructions or sound. This score is given to a child who is not alert but responds to **V**oice or **V**erbal instructions, e.g. turns head to mother's call.

P = (response to pain) this score is given to a child who is not alert, not responding appropriately to voice but responds to **P**ain appropriately. It is important to assess the response to pain carefully. The way ETAT+ teaches is to gradually increase the pressure, using a knuckle of a finger, on the bony part of the infant/child sternum (breastbone). A child who can respond appropriately to pain should reach across with their hand and try and push your finger/hand away. You are testing they know where the pain is (localising the pain) and that they can deliberately try and remove it. Just bending the arms without purpose is NOT an appropriate response. This appropriate localizing and motor response to a painful stimulus would be scored as **P**.

U = failure of an infant or child to elicit any of the responses described above is deemed as **U**nresponsive or **U**nconscious and scored as **U**.

In addition, it is also important to assess for the ability to drink / breastfeed or the ability to sit up in children above the age of 1 year (those who cannot sit up are said to be 'prostrated').



Take note 2.3.1

Children who are classified as "A or V" on the AVPU scale may still be unable to drink/feed and to sit up. These are two important signs indicating severity of illness and possible neurological impairment

Children who are not alert on the AVPU scale may have neurological impairment from a variety of factors. These may include hypoxemia (low oxygen concentrations in blood), circulatory impairment or the acute effects of neurological illnesses.

Additionally, a reduced level of consciousness may be indicative of *hypoglycemia*. Such children should be given a bolus of 10% dextrose (5 ml/kg) if the blood sugar cannot be measured immediately (note we use a lower dose in the neonatal period).

We will now consider how to carry out a rapid assessment of the seriously sick non collapsed child using the structured ABCD approach.

2.3.5 Rapid Assessment of the seriously sick Non Collapsed Child

Now that we have outlined the signs that indicate severe illness in children, let us then move on to the sequence of evaluation. Similar to the ABC Approach to the collapsed child, the ABCD Approach to the non-collapsed child involves:

- i. Quickly observing your safety and the safety of the child while at the same time observing if the child is alert by looking for eye contact/directed eye movements
- ii. Placing the child in the optimal setting to carry out the assessment
- iii. Shouting for help, when the child is identified as not being alert or having a serious problem.
- iv. Quickly and sequentially assessing the airway for patency and position; breathing for its adequacy and the need for oxygen therapy; circulation for its adequacy and immediate treatment for severely impaired circulation (shock) if present; disability using AVPU scale and possible treatment with 10% dextrose if not alert. .



Take note 2.3.2

During the assessment whenever a problem is identified at any stage, immediate intervention is carried out at that stage before proceeding to the next step so as to prevent further deterioration and death.

This sequence of the rapid assessment of the non-collapsed child is summarized next in Table 2.3.1.

Table 2.3.1: Rapid Assessment of the Non Collapsed Child

Observe	<p>Alert?</p> <p>Stimulate – <i>if not Alert</i></p> <p>Shout for Help – <i>if not Alert</i></p>	<p>Eye contact / movements</p> <p>Shout unless obviously alert</p> <p><i>If not, Alert take to / place on emergency couch</i></p> <p><i>If alert it may be most appropriate to continue evaluation while child is with parent</i></p>
Airway	<p>Assess for obstruction by listening for stridor / airway noises.</p> <p>Look in the mouth if not alert</p> <p>Position – <i>if not Alert</i> (appropriate for age)</p>	<p>Position only if not alert and placed on couch</p> <p>Suction (to where you can see) if not in alert child),</p> <p>Guedel airway only if minimal response to stimulation</p>
Breathing	<p>Assess adequacy of breathing</p> <ul style="list-style-type: none"> · Pulse oximetry? · Cyanosis? · Check oxygen saturation · Grunting? · Head nodding? · Rapid or very slow breathing? · Indrawing? · Deep / Acidotic breathing <p><i>If signs of respiratory distress listen for wheeze</i></p>	<p>Decide:</p> <ul style="list-style-type: none"> · · Is there a need for immediate bronchodilators?
Circulation	<p>Assess adequacy of circulation</p> <ul style="list-style-type: none"> · Large pulse – very fast or very slow? · coldness of extremity · Capillary refill? · Peripheral pulse – weak or not palpable? · (Note initial response to stimulation / alertness) · Check for severe pallor <p><i>If signs of poor circulation</i></p> <ul style="list-style-type: none"> · Ask about diarrhoea 	<p>Decide:</p> <p>-Does this child have severely impaired circulation AND sunken eyes / prolonged skin pinch? <i>If yes</i> give rapid bolus of Ringers Lactate</p> <p>-If there is NO severe diarrhoea / dehydration but severely impaired circulation with or without severe malnutrition give Ringers Lactate over 2 hours</p> <p><i>-If there is respiratory distress and has severe pallor, plan for emergency transfusion</i></p>

Scenario 2.3.1:

Take a moment to review the following case report:

You are asked to see a 2 year old baby girl named Abigael in the Outpatient department who has presented with severe diarrhoea and vomiting.

You previously prepared your workstation to deal with emergencies and ensure it is a safe environment.

As the child walks in you see they are excessively drowsy and you ask the mother to call the baby and she is not responding to the mothers call. You gently move the baby's shoulder while calling and watching the baby – she makes only a weak response and does not open the eyes. You call for help and place the baby on the emergency couch. After putting on your gloves you look in the mouth, position the airway and listen for noisy breathing.

There are no sounds heard and there is breathing. You assess the breathing for adequacy. The child is obviously breathing fast, has lower chest wall indrawing and deep acidotic breathing. There are no other signs of respiratory distress, and no crackles or wheeze. Your clinic is still not equipped with a pulse oximeter.


On assessment of the child's circulation, the large pulses are rapid. The peripheral pulses are hard to feel (weak). You press on the pulp of the finger and the colour returns after 5 seconds. The hands also feel cold and the warmth returns only at the elbow (a temperature gradient to elbow), though they appear to be the same pink color as the mother's hands. On inspection, there is no visible severe wasting. You ask about diarrhoea, there is a history of recent diarrhoea, you check for sunken eyes and pinch the skin on her abdomen. There are sunken eyes and skin pinch takes 2 seconds for it to return to its normal position. On AVPU assessment, the child is not maintaining eye contact; does not respond to her name on her mother's call and the child does not cry when painful stimulation is applied to her sternum.

1. Identify which signs point to problems in the following areas:
 - a. Airway
 - b. Breathing
 - c. Circulation
 - d. Disability

2. List the interventions that you will perform:
 - a. During the Initial Assessment
 - b. After the assessment of the Airway
 - c. After the assessment of the breathing
 - d. After the assessment of the circulation
 - e. After assessing the child's level of consciousness

Remember in real life you treat each problem as soon as you identify it before proceeding to the next step.


Congratulations on completing the unit. Now take time to look at the following review points

	<p>2.3.6 Summary</p> <ol style="list-style-type: none"> 1. A rapid ABCD Assessment at the time of presentation helps to promptly identify and treat the most common potentially life threatening conditions that a child may present with to the emergency area. 2. Classifying essential signs according to the ABCD Algorithm helps to clearly identify a problem and its severity and prioritize treatment 3. If a problem is identified – <i>TREAT IMMEDIATELY!!</i>
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2.3.7 Review questions

1. Why is it important that every sick child presenting to the emergency department is rapidly assessed in a sequential and structured way?
2. Explain what one must ensure before starting ABCD
3. What important signs and symptoms will point to a problem in the:
 - a) Airway?
 - b) Breathing?
 - c) Circulation?
 - d) Disability?

What appropriate interventions will you carry out when you discover a problem(s) in each of the areas mentioned in question 2?

	<p>2.3.8 References</p> <ol style="list-style-type: none"> 1. World Health Organization (2005). Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. WHO. 2. Ministry of Health (2016). Basic Paediatric Protocols – Revised Protocols. Ministry of Health: Kenya. 3. World Health Organization (2005). Emergency Triage Assessment and Treatment – Manual for Participants. WHO.
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UNIT 4: STRUCTURED PAEDIATRIC ADMISSION RECORDS

Welcome to Unit 4 of Module 2. So far we have looked at triage and a structured approach to care of the collapsed and non-collapsed child. We will now consider the value of structured admission records for helping ensure essential information is collected for each infant or child in hospital.

Unit Outline

- 2.4.1 Unit Introduction
- 2.4.2 Unit Objectives
- 2.4.3 Importance of the Structured Forms for Medical Documentation
- 2.4.4 Symptoms Included in the Paediatric Admission Record
- 2.4.5 Elements of the Paediatric Admission Record
- 2.4.6 Strengths and limitations of the Paediatric Admission Record
- 2.4.7 Summary
- 2.4.8 Review Questions
- 2.4.9 References

2.4.1 Unit Introduction

Structured forms for documentation are important in order to ensure essential information is obtained for each patient during each encounter. Well-designed structured forms help summarize information for decision making as well as provide adequate information for the next health provider to continue with the patient's care. You have already looked at a structured approach to patient care; now let us look at structured documentation.

The Paediatric and Neonatal Admission Record (PAR & NAR) are examples of structured forms. In this unit we will look at the importance of, the symptoms included and the elements, strengths and limitations of the PAR.

I hope that you will enjoy this unit.



2.4.2 Objectives

By the end of this unit, you should be able to:

- i. Explain the importance of the structured forms for medical documentation
- ii. Outline the symptoms that are included in the Paediatric Admission Record
- iii. Describe the elements of the Paediatric Admission Record
- iv. Discuss the strengths and limitations of the Paediatric Admission Record

2.4.3 Importance of the Structured Forms for Medical Documentation

Let us begin by looking at the importance of structured tools for medical documentation. A structured tool is a tool that is developed as a template for eliciting important history, clinical signs, examination and management plan for patients.



In-text Question 2.4.1

Can you think of an example of a structured tool for documentation at your facility?

In Kenya, the Ministry of Health has developed some tools for collecting information from patients in a structured format. Some of these include the Paediatric Admission Record (PAR) and the Neonatal Admission Record (NAR). For the purposes of this unit we will discuss both the PAR and the NAR as one; referring to both of them as the PAR.



In-text Question 2.4. 2

What do you think would be the importance of documenting in a structured manner?

Well done! Compare your answers with the following information:

Structured forms for documenting are important because they:

- i. Define the minimum amount of documentation required for every patient encounter and help make sure important things do not get forgotten, for example, information on whether the child has had all appropriate immunisations or a clear record of the level of consciousness at admission
- ii. Assist the user to correctly classify illness to aid in appropriate diagnosis and treatment they are a decision aide that can help link the best evidence to routine practice
- iii. Ensure consistency in documentation by different health workers – so we speak the 'same language'
- iv. Provide sufficient information for continuing patient care appropriately by another health worker – so we communicate effectively



Take Note 2.4. 1

Structured forms always represent the minimum information that even a health worker with very limited training or experience should understand and complete. –Those with more training and experience should go **well beyond** the structured forms when taking a full history and examination.

2.4.4 Symptoms included in the Paediatric Admission Record

Let us now look at symptoms included in a well- designed and structured form for documentation of patient information. We will also look in detail at the Pediatric Admission

Record as an example of a well-designed structured form.

Symptoms and signs included in well-designed structured forms should:

- i. Be the most useful symptoms (elicited from history) and signs (obtained from physical examination) that would go into making a diagnosis for common illnesses
- ii. Aid in assessing the severity of illness and identify the risk of death as well as help monitor progress of patient
- iii. Guide correct management of illness (using symptoms and signs linked to evidence based guidelines) and help in differentiating diseases or identifying multiple problems that require action
- iv. Be easy to observe and learn from
- v. Be easily recognized by health workers



Activity 2.4.1

Think of a common childhood illness. List the most useful signs and symptoms that you would include in diagnosing and assessing severity of that illness

Example: Paediatric Admission Record

We will now look at the Paediatric Admission Record which helps us to have a structured approach to documentation of symptoms and signs of a sick child.

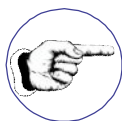


Activity 2.4.2

Look at Table 2.4.1; it is part of the Paediatric Admission Record (PAR). For each of the items included in the history and physical exam, write down why it is a good sign or symptom to include. For example, grunting is easy to observe and gives an indication of the severity of the respiratory illness

Table 2.4.1: Excerpt from a PAR for Activity 2.4.2

History & Examination										
Time seen	am <input type="checkbox"/>	Vaccines	OPV/ Penta x	Pneumo x	Rotavirus	BCG <input type="checkbox"/>	Measles <input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>	
	pm <input type="checkbox"/>									
Weight	kg	WAZ=	Height / Length			WHZ=	MUAC			
Vital Signs	Temp (°C)		Resp Rate	Bpm	Pulse	/min	BP		mmHg	
Fever – No. of days =										
		Y <input type="checkbox"/>	N <input type="checkbox"/>	A & B			Oxygen saturation	%		
Cough– No. of days =		Y <input type="checkbox"/>	N <input type="checkbox"/>				Central Cyanosis	Y <input type="checkbox"/>	N <input type="checkbox"/>	
Cough > 2 weeks		Y <input type="checkbox"/>	N <input type="checkbox"/>				Lower chest indrawing	Y <input type="checkbox"/>	N <input type="checkbox"/>	
Difficulty breathing		Y <input type="checkbox"/>	N <input type="checkbox"/>				Grunting	Y <input type="checkbox"/>	N <input type="checkbox"/>	
Well done for completing the exercise! Please take note of the following										



Take Note 2.4.2

PARs also incorporates the A, B, C s; reinforcing the need for a structured approach to evaluation, as well as documentation

2.4.5 Elements of the Paediatric Admission Record

We have just looked at part of the Paediatric Admission Record as an example of a structured tool or form. This is a Ministry of Health tool in Kenya for documenting consistently patient information for infants and children above the age of 7 days who are being admitted. It is important for all health care workers who are admitting children to be familiar with this tool. We will now look at the rest of this tool in detail so that we can fill it appropriately in our day to day practice.

This tool is divided into five parts:

- i. Patient demographics, anthropometrics, weight and vaccine status
- ii. History and Physical Examination

- iii. Other History and Physical Examination (additional information)
- iv. Problem List and Classification of Severity of Illness
- v. Investigation and Management Plan

Let us look at each of these in detail

1) Patient demographics, anthropometrics, weight and vaccine status

Look at table 2.4.2. This is the first part of the Paediatric Admission Record (PAR)


Table 2.4.2 First part of PAR

Name		IP No.					Ward	
Next of kin		Residence						
		Sub-location						
Adm Date	dd/mm/yyyy	Sex	M <input type="checkbox"/> / F <input type="checkbox"/>	Age	yrs	mths	days	
Referred?	Y <input type="checkbox"/> N <input type="checkbox"/> , if yes from:	<input type="checkbox"/> Other Hosp <input type="checkbox"/> HCentre / Clinic		Re-admission?	Y <input type="checkbox"/> N <input type="checkbox"/>			
Presenting Complaints								

We must always take the weight of the child. There are only two occasions when we need to estimate weight:


- a. *If a child is being given life support*
- b. *If a child has severely impaired circulation and diarrhoea / dehydration needs urgent bolus fluids (for treatment of hypovolaemic shock caused by the diarrhoea)*

For all other occasions it is important to safely weigh the child. If you are organized, it should only take 20-30 seconds to weigh a baby / child. This weight means you can now make an accurate prescription for drugs and fluids etc.



Take Note 2.4.3
Always get vaccine history for every child at every visit. Remember if their vaccines are not up to date, then you need to document it and ensure that they get the necessary vaccines before discharge.

Assignment 2.4.1



Visit the outpatient clinic and inpatient wards at your facility and observe if weight is being measured for every child. If it is not being done, find out why and suggest possible solutions to ensure that every child gets weighed every time they come to the clinic or get admitted.

History and Physical Examination

We have already looked at part of this section; let us now look at the rest of this section of the PAR form in detail.

This section of the form helps us to recognize and document the signs and symptoms in order to correctly diagnose and assess severity of illness. This is important because when this is done well, we are able to initiate the correct management for the patient.

Take a look at table 2.4.3: which shows the History and Physical Examination Section of the PAR. This part of the form helps us to recognize and document the signs and symptoms in order to correctly diagnose and assess severity of illness. This is important because when this is done well, we are able to initiate the correct management for the patient.

Table 2.4.3: The History and Physical Examination Section of the PAR

Time seen	am <input type="checkbox"/> pm <input type="checkbox"/>	Vaccines	<i>OPV</i> Pentax	<i>Pneumo</i> x	Rotavirus	BCG Y <input type="checkbox"/> N <input type="checkbox"/>	Measles Y <input type="checkbox"/> N <input type="checkbox"/>
Weight	kg	WAZ=	Height /	Length	WHZ=	MUAC	
Vital Signs	Temp (°C)		Resp Rate bpm		Pulse /min	BP	mmHg
Length of illness	days				Stridor		Y <input type="checkbox"/> N <input type="checkbox"/>
Fever – No. of days =	Y <input type="checkbox"/> N <input type="checkbox"/>				Oxygen saturation	%	
Cough– No. of days =	Y <input type="checkbox"/> N <input type="checkbox"/>				Central Cyanosis		Y <input type="checkbox"/> N <input type="checkbox"/>
Cough > 2 weeks	Y <input type="checkbox"/> N <input type="checkbox"/>				Lower chest indrawing		Y <input type="checkbox"/> N <input type="checkbox"/>
Difficulty breathing	Y <input type="checkbox"/> N <input type="checkbox"/>				Grunting		Y <input type="checkbox"/> N <input type="checkbox"/>
Diarrhoea No. of days =	Y <input type="checkbox"/> N <input type="checkbox"/>				Acidotic breathing		Y <input type="checkbox"/> N <input type="checkbox"/>
Diarrhoea > 14d	Y <input type="checkbox"/> N <input type="checkbox"/>				Wheeze		Y <input type="checkbox"/> N <input type="checkbox"/>
Diarrhoea bloody	Y <input type="checkbox"/> N <input type="checkbox"/>				Crackles		Y <input type="checkbox"/> N <input type="checkbox"/>
Vomits everything	Y <input type="checkbox"/> N <input type="checkbox"/>				Peripheral Pulse	<input type="checkbox"/> Normal	W e <input type="checkbox"/> a k
					Dehydr'n		

Other History and Physical Examination (additional information)

The third part of this form as shown in figure 2.4.4 gives the person examining the patient space to write additional history and examination that may not have been included in the previous sections above.

Figure 2.4.1: The other history and physical examination section of PAR

Other history and examination	
Rt	Lt

Summary

If there is additional pertinent information that you obtain during history and physical exam and it is not included in the previous sections, then do not hesitate to include it here. Filling this form should not just be routine, but should include all the information deemed necessary to make an appropriate diagnosis and treatment plan! It is possible to adapt the form if there are additional local requirements while keeping the core information.

Problem Lists and Classification of Severity of Disease

We are almost at the end of reviewing the Paediatric Admission Record. This is the second last part.

It is important to make a problem list and classify the severity of illness. This helps us to then manage the child appropriately.

Before proceeding please take time to complete the following activity



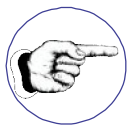
Activity 2.4.3

Look at the section of the PAR form in table 2.4.4 and look at the classification by level of severity of some of the common childhood illnesses. Can you see how this is linked to some of the ideas in the ABCs we have already covered? We will be looking at particular illnesses and the classification of their severity in other modules

Table 2.4.4: shows a section of the PAR form to be used for activity 2.4.3

Table 2.4.4 Section of PAR form

Admission Diagnoses – Select ONE primary diagnosis (tick box indicating “1”) and ANY secondary diagnoses (tick box indicating “2”), then indicate level of severity or type of disease if required			
Malaria	1 <input type="checkbox"/> 2 <input type="checkbox"/>	<input type="checkbox"/> Non-sev <input type="checkbox"/> Sev (AVPU < A, or Resp. Dist)	Anaemia <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> <input type="checkbox"/> Nonsev <input type="checkbox"/> Sev
Pneumonia	1 <input type="checkbox"/> 2 <input type="checkbox"/>	<input type="checkbox"/> Non-sev <input type="checkbox"/> Severe <input type="checkbox"/> V. Sev	Meningitis <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/>
Diarrhoea	1 <input type="checkbox"/> 2 <input type="checkbox"/>	<input type="checkbox"/> Non-bloody <input type="checkbox"/> Bloody (dysentery)	Neonatal sepsis <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/>
Dehydration	1 <input type="checkbox"/> 2 <input type="checkbox"/>	<input type="checkbox"/> Some <input type="checkbox"/> Severe	Birth asphyxia <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/>
HIV	1 <input type="checkbox"/> 2 <input type="checkbox"/>	<input type="checkbox"/> Positive <input type="checkbox"/> Negative <input type="checkbox"/> Declined PITC	Prematurity / LBW <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/>
Malnutrition	1 <input type="checkbox"/> 2 <input type="checkbox"/>	<input type="checkbox"/> Severe malnutrition <u>with</u> oedema <input type="checkbox"/> Severe malnutrition <u>without</u> oedema	Severely Impaired Circulation <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/>
Other 1	1 <input type="checkbox"/> 2 <input type="checkbox"/>		
Other 2	1 <input type="checkbox"/> 2 <input type="checkbox"/>		



Take Note 2.4.4

Classifying the severity of an illness is vital to making sure that treatment is correct. It also helps us use our resources most effectively.

Investigation and Management Plan

Let us now look at the last but certainly not the least part of the Paediatric Admission Record. Having diagnosed and assessed severity of the illness, we must now determine what further investigations we would like, the supportive treatment and the review plan for the patient.

Table 2.4.5 is an illustration of a section of the PAR dealing with investigation and management plan.




Table 2.4.5 Investigation (Tick when samples are collected)

Investigations ordered – record results in medical record				
Malaria	<input type="checkbox"/> Blood slide	<input type="checkbox"/> Rapid Test	Glucose	<input type="checkbox"/> Stick test <input type="checkbox"/> Laboratory
Haematology	<input type="checkbox"/> Hb	<input type="checkbox"/> HCT	<input type="checkbox"/> Full haemogram	Chemistry <input type="checkbox"/> Na + K <input type="checkbox"/> Urea <input type="checkbox"/> Creat <input type="checkbox"/> LFT
Microbiology	<input type="checkbox"/> Lumbar Punct	<input type="checkbox"/> Blood Cult	HIV	<input type="checkbox"/> Rapid test <input type="checkbox"/> PCR
X-Ray	CXR <input type="checkbox"/> AXR <input type="checkbox"/> Other =		Other 1	
Treatment Supportive care & Observations – indicate what care is needed and sign please				
Keep warm	<input type="checkbox"/>	Oxygen	<input type="checkbox"/>	Clinician Name & Sig
IV / oral fluids plan	<input type="checkbox"/>	Blood transfusion	<input type="checkbox"/>	
Vitamin A	<input type="checkbox"/>	Nutrition / Feeds plan	<input type="checkbox"/>	
Review status	<input type="checkbox"/> Medical <6hrs <input type="checkbox"/> Priority Nursing Observations			
Results of Investigations	Date	Date	Date	
Malaria				
Continuation notes please put date and time and sign!				

You should always document the results of the investigations you have done and the supportive care you are providing. Any further monitoring including vaccine catch up should also be documented. Always remember to sign your name clearly.

For you to further appreciate what we have learnt, carry out the following assignment

	<p>Assignment 2.4.2</p> <p>Take a moment to go to the outpatient clinic or the paediatric ward and review some of the case records (hopefully with PARs!) which have been filled by the clinicians. Practice filling some of the forms as you help with the admissions!</p>
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Well done! We have come to the end of reviewing the Paediatric Admission Record. Now we will briefly outline some of the strengths and weaknesses of these structured tools.

2.4.6 Strengths and Limitations of Structured Tools for Documentation

Now that you have reviewed the Paediatric Admission Record, let us review the strengths and limitations of the structured form.



In-text Question 2.4.3

What are some of the strengths of a structured Paediatric Admission Record?

Well done! Look at the list below and compare it with your answers...

- The essential information is captured
- It allows for better communication between health workers
- It allows for monitoring and documentation of progress
- It is often quicker to fill
- It provides a link to safe, sensible and correct practice
- It is standardized and allows for uniformity in documentation

Having looked at the strengths of PAR, we will now look at some of its possible weaknesses. But before then could you please answer the following question 2.4.4?



In-text Question 2.4.4

What do you think are some of the limitations of the structured Paediatric Admission Record?

Well done! Look at some of the limitations listed below and compare them your answers

- The focus of the structured form is limited – you cannot make a form that covers all possible diagnoses. The form is focused to ensure that essential aspects of the common illnesses that cause most mortality are covered
- Structured forms do not replace conventional history taking but represent the minimum amount of information that must be obtained and documented and acted upon
- Filling a PAR is the start of a process and not the entire process
- There is a risk people will 'cheat' and fill the PAR by 'guessing' or even inventing the findings. It is important that all health professionals take their responsibility seriously – it is better to be honest and leave something out than cheat. Obviously it is best to complete the form properly!
- The information must be used to benefit children. It is not enough to fill the form, we must act on the information we obtain



Take note 2.4.5

Remember that an occasional child may present with unusual signs not covered in the PAR. The PAR is a basic starting point for a good history and examination but you should go beyond what it contains to the best of your ability. It is in order to think out of the box if the patient's symptoms and signs warrant it; this form is just a guide for common illnesses only.

Before proceeding examine scenario 2.4.1

Scenario 2.4.1

Imagine you are the one at the outpatient clinic when Juma Munya, a three year old boy, is brought to the clinic by his mother, Amina. He has a four day history of diarrhea and vomiting. The diarrhea is non-bloody. Mum reports fever for the last two days. He has not had any convulsions.

He was born as a term neonate, was breastfed exclusively for 6 months with complementary feeds introduced at 6 months. His vaccines are up to date.

His older brother was recently admitted with jaundice and diarrhea from which he recovered after a few days.

On examination you find that he is sick-looking, lethargic, pale, has a capillary refill time of 3 seconds. He does not have visible wasting or edema or jaundice.

He responds to voice and does not need help to maintain his airway. His temperature is 38.50C, respiratory rate is 40 breaths per minute and there is acidotic breathing. His pulse rate is 120 per minute, with a weak peripheral pulse. Skin turgor, is at 2 seconds.

His chest is clear; his heart sounds are audible with no gallop rhythm or murmur and has a liver span of seven centimeters. Practice using the PAR by filling in the above information. What key information is required by the PAR that you do not have in the history and examination above? Is the missing information potentially important for getting the right diagnosis and providing the right management plan?

Well done, you may now go through the summary of the unit.



2.4.7 Summary

Congratulations on coming to the end of the unit on Structured Paediatric Admission Records. In summary we have said that:

- Structured admission forms can help improve documentation and management for common childhood conditions
- Signs and Symptoms that are included are those that are most important for making a diagnosis, differentiating illness and assessing severity for common illnesses. They are easy to observe and are easily recognizable by health workers
- Structured forms represent the minimum amount of information that should be obtained and acted upon; always try and do better than the minimum

Structured forms supports but do not replace conventional history taking and physical examination; we must continue to apply ourselves and think outside the box.

2.4.8 Review questions

1. Explain why it is important to have a structured form for medical documentation
2. What are some of the essential signs and symptoms included in the PAR?
3. List the important elements of a PAR?
4. Outline some of the strengths and limitations of the PAR?
5. Congratulations on finishing this unit! Take a break and enjoy the next module!



2.4.9 References

1. Implementation of structured paediatric admission record for district hospitals in Kenya-results of a pilot study S Mwakyusa et al BioMedCentral International Health and Human Rights 2006, 6:9
2. Kenya Clinical Guidelines, 2013; <http://www.idoc-africa.org>
3. World health Organization; 2013; Hospital Care for Children; Guidelines for management of common illnesses with limited resources
4. Ministry of Health-Kenya; 2016; Basic Paediatric Protocols.

MODULE 3

Management of Cough, Difficulty in Breathing and Diarrhoea or Dehydration

MODULE INTRODUCTION

Welcome to the third module of this course.

Having gone through modules 1 and 2, we shall now apply what you have learnt in management of some serious childhood illnesses.

In this module we will focus on two of the common childhood illnesses in the units as follows:.

Unit 3.1: Managing a child with respiratory distress

Unit 3.2: Acute diarrhoea and dehydration



MODULE OBJECTIVES

By the end of this module, you should be able to:

1. Apply the ABCD approach and other information to the management of an infant or child with respiratory distress.
2. Apply the ABCD approach and other information to the management of an infant or child with diarrhoea.

UNIT 3.1: MANAGING AN INFANT OR CHILD WITH RESPIRATORY DISTRESS

Unit Outline:

- 3.1.1 Introduction
- 3.1.2 Objectives
- 3.1.3 Causes of respiratory distress
- 3.1.4 ABCD approach to assessment of respiratory distress
- 3.1.5 Recognizing, classifying and managing childhood pneumonia
- 3.1.6 Recognizing, classifying and managing asthma in children.
- 3.1.7 Summary
- 3.1.8 Review questions
- 3.1.9 References

3.1.1 Unit Introduction

We have seen how we can effectively use essential clinical symptoms and signs, the ABCD approach to a seriously ill infant or child and appropriate use of the standard admission records for the assessment and management of sick children.

In this unit we will focus on how information from the rapid assessment and other key symptoms or signs help direct the management of the common conditions that present with respiratory distress; thus affecting A and B in children aged 2 months to 5 years. We will particularly discuss how using essential signs and symptoms inform recognition, classification and management of two common childhood diseases.



3.1.2 Unit Objectives

By the end of the unit you should be able to:

- i. Outline causes of respiratory distress.
- ii. Discuss the ABCD approach to assessment of respiratory distress.
- iii. Use essential signs and symptoms to:
 - a. classify severity of pneumonia
 - b. manage a child with pneumonia
- iv. Use essential signs and symptoms to
 - a. Classify severity of asthma
 - b. Manage a child with asthma.
- v. Outline possible causes of treatment failure.

3.1.3 Causes of respiratory distress.

History of cough, difficulty in breathing or both usually, are the essential symptoms that should prompt a careful look for conditions causing respiratory distress.

The causes of respiratory distress can broadly be classified as:

Primary lung or airway disease such as: acute pneumonia, acute asthma, bronchiolitis, pulmonary tuberculosis, *pneumocystis jiroveci* pneumonitis (formerly PCP), and croup.

Conditions arising from other systems/infections such as: severe malaria, severe anaemia, severe dehydration, heart disease, diabetic ketoacidosis and even renal disease.

Figure 3.1.1 shows a schematic diagram of common causes of respiratory distress and illustrates how they have similar clinical presentations. At the centre of this diagram are common signs that can be seen in the disease conditions named in the coloured circles. Outside the circles are some signs that may help in identification of some of these diseases.

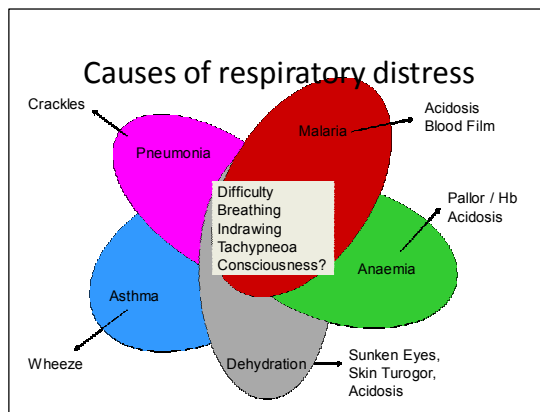


Figure 3.1.1 Causes of respiratory distress

3.1.4 The ABCD approach to assessment of respiratory distress

Let us now illustrate how we use the ABCD approach to assessment of respiratory distress to gather our first important information using scenario 3.1.1. The scenario will be broken down into each of the critical steps to help you answer the questions that will arise as we go along.

Scenario 3.1.1



You are asked to see Kendi, a 7 month old girl in the out-patient department who is said to have difficulty in breathing.

As you approach Kendi and her mother, you observe that she is alert and sitting up on her mother's lap but appears anxious.

From your observation, you notice that she appears alert and anxious; would you change where you are dealing with Kendi (the setting) by taking her away from her mother to an examination couch? *You now assess her airway by listening carefully and find that she has no stridor or noisy breathing.*

On your rapid assessment of breathing, you find she has a rapid respiratory rate, is grunting, and has lower chest wall in-drawing and deep acidotic breathing. (The other signs of respiratory distress are normal – not present)

On auscultation, she has no crackles and no wheeze.

Good! It would be better to leave Kendi with her mother as Kendi is alert. Moving her away would most likely cause her to be more anxious, which may worsen her respiratory distress and make it harder for you to assess her.

You now assess her airway by listening carefully and find that she has no stridor or noisy breathing.

On your rapid assessment of breathing, you find she has a rapid respiratory rate, is grunting, and has lower chest wall in-drawing and deep acidotic breathing. (The other signs of respiratory distress are not present)

Supposing you are alone in the examination room with Kendi and her mother, what 2 steps must you do before you proceed to assess circulation?

Good! Calling for help and supporting breathing by initiating oxygen using a suitable oxygen delivery device at the correct flow rate are the 2 critical steps you need to do before you proceed. You can safely give oxygen while Kendi is still on her mother's lap.

Now that you have started oxygen and confirmed that help is on the way let us see what happens next.

You assess the circulation by checking the large pulse and find that Kendi has a strong and fast brachial pulse, the peripheral pulse (radial) is easy to feel, her hands are warm, capillary refill time is less than 2 seconds and you notice that she has severe palmar pallor (+++) when you compare her palm to that of her mother.

What do you think is the likely cause of Kendi's respiratory distress?

What 2 critical steps must you do now?

Good!

You need to establish intravascular access (take blood samples) and give an urgent blood transfusion of 10mls/kg of packed cells (or if not available 20mls/kg of whole blood) to be given over 4 hours.

Severe anaemia is the likely cause of the respiratory distress; this is an emergency because if left untreated, severe anaemia with respiratory distress is associated with a high risk of dying!

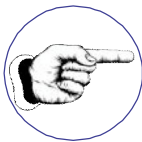
Remember you had asked for help, assistants can help you do this as you continue your rapid assessment.

On your assessment of disability, Kendi is on her mother's lap and closely watching you (AVPU is at A) as she attempts to breastfeed you notice that she is not able to breastfeed effectively.

What does her inability to breastfeed effectively imply?

Good attempt! Kendi is alert, therefore there is no absolute need for a dextrose bolus (you may have checked a blood sugar when you took samples to organise the blood transfusion) but her inability to breastfeed implies that she is severely ill. Hypoglycaemia is likely to develop if not addressed in your treatment plan.

Well done! You have taken the necessary steps in ensuring that emergency interventions have been initiated using the ABCD approach to a patient with respiratory distress.



Take Note 3.1.1

Not all respiratory distress is caused by pneumonia.
A good assessment is required to determine the cause of respiratory distress.

Now let us take this a step further and discuss two conditions that cause arising from primary lung and airway disease in sections 3.1.5 and 3.1.6.

3.1.5 Recognizing, classifying and managing a child with pneumonia who is HIV negative.

Pneumonia is estimated to cause 1.2 million deaths every year in children under the age of five years making it the leading cause of death in children worldwide – it causes 18% of all childhood deaths, more deaths than AIDS, malaria and tuberculosis combined.

The essential symptoms that should start you checking for the possibility of pneumonia are history of cough, or difficulty breathing or both in infants or children aged >2 months to 5 years.

The essential signs that will help you classify the severity of pneumonia are illustrated in Figure 3.1.2.

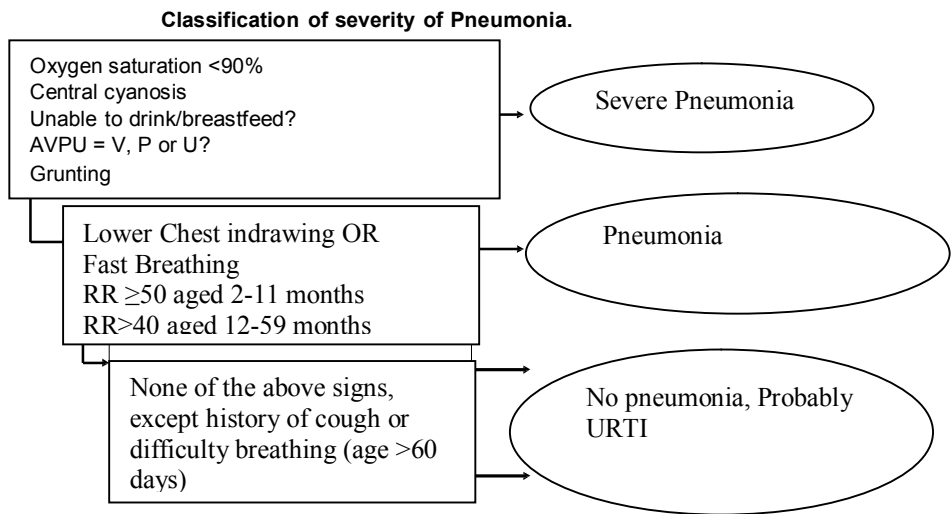


Figure 3.1.2 Classification of severity of pneumonia using essential signs.

Severe pneumonia – is suggested by history of cough or difficulty breathing, in a child aged over 60 days plus one of the following danger signs: Central cyanosis, inability to drink/breastfeed, grunting or AVPU = V, P or U or oxygen saturation less than 90%. Severe pneumonia carries an increased risk of death.

Management involves giving oxygen, maintenance intravenous fluids or supported feeding and broad spectrum intravenous/intramuscular antibiotics (benzyl penicillin and gentamicin) Always remember to refer to MOH Basic Paediatric Protocols for appropriate dosing of the drugs.

Pneumonia – history of cough or difficulty breathing, age less than 60 days without signs of severe pneumonia. The infant/child however has tachypnea i.e respiratory rate (RR) of more than or equal to 50 breaths/minute in ages 2 – 11 months or more than or equal to 40 in ages 1 – 5 years and/or lower chest wall indrawing.

Out-patient management using high dose oral amoxicillin is recommended and arrange for a review in 2 days to reassess for improvement or deterioration. Refer to MOH Basic Paediatric Protocols for appropriate dosing.

No pneumonia – history of cough or difficulty breathing, age > 60 days with none of the signs above that indicate pneumonia or severe pneumonia. Treat as an upper respiratory tract infection – no antibiotics are required.

We have discussed how to recognize, classify severity and manage a child with pneumonia, before we proceed to the next topic, it is important to think about HIV. For all children admitted to hospital we need to know the HIV status as soon as the child is admitted. The treatments for pneumonia described above assume the child is tested and is HIV negative.

Provider initiated testing and counselling (PITC) for HIV should be offered to all sick infants and children because our treatments change if the child is HIV exposed or infected. Children with HIV who have signs of severe or very severe pneumonia should all get broad spectrum antibiotics – Penicillin / Ampicillin plus Gentamicin. In addition opportunistic infections such as *Pneumocystis jiroveci* pneumonitis (PJP) infections may be present.

The addition of high dose co-trimoxazole for 3 weeks along with antiretroviral therapy (ART) as you manage pneumonia is therefore recommended as additional treatment to an HIV infected child presenting with features of pneumonia or asthma.

Progressive worsening or persistence of respiratory distress despite treatment offered as per the standard guidelines implies treatment failure. This warrants further investigations for

infections such as pulmonary tuberculosis as illustrated later in this module and possible change of treatment.

Having highlighted the importance of HIV, now take time to go through assignment 3.1.1.



Assignment 3.1.1

Describe how you would manage a child with asthma who is brought to your hospital in severe respiratory distress.

Hint: use the ABCD approach.

Name the drugs you would need in the management of asthma.

Good! Let us now discuss the steps you would take in recognizing, classifying and managing a child with asthma to help you review your answers to assignment 3.1.1.

3.1.6 Recognizing, classifying and managing a child with wheeze or asthma

The recognition of possible asthma is similar to that of pneumonia. The essential symptoms include a cough or difficulty breathing or both, with presence of a wheeze as an additional symptom.

Remember likelihood of asthma is higher in children older than 12 months and history or recurrent wheeze.

There are international guidelines on classifying asthma. However, these are more complicated and often suggest use of tests (like peak flow measurement) that are often not present in MOH hospitals. It is fine to use these international guidelines but for the ETAT+ course and MOH guidelines we have tried to keep things simple – you will see how.

In order to classify the severity of asthma within ETAT+, it is important to once again assess the essential signs as illustrated in figure 3.1.3, and manage accordingly with the use of bronchodilators like salbutamol, oxygen and steroids.

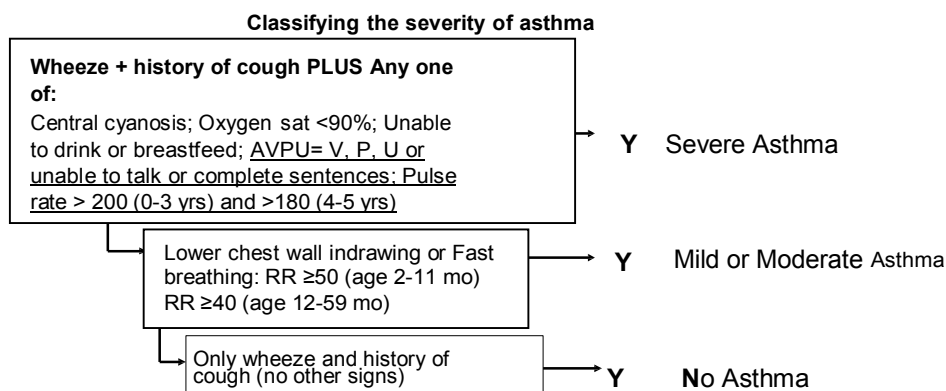


Figure 3.1.3 Classification of severity of asthma using just essential signs.

Severe asthma – is recognised by history of cough or difficulty breathing **and** wheeze **plus** central cyanosis, inability to drink/breastfeed (or inability to talk) due to breathlessness, grunting or AVPU = V, P or U; oxygen saturation <90%; inability to talk/complete sentences (older children), pulse rate >200bpm (0-3 year old) and >180bpm (4-5 year old). Severe asthma carries an increased risk of death. Sometimes in Severe asthma the obstruction is so severe that there is minimal air movement and the chest becomes silent (no wheeze). This is a life threatening condition.

Management involves measuring oxygen saturation levels using a pulse oximeter, giving oxygen; and nebulise with 2.5 mg salbutamol. The salbutamol can be repeated every 20 minutes (or even more often) for 3 doses if the treatment does not lead to a rapid response. So it is important to reassess the severity of respiratory distress after each dose. (Ipratropium bromide, 250mcg, should be considered and added as a nebuliser if the response is poor). Also, give antibiotics as for severe pneumonia

It is important to start oral prednisolone at 2mg/kg/day as soon as possible. Intravenous hydrocortisone (4mg/kg/dose 6 hourly) is used only if the child is unable to drink and changed to oral prednisolone as soon as the child can take orally. Check protocol for maximum daily dose of Prednisolone.

Make sure you reassess after each dose of salbutamol to determine the severity. After the first salbutamol doses it is often possible to give the salbutamol 4 to 6 hourly for the first 24 hours when a new treatment plan should be made. If a nebuliser is not available then use a metered dose inhaler (MDI) with a spacer and face mask to give up to 6 'puffs' of salbutamol every 20 minutes and up to 3 doses in 60 minutes depending on response. Oral salbutamol should not be used in very severe or severe asthma.

Mild or Moderate asthma – history of cough or difficulty breathing **and** wheeze **plus** lower chest wall in- drawing with ability to drink and fast breathing (RR \geq 50 for infants 2-11 months and \geq 40 for children 12-59 months).

Management involves measuring oxygen saturation levels (SaO₂) using a pulse oximeter where possible. Start the child/infant on oxygen. Nebulise with 2.5 mg salbutamol or use metered dose inhaler (MDI) with a spacer and mask 2 puffs repeated every 20 minutes, up to 3 doses for the first one hour. These children should also start oral prednisolone.

No Asthma– history of cough or difficulty breathing **and** wheeze with no other signs.

Monitor closely for 1-2 hours and if mild symptoms allow, allow home on salbutamol MDI 2 puffs (with spacer and mask) every 6 hours. Counsel the caregiver on signs of deterioration. Figure 3.1.6 shows how to use a spacer and inhaler.

All caregivers and children with asthma should be given health education on how to avoid triggers and on how to use the inhaler medicines effectively.



Figure 3.1.4: Using an inhaler, a spacer and a mask

Table 3.1.1 illustrates protocol of management of a wheezing child with possible asthma. This is a summary of the above discussion.

Table 3.1.1: Protocol of management of a wheezing child with possible asthma

Medication	Mild asthma attack	Moderate Asthmatic attack	Severe Asthma Attack
Salbutamol* every 20 min x 1 hour	MDI 2 puffs	MDI 2 puffs OR Nebulise 2.5mg	-MDI 6 puffs (face mask all ages) OR -Nebulise 2.5mg (child <5yr) – 5.0mg (> 5yr)
Oxygen (Maintain SaO ₂ > 94%)	No	By face mask (5l/min)	By non-rebreather with face mask 10l/min)
Anticholinergic Ipratropium bromide every 20 min x 1 hour	No	Nebulise 250mcg	Nebulise 250mcg
Early Steroids**	No	Prednisolone 2 mg /kg	Prednisolone 2 mg /kg

*Adrenaline: Where inhaled beta2 agonists are not available, or where nebulization is difficult, or if the child is not cooperative, subcutaneous adrenaline (0.01ml/kg) 1:1000 may be used (maximum of 0.3ml per dose), and repeated every 20 minutes to a maximum of 3 doses.

** Early steroids - for children unable to take orally give IV/IM hydrocortisone (4mg/kg/dose 6 hourly) and change to oral prednisolone when child improves

What to do after the first hour of emergency asthma management

- I. Re-assess the child for improvement and re-classify severity.
- II. If improved and now mild symptoms or asymptomatic – send home on salbutamol MDI 2 puffs every 6 hours until asthma symptoms cease. If the child is having repeated attacks, then preventive therapy with inhaled steroids should be considered.
- III. If still moderate to severe asthma symptoms – ADMIT TO THE WARD, and manage as follows:
 - a. Investigate as appropriate
 - b. Continue oxygen to maintain SaO₂ above 94%
 - c. Give inhaled salbutamol (MDI 2-4 puffs every hour, or nebulise hourly) until moderate – severe symptoms subside and then reduce frequency to 2 puffs 6 hourly.
 - d. Continue steroids daily for 3 to 5 days.
 - e. Give additional medication as indicated (pneumonia - give antibiotics, allergic rhinitis - give topical nasal steroid drops eg betamethasone Nasal drops)

When to discharge the child

Once moderate to severe symptoms improve, do the following:

- Reduce frequency of salbutamol MDI and spacer to 2 puffs every 6 hours.
- Train parent as follows: Correct use of MDI and spacer devices; educate on triggers and prevention of asthma exacerbation; educate how to recognise worsening asthma symptoms at home; educate on need for long term asthma controller MDI treatment.
- Start the child on low dose steroid budesonide MDI 100mcg bd (< 5yr) or 200 mcg bd (>5yr)

Once the child has mild or no symptoms for 24 hours discharge on salbutamol MDI 2 puffs every 6 hours until asthma symptoms cease, oral prednisone to complete 3 to 5 days, and budesonide MDI long-term. Continue adjunct treatment such as antibiotics where relevant

Give an appointment for follow-up review after 2 days and thereafter plan for regular follow up based on the severity and frequency of the symptoms.

Scenario 3.1.2

You are asked to see Saida a 3 years old girl in the out-patient department. She is said to have wheezing and difficulty breathing. As you approach Saida and her mother, you observe that she is weak-looking, too breathless to drink or talk with audible wheeze.

1. Determine the degree of severity of asthma in Saida
2. Describe in details how you will manage Saida in the first 1 hour
3. Make a treatment plan for her admission care for the first 24 hours
4. What criteria will you use to discharge Saida from hospital
5. List down the key home messages to Saida's mother for management of asthma

Before we conclude it is important to remind you that your management of pneumonia or asthma does not end with only antibiotics or bronchodilators. Always remember to rule out other systemic illnesses as had been mentioned before.

When to suspect Tuberculosis (TB) in a child with cough or difficulty in breathing?

TB is suspected based on two or more typical symptoms:

- Persistent cough of more than 2 weeks
- Persistent fever for more than 2 weeks
- Poor weight gain,
- Unexplained lethargy for more than 2 weeks
- Pneumonia that is not responding to antibiotic treatments

ALGORITHM FOR TB DIAGNOSIS IN CHILDREN

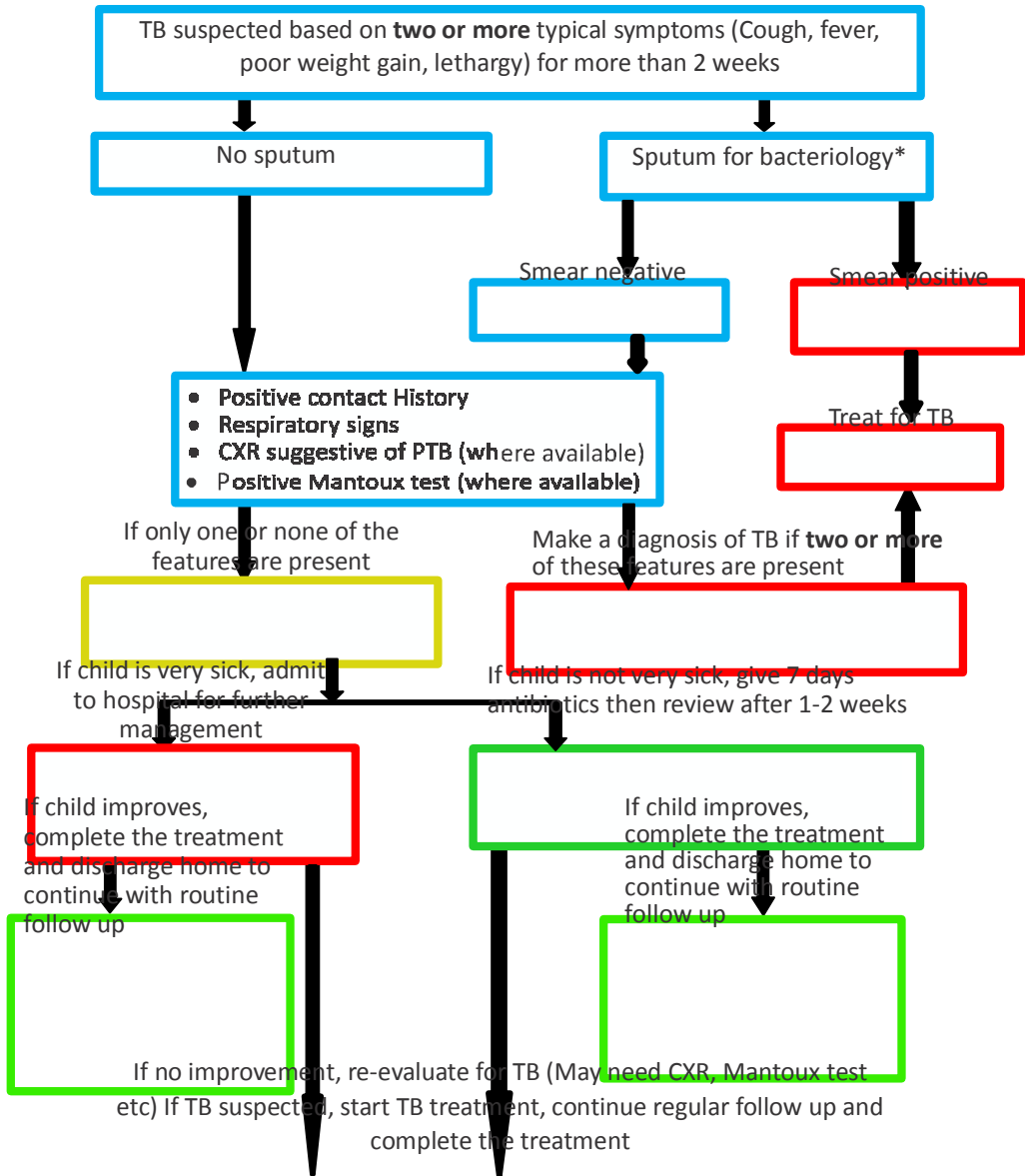


Figure 3.1.5 Algorithm for TB Diagnosis in Children.

TREATMENT FOR PAEDIATRIC TB

Table 3.1.2: Revised Treatment Regimen for TB in Children (adapted from WHO)


TB disease category	Recommended regimen	
	Intensive phase	Continuation phase
<i>All forms of TB except TB meningitis, bone and joint TB (osteoarticular TB)</i>	2* RHZE	4 RH
TB meningitis Bone and joint TB	2 RHZE	10 RH
**Retreatment	3 RHZE	5 RHE
<i>Drug resistant TB</i>	Refer to a DRTB specialist	
<i>Role of Steroids</i>	Give prednisolone for TB meningitis, PTB with respiratory distress or airway obstruction, severe military TB or pericardial effusion (2mg/kg daily)	

H= Isoniazid R= Rifampicin Z= Pyrazinamide E= Ethambutol

*Numeral refers to number of months of the regimen e.g. 2 HRZE refers to two months of Isoniazid, Rifampicin, Pyrazinamide and Ethambutol

** For children on retreatment, assess for clinical improvement after one month of treatment Ethambutol is safe and can be used in children in doses not exceeding 20mg/kg/day

Let us now summarise this unit.

	<p>3.1.8 Summary</p> <p>In this unit we have:</p> <ol style="list-style-type: none"> i. Patient with cough or difficulty in breathing need careful assessment to help identify the diagnosis. ii. Pneumonia and asthma should be identified and treated appropriately early. iii. Tuberculosis should be considered in patients with persistent cough or persistent fever and investigated for correct management"
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3.1.9 Review questions

1. Name the 2 causes of respiratory distress from lung or airway disease, and 2 causes from systemic disease.
2. What are the essential signs you would look for to determine very severe pneumonia/asthma?
3. What infections would you investigate for if treatment of pneumonia fails?

**3.1.10 References**

1. WHO guidelines 2010; maternal, newborn, child and adolescent health; http://www.who.int/maternal_child_adolescent/en/
2. Kenyan Clinical Guidelines, 2013; <http://www.idoc-africa.org>
3. World Health Organization; 2013; Hospital Care for Children; Guidelines for management of common illnesses with limited resources
4. Ministry of Health-Kenya; 2016; Basic Paediatric Protocols.
5. Global strategy for the diagnosis and management of asthma in children 5 years and younger (Global Initiative for Asthma) GINA guidelines <http://www.ginasthma.org>
6. The Kenya Association of the Prevention of Tuberculosis and Lung Diseases (KAPTLD guidelines) <http://www.kaptld.or.ke/>
5. WHO recommendations on the management of diarrhoea and pneumonia
http://www.unicef.org/aids/files/hiv_diarrhoea_and_pneumonia.pdf

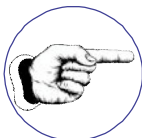
MODULE 3: UNIT 2: ACUTE DIARRHOEA AND DEHYDRATION

Unit Outline

- 3.2.1 Introduction
- 3.2.2 Unit Objectives
- 3.2.3 Definition of acute diarrhoea and dehydration
- 3.2.4 Classifying the levels of dehydration
- 3.2.5 Choice of Fluids in Rehydration Therapy
- 3.2.6 Treatment of the different levels of Dehydration
- 3.2.7 Use of Zinc in Diarrhoea
- 3.2.8 Treatment of Dysentery
- 3.2.9 Summary of Unit 3.2.
- 3.2.10 References and Further reading
- 3.2.11 Review Questions

3.2.1 Unit Introduction

Welcome to Unit 3.2. This unit will focus on the treatment of acute diarrhoea and dehydration. We will start with a brief introduction on acute diarrhoea and dehydration, and then proceed to classification and treatment of the different levels of dehydration. We will also consider the use of zinc in diarrhoea. Finally we will go through the treatment of dysentery.



Take Note 3.1

The classification and treatment of dehydration described here refers to the approach to the non-malnourished child. For information pertaining to dehydration in the malnourished child, see Module 6.

I hope you find this unit enjoyable and informative.




3.2.2 Unit Objectives

By the end of this unit, you will be able to:

- i. Define Acute Diarrhoea and Dehydration
- ii. Classify Dehydration
- iii. Describe the rationale behind the choice of fluids for different levels of dehydration
- iv. Describe fluid therapy in the management of different levels of dehydration
- v. Describe other supportive aspects in the treatment of diarrhoea
- vi. Describe the diagnosis and treatment of Dysentery

3.2.3 Definition of acute diarrhoea and dehydration

Before we proceed, take some time to perform activity 3.1

	<p>Activity 3.1</p> <p>Write down your current understanding of the terms:</p> <ul style="list-style-type: none"> • Diarrhoea • Dehydration
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Well done!

Read through and compare your answers to the following information

Acute diarrhoea is defined as having 3 or more loose (liquid or semisolid) stools per day. It may either be acute watery diarrhoea or acute bloody diarrhoea. This is often accompanied by fever and vomiting. Acute diarrhoeal illnesses are a major contributor to under-five morbidity and mortality worldwide. Majority of diarrhoeal deaths occur in developing countries especially countries in Sub-Saharan Africa

One of the most important factors that affect mortality in children with acute diarrhoea is the degree of dehydration they develop.

Dehydration refers to the resultant loss of fluid from the child's body arising from loose motions, vomiting, sweating, urine and fast breathing during the illness. Children with more severe levels of dehydration are at increased risk of mortality. These risks also increase the longer the fluid deficit remains uncorrected. Prompt rehydration therapy is therefore one of the most important aspects of treatment if death due to diarrhoea is to be avoided.

3.2.4 Classification of the level of dehydration

Rehydration therapy is guided by the severity of the level of dehydration. In order to reliably treat dehydration then we need to classify the level of dehydration the child presents with. The level of dehydration can be determined by loss in body weight obtained from deducting the presenting weight from that recorded at previous visits. More commonly however, we rely on clinical signs to estimate the level of dehydration.

For the purposes of rehydration therapy, the MOH and World Health Organization classify Dehydration into 4 classes:


- Severely impaired circulation from diarrhoea/dehydration (hypovolaemic shock)
- Severe dehydration

- ÿ Some dehydration
- ÿ No dehydration

Let us consider these definitions in turn.

3.2.4.1 Severely impaired circulation from diarrhoea/dehydration (hypovolaemic shock):

Before you read the text, take some time to perform activity 3.2.

	<p>Activity 3.2</p> <p>List three signs that could be used to identify the child with severely impaired circulation from diarrhoea/dehydration (hypovolaemic shock).</p>
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Good! Now, let us read on to get more information about the diagnosis of shock.

Severely impaired circulation from diarrhoea/dehydration (hypovolaemic shock) is the most severe form of dehydration recognized by the World Health Organization (WHO). It is often a pre-terminal effect (last event before the child goes into cardiopulmonary collapse). It is therefore, very important to accurately diagnose this hypovolaemic shock and provide effective treatment.

Signs of severely impaired circulation from diarrhoea/dehydration (hypovolaemic shock) occur when severe circulatory compromise results in a reduced consciousness level and the development of impaired peripheral circulation.

The child with severely impaired circulation from diarrhoea/dehydration (hypovolaemic shock) will have cold hands plus a weak/ absent pulse and a capillary refill more than 3 seconds and reduced level of consciousness - less than Alert on the AVPU Scale

In addition, the child will have a history of diarrhoea and the two essential signs of severe dehydration: sunken eyes and slow skin pinch.

This is illustrated in Figure 3.2.1.

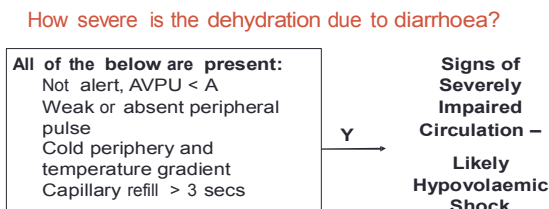



Figure 3.2.1 Diagnosing Severely impaired circulation or Shock

3.2.4.2 Severe Dehydration:

If the child does not fulfil the criteria for severely impaired circulation from diarrhoea/dehydration (hypovolaemic shock); ask yourself, does the child have features of severe dehydration?

Before proceeding, take some time to attempt Activity 3.3.

	<p>Activity 3.3 List three signs that could be used to identify the child with severe dehydration</p>
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Good!

Now let us see how these signs are used to make a diagnosis of severe dehydration

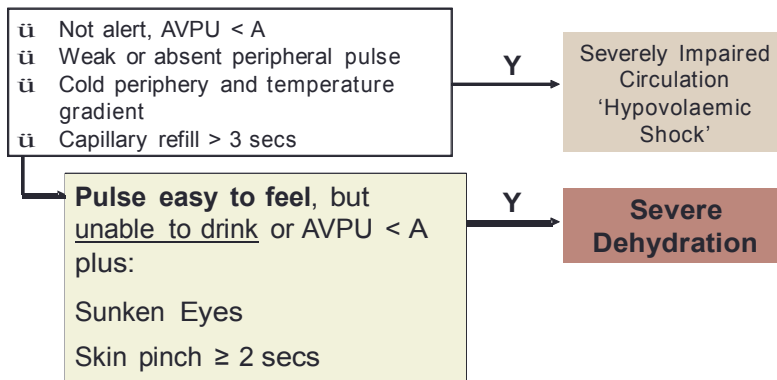


Figure 3.2.2: Diagnosing Severe Dehydration

The most reliable signs of severe dehydration are *sunken eyes* and a *very slow return after skin pinch (more than 2 seconds)*. If these two signs are present and the pulse is easy to feel (even if it is very fast) and the *child cannot drink* (which means they are not likely to be alert) then the child has severe dehydration and intravenous (IV) fluids are indicated



Figure 3.2.3: An Infant with Sunken Eyes



Figure 3.2.4: Delayed Skin Turgor

3.2.4.3: Some dehydration

Now, let us turn our attention to the diagnosis of some dehydration.

The same signs used to establish a diagnosis of severe dehydration are considered in establishing the diagnosis of some dehydration.

A key difference between the two however, is that the child with some dehydration *can drink*. In addition, the child may present with *restlessness* or *irritability*.

Therefore, to make the diagnosis of some dehydration, the child must be able to drink but have at least 2 of the following 3 signs:

- Sunken eyes
- Skin Pinch that returns within 1 - 2 seconds
- Restlessness or Irritability

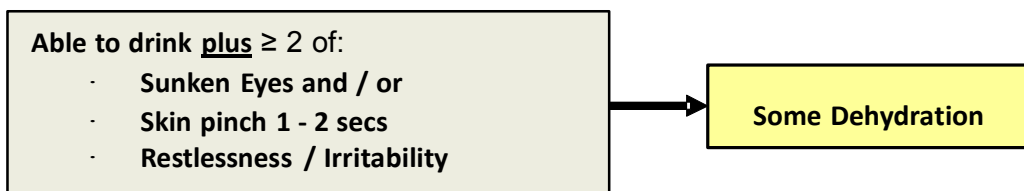


Figure 3.2.5: Diagnosing Some Dehydration



Take Note 3.2

The ability to drink is an important sign to distinguish severe dehydration from some dehydration. The health care worker should attempt to establish the child's ability to drink by observing and either asking the mother to breastfeed or offering the child a drink (ORS or Milk).

3.2.4.4. No dehydration:

If a child does not meet any of the dehydration classifications above then they have no significant dehydration even if they have lots of diarrhoea. Treatment should be offered to the child to prevent them from developing dehydration.

Having reviewed how to diagnose different levels of dehydration in children with diarrhoea; undertake activity 3.4.



Activity 3.4

You are asked to see Peter, a 6 month old infant presented to the outpatient department, who is reported to have severe diarrhoea and vomiting. The child is weak but he is able to fix his gaze and look around him. There is no stridor or noisy breathing. He is breathing adequately. On inspection there is no visible severe wasting, and he has sunken eyes. He has warm hands which appear to be the same colour as his mother's. You press on the pulp of the finger and the colour returns after 2 seconds. You pinch the skin on his abdomen and it takes 2 seconds for it to return to its normal position. The child is able to breastfeed.

What is Peter's level of dehydration?

Well Done! Peter has some dehydration

3.2.5 Choice of fluid therapy in dehydration:

Having completed the classification of dehydration we will proceed to discuss how to make rational decisions when choosing fluid therapy for children with diarrhoea. There are several fluids that are available for rehydration and we need to understand the science of dehydration to be able to choose the appropriate fluid for rehydration

3.2.5.1. Fluid choice for Shock and Severe Hydration:

Now, read through the following information regarding the choice of fluids for intravenous rehydration in shock and severe dehydration.

In dehydration secondary to acute diarrhoea, we need to replace fluid that is similar to the body fluid.

Look carefully at the following illustrations of the pathophysiology of fluid therapy in dehydration. They indicate what happens when hypotonic IV fluid is given versus when isotonic IV fluids are given in severe forms of dehydration.

Pathophysiological State during Dehydration:

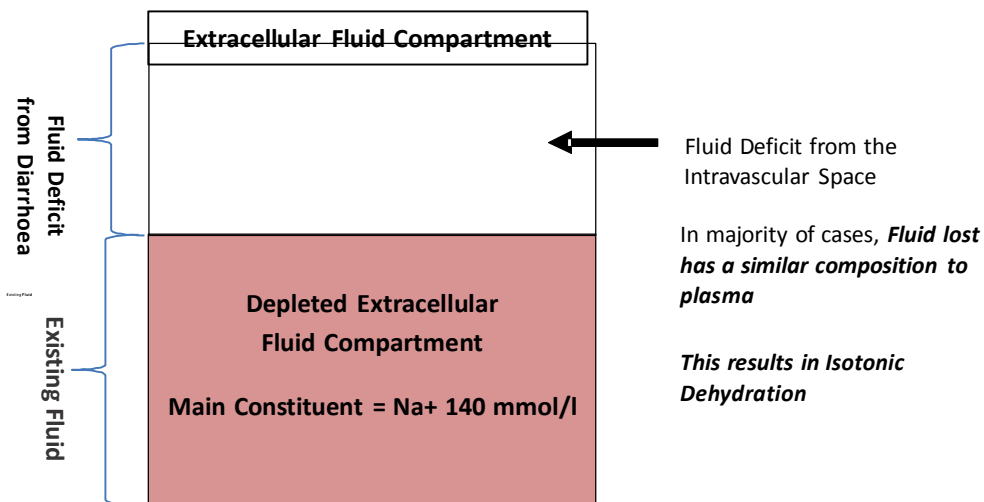
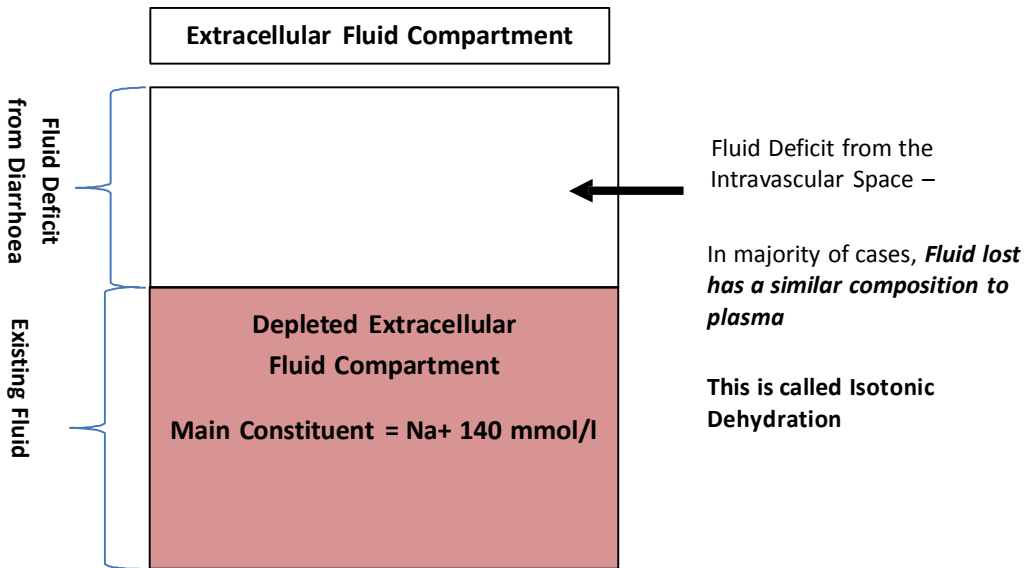


Figure 3.2.6: Hypotonic Rehydration Fluid Choice and its Physiological Implications

Pathophysiological State during Dehydration:



Replacement with Isotonic IV Fluids

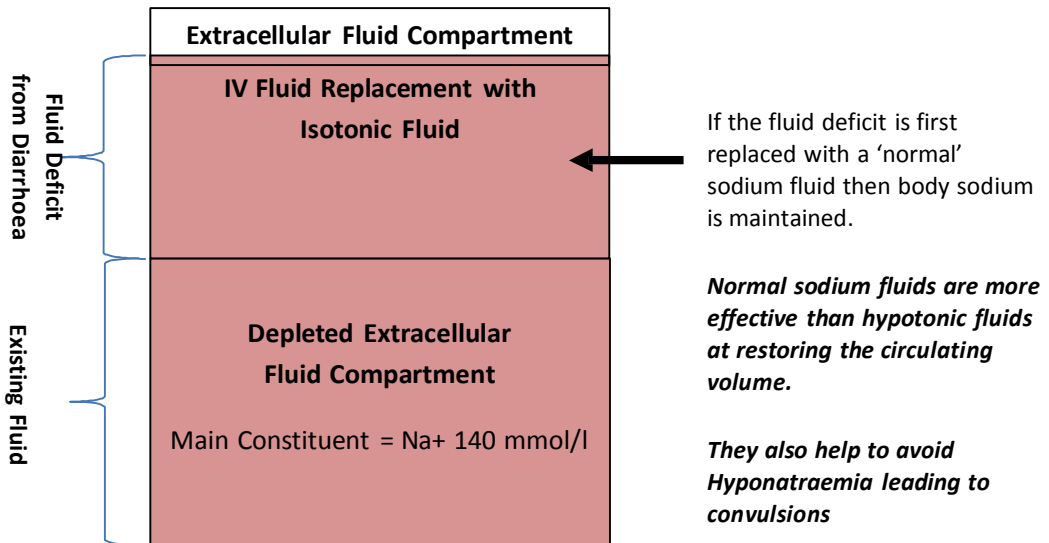


Figure 3.2.7: Isotonic Rehydration Fluid Choice and its Physiological Advantages

Low sodium concentration fluids **should not** be used to correct shock or severe dehydration as they cause sodium concentration levels to fall and do not last long in circulation hence, the appropriate fluids to use for Intravenous Rehydration in Shock and Severe Dehydration is Ringer's Lactate. Normal saline is only used where the Ringer's lactate is not available.

Let us now turn our attention to fluids choices for Some Dehydration.

3.2.5.2 Fluid Choices for Some and No Dehydration.

In contrast to fluid therapy in shock and severe dehydration, fluid therapy for some and no dehydration comprises the use of low osmolarity oral rehydration salts (ORS). These salts are carefully formulated so that they contain – after adding the clean water – sodium, potassium, lactate (as citrate) and glucose in amounts that are easily absorbed and that allow the body to rapidly correct the fluid deficit and any abnormalities in sodium and potassium.

Recent reviews of evidence have demonstrated that ORS is just as effective as IV fluid resuscitation in some dehydration and probably safer even when there is vomiting. In addition, it has also been demonstrated that the use of low osmolarity ORS is associated with less complications such as convulsions and over hydration, than the use of IV Fluids.

Now, let us consider how we use the fluids chosen to correct the different levels of dehydration.

3.2.6 Treatment of different levels of dehydration:

First, note carefully the treatment of shock from diarrhoea.

3.2.6.1. Treatment of severely impaired circulation from diarrhoea/dehydration (hypovolaemic shock):

This condition is life threatening; it requires immediate treatment. The intravascular fluid compartment must be rapidly restored if the mortality is to be averted. Treatment therefore involves:

- ÿ Rapid assessment to determine the responsiveness of the child. Confirm the safety of the environment for the health worker and the child. Always call for help.
- ÿ Rapid assessment and management of the child's airway and breathing; often these children will need oxygen.
- ÿ Establishment of the diagnosis of diarrhoea related hypovolaemic shock; as discussed in section 3.2.3.

- Rapid placement of intraosseous access or intravenous access. *As intraosseous access is much quicker to establish than searching for an iv line this is often preferred and will be discussed and demonstrated during the practical sessions ref fig 3.2.8*



Figure 3.2.8: Position of Placement of an Intraosseous Access needle at the Anteromedial surface of the Tibia 2 cm below the Tibial Tuberosity

Once IO access has been secured, then fluid administration should be started at once.

- Administration of a fluid Bolus (Ringers Lactate) of 20 mls/kg over 15 minutes.
- Rapid assessment of the child's disability (level of consciousness) once the fluid has been started and administration of 10% dextrose (below A on the AVPU scale).
- After the first bolus there should be a full reassessment (ABCD). During reassessment, it should be determined whether there are still signs of severely impaired circulation from diarrhoea/dehydration (hypovolaemic shock); if present the fluid bolus may be repeated. After this second bolus, or after the first if the circulation has improved, proceed to give Step 2 of the Plan C fluid management approach – this is described in the MOH protocols and in the WHO Pocketbook and comprises: 70 ml/kg of fluid over 5 hours if the child is less than one 1 year; and over 2 ½ hours if the child is older than 1 year.

The following algorithm summarizes this treatment.

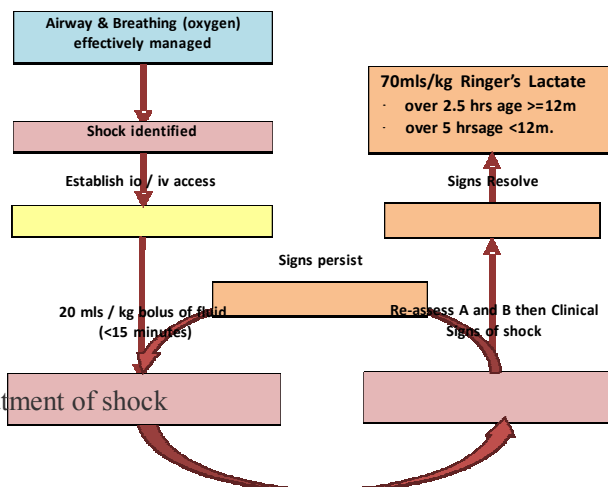


Figure 3.2.9: Treatment of shock

3.2.6.2. Treatment of Severe Dehydration:

Good progress! Now consider the treatment of Severe Dehydration.

The treatment of Severe Dehydration requires use of IV Fluids, preferably Ringer's Lactate. If Ringer's Lactate is not available, Normal Saline could be used. Fluid therapy is administered quickly to prevent the child from progressing to shock and cardiopulmonary collapse.

IV Access (peripheral vein) should be obtained as fast as possible because the child cannot drink.

Treatment is administered according to the PLAN C Rehydration plan; in 2 phases – Step I and Step II. Both phases aim to deliver 100 mls/kg of IV fluid over the total rehydration period. This should be initiated during the initial ABCD assessment of the sick child.

Step 1 of Plan C involves administration of 30 mls/kg of IV Ringer's Lactate over 1 hour if the child is less than 1 year and over 30 minutes if the child is one year or more.

Step 2 consists of an infusion of 70mls/kg of Ringer's Lactate over 5 hours if the child is less than one year; and over 2 ½ hours if the child is one year of older.

This treatment is summarized in Table 3.1.1:

Table 3.1.1: Treatment summary: Management of severe dehydration

RINGERS LACTATE (RL) or normal saline if RL unavailable	AGE < 12 MONTHS	AGE ≥ 12 MONTHS TO 5 YEARS
Step 1	30 mls / kg over 1 hour	30 mls / kg over 30 minutes
Step 2	70 mls / kg over 5 hours	70 mls / kg over 2.5 hours
Then re-assess child – if still has signs of severe dehydration repeat step. If signs improving treat for some or even no dehydration		

In the event IV Access cannot be obtained, ORS can be used via a naso-gastric tube if necessary. ORS can be administered at 100 mls/kg over duration of 6 hours.

During IV or NG rehydration of a child with severe dehydration, the child should be reassessed after the first hour of rehydration and then after 3 – 6 hours to re-classify the level of dehydration. If there are still signs of severe dehydration repeat Plan C of rehydration. If the signs have improved, the child can be treated for some dehydration using ORS.

ORS should be started as soon as the child is able to take fluid orally.

Having gone through the treatment of Severe Dehydration let us now focus on the management of Some Dehydration.

3.2.6.3. Treatment of Some Dehydration:

Before proceeding, however, take some time to answer Question 3.1.



Question 3.1

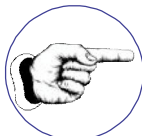
What are two benefits of using ORS in the therapy of some dehydration?

Good!

ORS has the advantage of being safe and just as effective. Now let us consider the approach to the management of the child with some dehydration.

- ÿ In some dehydration, therapy consists of administering ORS at 75mls/kg over 4 hours. This is referred to as PLAN B rehydration therapy
- ÿ After the first 4 hours of therapy the child should be reassessed. Do they still have some dehydration? If they do the 75mls/kg of ORS over 4 hours should be repeated. If the situation has improved they can be advised to give 10mls/kg of ORS with every loose stool and offer the child as much fluid as they wish to take.
- ÿ To make administration of ORS simple and effective, the following approaches may be useful
- ÿ The amount of fluid the child needs should be clarified for the child's mother or primary caregiver using readily available utensils or containers whose volume is already known. For instance, the use of soda bottles could help the mother know how to give 300 mls or 500 mls depending on the bottle used.
- ÿ The caregiver should be reminded that the ORS should be given slowly; small frequent sips are ideal.
- ÿ Breast feeding and other forms of feeding can and should continue

- Mothers should be counselled on how to constitute the ORS and administer it for continued therapy at home.
- The presence of puffy eyes warrants reassessment and review of treatment

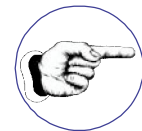
	<p>Take Note 3.3</p> <p>Vomiting is not a contraindication to the use of ORS</p> <ul style="list-style-type: none"> • If the child vomits during administration of ORS, wait 10 minutes; then, resume giving ORS solution more slowly.
---	--

3.2.6.4. Treatment of No dehydration:

The aim of treatment in children with diarrhoea but no dehydration is to give them extra fluid to prevent them from developing dehydration due to on-going losses. Administration of ORS is balanced with the administration of nutritious feeds.

To prevent dehydration, ORS is administered at a volume of 10mls/kg with each loose stool. If the child vomits, as with therapy in some dehydration, the caregiver should be urged to wait 10 minutes and to administer the ORS slowly thereafter.


Feeding should continue throughout the illness; and the mother should also be advised to give additional fluids.

	<p>Take note 3.2</p> <p>Always reassess and reclassify the degree of dehydration after each step of treatment</p>
---	--

Having gone through the management of dehydration we will now discuss the use of Zinc Sulphate in diarrhoea.

3.2.7 Use of zinc in diarrhoea

First, answer the following question.

	<p>Question 3.1</p> <p>What do you know to be the benefits of using Zinc Sulphate for diarrhoea?</p>
---	---

Good!

In clinical studies carried out in different parts of the world; the use of Zinc Sulphate over treatment duration of 10 – 14 days has been shown to reduce the length and severity of the diarrhoeal illness. This effect was demonstrated in both acute and persistent diarrhoea (diarrhoea lasting more than 14 days).

In addition, it reduces the risk of treatment failure and death in children with persistent diarrhoea. Zinc Sulphate treatment also helps to prevent future diarrhoeal episodes.

These effects result from correction of zinc deficiency in affected children which is widespread and often made worse by diarrhoea.

In view of this, Zinc Sulphate should be given to ALL children with any form of diarrhoea over a period of 10 – 14 days. The doses are as follows:

- In children less than 6 months; 10 mg of Zinc Sulphate once daily for 10 days.
- In children equal to or more than 6 months; 20 mg of Zinc Sulphate once daily for 10 days.

3.2.8 Treatment of dysentery

Having reviewed the use of zinc in diarrhoea, let us complete this module by considering the treatment of dysentery. First, take some time to answer Question 3.4



Activity 3.4

State the most common aetiological agent that causes dysentery?
List the other common causes of bloody diarrhoea in children

Did you identify *Shigella* species as the most common cause of Dysentery? Well done! Now read the information below.

Dysentery or Bloody Diarrhoea is defined by the presence of loose frequent motions with visible blood in the stools. The single most common aetiological agent causing dysentery is *Shigella* species. Other causes include:

- Enteroinvasive *E. coli*
- *Campylobacter* species
- Non typhoidal *Salmonella*
- The invasive form of *Entamoeba Histolytica*.
- Non infective causes including intususception


The treatment of dysentery, as with acute watery diarrhoea, involves rehydration therapy for dehydration; use of zinc as well as the use of antibiotics.

Children with dysentery should be treated with **Ciprofloxacin** at a dose of **15 mg/kg twice daily (total 30mg/kg/day) for 3 days.**

Ceftriaxone may be given as **second line therapy** in severely ill children at a dose of **50mg/kg 12hrly daily for 3 days.**

Where antibiotic sensitivity is known, antibiotics should be selected according to the local antibiotic sensitivities.

Congratulations! You have completed this unit. Now look at the following summary points

	<p>3.2.9 Summary</p>
	<ol style="list-style-type: none"> 1. A small number of signs are most useful in classifying the severity of dehydration. These should be carefully assessed in all children with diarrhoea. 2. Children with severely impaired circulation from diarrhoea/dehydration (hypovolaemic shock) and severe dehydration must be promptly treated using IV fluids with physiological sodium concentrations. 3. Children with some and no dehydration should be treated by gradually administering ORS 4. When treating children with dehydration: Classify the severity, treat by specifying fluid, volume and infusion duration then reassess 5. Zinc sulphate should be administered to ALL children with diarrhoea. 6. Children with dysentery should be either treated with Ciprofloxacin or Ceftriaxone in severe cases.

3.2.10 Review Questions:

Take some time now to go through the following review questions.

1. Regarding clinical signs used in diagnosis of dehydration
 - a. List which signs differentiate Severely impaired circulation from diarrhoea/dehydration (hypovolaemic shock) from Severe Dehydration
 - b. List which signs differentiate Severe Dehydration from Some Dehydration
2. Name 2 fluids that you can use to treat hypovolaemic shock initially.
3. What volume of IV fluids would you give a well-nourished 1 year old child with hypovolaemic shock?

4. What volume of ORS would you give a well-nourished 18 month old child weighing 12 kg? Over what duration?
5. What are some of the benefits of using Zinc Sulphate in diarrhoea?
6. What dose of Ciprofloxacin would you give a 2 ½ year old weighing 14 kg, presenting with a 2 day history of dysentery?



3.2.11 References

1. **World Health Organization (2013)**. Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. WHO.
2. **Ministry of Health-Kenya (2016)**. Basic Paediatric Protocols
3. **UNICEF/WHO (2009)**. Diarrhoea: Why children are still dying and what can be done. WHO.
4. **Kenya Clinical Guidelines, 2013**; <http://www.idoc-africa.org>

MODULE 4

The Child With Altered Consciousness

INTRODUCTION

Welcome to Module This module covers the following common conditions that may lead to altered consciousness in children: convulsions, hypoglycaemia, meningitis and severe malaria. If these conditions are not recognized and managed early, they can lead to death and other complications.

Module 4 will be covered in 4 units which are:-

Unit 4.1: Management of the child with hypoglycaemia

Unit 4.2: Management of the child with convulsions

Unit 4.3: Management of the child with meningitis

Unit 4.4: Management of the child with severe malaria



MODULE OBJECTIVES

By the end of this module you should be able to:-

- i. Discuss the management of a child with hypoglycemia
- ii. Describe the management of children with convulsions
- iii. Identify and manage a child with meningitis
- iv. Describe the identification and management of a child with severe malaria

UNIT 4.1: MANAGEMENT OF THE CHILD WITH HYPOGLYCEMIA

Unit Outline

- 4.1.1: Introduction
- 4.1.2: Unit Objectives
- 4.1.3: Definition of hypoglycaemia
- 4.1.4: Clinical signs of hypoglycaemia
- 4.1.5: Treatment of hypoglycaemia
- 4.1.6: Summary
- 4.1.7: Review questions
- 4.1.8: References

4.1.1 Introduction

Welcome to the first unit of this module. In this unit we will be able to define hypoglycaemia, look at the epidemiology and finally describe the management of hypoglycaemia.

**4.1.2 Unit Objectives**

By the end of this unit you should be able to:

- i. Define hypoglycaemia
- ii. Describe the clinical signs of hypoglycaemia
- iii. Describe the treatment of hypoglycaemia in children

4.1.3 Definition of Hypoglycaemia

Let us begin by defining the term hypoglycaemia.

**In-text Question 4.1.1**

In your own words, define the term hypoglycemia?

Good! Now compare your answer with the one included in the next paragraph. Hypoglycaemia is said to be present when blood sugar level is less than 2.5 mmol/l) in any child and less than 3 mmol/l in one with severe malnutrition.

The magnitude of hypoglycaemia in sick children

Now have a look at the frequency of hypoglycaemia in sick children by answering the questions in section 4.1.2.



In-text Question 4.1.2

How common is hypoglycaemia in the sick children admitted in your ward / hospital?
In which conditions or illnesses is hypoglycaemia commonly seen?

Good. Now compare your answers with the following information.

Amongst all children admitted to hospital, hypoglycaemia is found in approximately 8% or 1 in 12. Approximately 20% of sick infants aged < 7 days have hypoglycaemia. Disease-specific data similarly shows high prevalence (ranging from 6.6% to 30%) in children with severe malaria, anaemia, respiratory tract infections, diarrhoea and malnutrition.

As you can see, hypoglycaemia is a common phenomenon in sick children and should be actively looked for and managed. You will now focus on how to identify children with hypoglycaemia

4.1.4 Clinical signs associated with hypoglycaemia

In this section we will review the clinical features of hypoglycaemia. First take a moment to do the following activity.

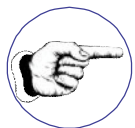


Activity 4.1.1

List some of the signs you would expect to find in a sick child with hypoglycaemia

Does your list include some or all of the following?

Some of the signs associated with hypoglycaemia are; Sweating, restlessness, irritability, poor feeding, convulsions and coma. However, none of these signs is entirely reliable. The best way to find if hypoglycaemia is present is to measure blood glucose. Well done.



Take Note 4.1.1

Blood glucose should be monitored in all severely ill new-borns and children.

Complications of hypoglycaemia

We will now proceed to look at the complications of hypoglycaemia in sick children. Test your knowledge by answering question 4.2.3.



In-text Question 4.1.3

What are the common complications of hypoglycaemia in children?

Now check if your list includes the ones given in the following information

Hypoglycaemia can lead to altered consciousness, convulsions and even death. It has been found to be associated with a five times increase risk of death in Mozambique and Kenya. Among patients with severe malaria, it is associated with a three-fold increased risk of death. It is also associated with increased risk of permanent brain injury.

You have done very well so proceed to the next section which covers management of hypoglycaemia.

4.1.5 Treatment of hypoglycaemia

Now we shall look at how to manage hypoglycaemia. First answer question 4.1.2



In-text Question 4.1.4

How are sick children with hypoglycaemia treated in at your clinic/ward/hospital?

Good. Compare your answer with what ought to be done.

In case you are not able to perform rapid blood glucose measurement it is recommended to give a bolus of intravenous glucose if a sick child has the following:

- Altered consciousness
- Inability to drink / breastfeed.

Sick children do NOT need to be given oral glucose powder. They should be fed.

In the neonatal period, babies who can breast feed do not require intravenous glucose treatment. Instead breastfeeding should be continued. Feeding should be encouraged and improved when blood glucose is low –and if necessary with a nasogastric tube. In case you test and find the blood sugar level less than 1.1 mmol/l then intravenous bolus of glucose is required.

Beyond the neonatal period treatment with intravenous dextrose should be given if the glucose level is below 2.5 mmol/l.

In children with severe malnutrition, correct hypoglycaemia if the blood glucose level is below 3 mmol/l.

Take a minute to study the summary provided in Table 4.1.1


Table 4.1.1 Management of hypoglycemia in Severe Malnutrition

Neonatal period	<i>if glucose <1.1mmol/L</i>	Treat with iv dextrose
	<i>if glucose 1.1 – 2.2 mmol/L</i>	Consider immediate nasogastric tube feed with expressed breast milk
Infants / children	<i>if glucose <2.2mmol/L</i>	Treat with iv dextrose
Severe Malnutrition	<i>if glucose <3.0mmol/L</i>	Treat with iv glucose if unconscious / shocked
		Treat with immediate feed if AVPU = V or A

Neonatal period if glucose <1.1mmol/L Treat with iv dextrose if glucose 1.1 – 2.5 mmol/L. Consider immediate nasogastric tube feed with expressed breast milk Infants / children if glucose <2.5mmol/L. Treat with iv dextrose

In Severe Malnutrition with glucose <3.0mmol/L, treat with iv glucose if unconscious / shocked. If the AVPU score is A or V then immediate feeding is the preferred choice. Concentration of Dextrose for Intravenous administration

There are various concentrations of dextrose available in hospitals for various purposes. Before reading further, answer question 4.1.5.




In-text Question 4.1.5

What is the concentration of dextrose you have been using to treat hypoglycaemia in children at your hospital?

Very Good! I believe your answer is close to the information in the following text.

10% dextrose solution is the concentration of dextrose that is considered safe and effective for emergency correction of hypoglycaemia in sick children. 10% dextrose is administered as 5 mls/kg given over 2 - 3 mins.




Take note: 4.1.1

Do not use 50% dextrose – it may cause brain injury, convulsions and death

In new-borns the use of 50% dextrose can increase the risk of brain damage due to asphyxia.

Preparation of 10% Dextrose solution

As indicated earlier, 10% dextrose is the solution of choice in treating hypoglycaemia.



In-text Question 4.1.6

What formulations of dextrose are available at your work place?

In case 10% dextrose is not readily available you can make it up yourself by using the following method.

Use 50% dextrose to make 10% dextrose by diluting the former with water for injection as shown in figure 4.1.1.

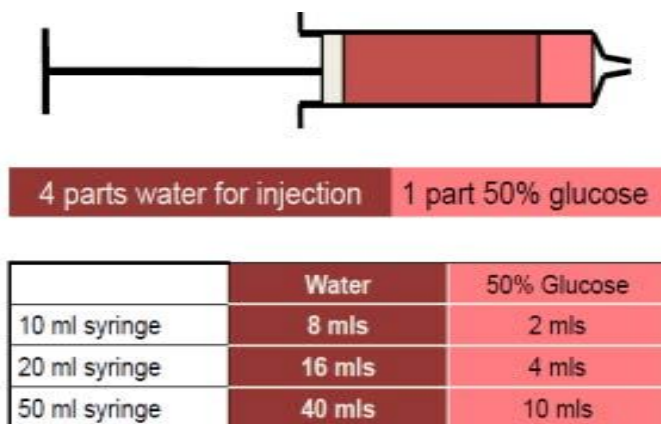



Figure 4.1.1: Making 10% dextrose using 50% dextrose and water for injection

Good! Using the knowledge you have now gained, do the following assignment



Assignment 4.1.1

Take time and visit the paediatric ward or clinic. Observe what dextrose solutions are available. Make some 10% dextrose using 50% dextrose

Maintenance therapy

Let us now look at the concept of maintenance therapy. First answer question 4.1.7.



In-text Question 4.1.7

After giving the bolus of glucose, what further action do you undertake to ensure the hypoglycaemia does not occur again?

Good. Maintenance glucose must be provided to prevent rebound hypoglycaemia. Look at the following information.

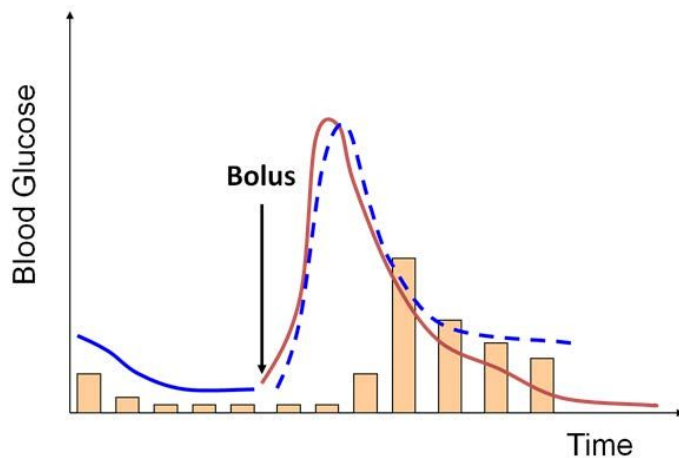


Figure 4.1.2: The response to a bolus of 10% dextrose


The blue dotted line represents what we hope will happen with the blood glucose level after the bolus


The pale orange bars represent what the insulin level is likely to be in response to a glucose bolus – note the lag time as insulin release is slow in response to a high glucose.

The dark red line represents what may happen after a bolus of glucose if the insulin level rises as predicted:

The glucose level falls again to very low levels because when only a bolus of glucose has been given and there is no continuous supply of glucose. Insulin levels increase in response to the bolus of glucose. The high insulin levels happen at a time when the glucose level has gone down if it is not sustained by a continuous supply of glucose.

This illustrates that giving only a bolus of glucose may result in problems at a later stage because of rebound hypoglycaemia.

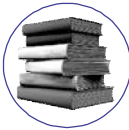
	<p>Take Note 4.1.2</p> <p>Following a bolus infusion of dextrose, a continuous supply of glucose must be provided through feeding or IV fluids containing dextrose.</p> <p>After a bolus of glucose you must plan to continue glucose supply by giving:</p> <ul style="list-style-type: none"> – IV fluids with dextrose – Nasogastric or oral feed
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	<p>4.1.6 Summary</p> <ul style="list-style-type: none"> ÿ Hypoglycaemia is common in very sick newborns and children ÿ The signs of hypoglycaemia are not completely reliable and blood sugar levels should be monitored in all sick children. ÿ Treat hypoglycaemia with a 5ml/kg intravenous bolus of 10% dextrose. ÿ To prevent rebound hypoglycaemia, bolus glucose treatment must be followed by maintenance therapy.
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4.1.7 Review questions

Take some time to go through the following review questions

1. Define the term hypoglycaemia
2. List some of the clinical signs of hypoglycaemia
3. Which children should be given intravenous glucose?
4. What is the preferred concentration of dextrose recommended for hypoglycaemia?
5. What are the complications of using 50% dextrose in children?
6. What is the volume of dextrose given when treating hypoglycaemia?
7. What are the options available of maintaining blood glucose at normal after a bolus of dextrose?

	<p>4.1.8 References and Further Reading</p> <ol style="list-style-type: none"> 1. Achoki R, Opiyo N, English M: Mini-review: Management of hypoglycaemia in children aged 0-59 months. <i>J Trop Pediatr</i> 2010, 56(4):227- 2. Ministry of Health-Kenya (2016). Basic Paediatric Protocols World Health Organization (2013). Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. WHO.
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UNIT 4.2 MANAGING CONVULSIONS IN CHILDREN

Unit Outline

- 4.2.1: Introduction
- 4.2.2: Objective
- 4.2.3: ABCD approach of managing a child with convulsions
- 4.2.4: A rational approach to the use of anticonvulsants in children
- 4.2.5: Properties of commonly available anticonvulsants
- 4.2.6: Summary
- 4.2.7: Review questions
- 4.2.8: References

4.2.1 Introduction

Convulsions in children are a common manifestation of illness which causes great distress to both care-givers and health workers.

This unit will help you enhance your knowledge and skills in managing convulsions in children older than one month.



4.2.2 Unit Objectives

By the end of this unit you will be able to:-

- i. Discuss the ABCD approach in the management of children with convulsions
- ii. Discuss the properties of commonly available anticonvulsant drugs – diazepam and phenobarbitone
- iii. Discuss a rational approach to the use of drugs in the management of convulsions in children

4.2.3 ABCD approach of managing a child with convulsions

In this section, you are going to apply the ABCD approach to managing a child with convulsions. Have you at one time or another encountered a convulsing child? If so, reflect back on one of these occasions. What went through your mind? How did you deal with the situation?

As you reflect, consider the following scenario.

Scenario 4.2.1

While working at the outpatient department, you are asked to see a little girl called Amina. She is 9 months old and is rushed to you because she is having a convulsion. You note that it is a generalised tonic clonic convulsion. Amina's mother tells you that she has had 2 other episodes, one at home, and one on the way to hospital. She has also had fever and refusal to feed for two days.

What should you do?

You should initiate and systematically continue with the ABCD approach tackling each aspect at a time.

A POINT OF CAUTION. It has been noted that many health workers rush to give anticonvulsants due to the anxiety caused by a convulsing child. Insufficient attention is paid to basic airway and respiratory support which may result in death and brain damage. The recommended management begins with the airway, the A.

A-AIRWAY

The airway is at risk in a convulsing child. You need to place the child on a flat surface and make sure they are in the recovery position to help maintain airway patency by preventing secretions that may cause obstruction

The recovery position is illustrated in figure 4.2.1

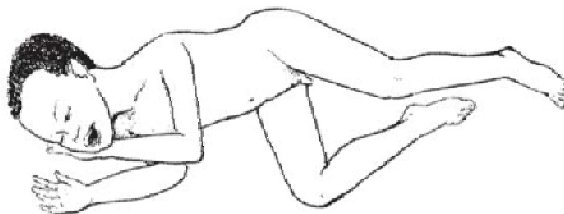


Figure 4.2.1: The recovery position: How to correctly position the convulsing child

DO NOT attempt to insert an oropharyngeal airway in a child with clenched teeth.

After the seizure (and treatment) the loss of muscle tone may result in obstruction of the airway by the tongue so you must remember to take care of the airway by correctly positioning and using suction to clear any secretions.

Now that you are satisfied with the airway patency and function, it is time to manage the breathing

B-BREATHING

It may be hard to assess the adequacy of breathing so provide the child with oxygen, especially if the convulsion is lasting more than five minutes.

Breathing having been sorted you now move to the management of circulation.

C-CIRCULATION

If the child is convulsing, you can safely assume then that a heart rate must be present. Checking pulses during an on-going convulsion may not be easy. Rapidly check for coldness of the extremities and capillary refilling.

Address any emergency signs of impaired circulation before proceeding with further management.

Finally, manage disability.

D-DISABILITY

You will recall from your previous session in module one unit two, that assessing disability requires you to go score the child's level of consciousness on the AVPU scale.



In-text question 4.2.1

What does each of the letters in A-V-P-U stand for?

Have you identified them as follows?

A is for **Alertness**

V is for response to **Voice**

P is for appropriate response to **Pain**

U is for **Unresponsive**

Well done!

A child is termed as having disability if he/she scores less than A on the AVPU scale.

In a child who is experiencing a convulsion, it may be difficult to assess the AVPU score.

**Take note: 4.2.1**

After a generalised convulsion, the child may go into post-ictal sleep and will seem un-arousable

You should seek to establish the cause of the convulsions, and the need for anticonvulsants. Hypoglycaemia, which we covered in unit one of this module, is among the commonest causes of convulsions so you need to be prepared to treat it using 5ml/kg of 10% dextrose.

Keep calm! Find out how long the convulsion has lasted. If it has persisted for more than 5 minutes then you should administer an anticonvulsant.

Good! This brings us to the end of the ABCD approach to managing convulsions. Let us now proceed to the next section which discusses the use of commonly available anticonvulsants, the doses and routes of administration.

4.2.4 Rational use of anticonvulsants in a convulsing child

Anticonvulsants are drugs used to stop and prevent seizures. Take time to now review their rational use in activity 4.2.1

**Activity 4.2.1.**

1. List some of the anticonvulsants you have seen used in children
2. What are some of their adverse effects?

Does your list include diazepam and phenobarbitone?

Well done then!

There are many anticonvulsants available, however diazepam and phenobarbitone are commonly available at all levels of our health facilities. They are effective if used correctly. Adequate care must be taken to avoid their adverse effects. Please remember that you may have to refer to higher health facility any child who continues convulsing despite receiving adequate doses of these initial drugs.

Now have a look at the rational approach to prescribing anticonvulsants. Answering question 4.2.2 will start you on this process.



In-text Question 4.2.2

Do you recall the scenario 4.2.1 of our 9 month old girl Amina, who having a generalized convulsion?

You quickly assessed her, put her in the recovery position, wiped off her secretions, and provided her oxygen using nasal prongs
However her seizure still persists!

What should you do now?

It is indeed correct to now address hypoglycaemia and anticonvulsant drugs.

If the convulsion lasts for 5 or more minutes, diazepam should be given. Many febrile convulsions are short and happen only once. The use of diazepam to prevent febrile convulsions is **not** recommended.

Now obtain IV access if you hadn't already, and administer 5ml/kg of 10% dextrose to correct possible hypoglycaemia.



In-text Question 4.2.3

What can you do next if even 5 minutes after giving diazepam the convulsion still continues?

Good! A second dose of diazepam should be administered.

Note that if the convulsion is still on going 5 minutes after giving 2 doses of diazepam then you will need to give a loading dose of 15 mg/kg of IM phenobarbitone.

Good. Let us now look at a summary of these steps in Figure 4.2.2

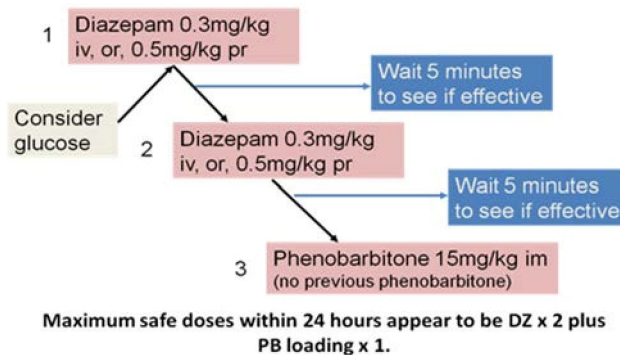


Figure 4.2.2: Rational approach to managing convulsions in children

4.2.5 Properties of commonly available anticonvulsant drugs – diazepam and phenobarbitone

Now let us review the properties of each of these drugs individually.

Diazepam

Diazepam is the first line anticonvulsant drug. It can be given by the intravenous (IV) or per rectal (PR) routes.

Let us briefly look at some basic pharmacokinetics of IV Diazepam. This is illustrated in Figure 4.2.3.

As you can see, the Y axis illustrates diazepam concentration, while the X axis represents time.

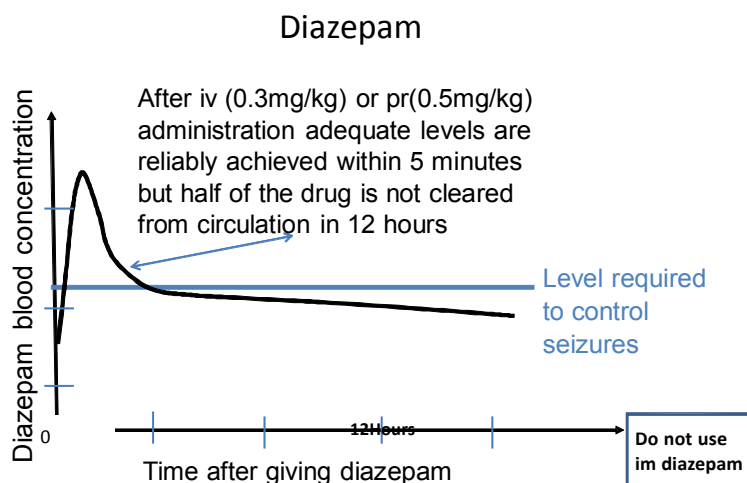


Figure 4.2.3 Diazepam pharmacokinetics after IV administration

To have its effect diazepam must reach a certain level in the blood (it then reaches an effective level in the brain where we want it to act). This level is indicated by the blue line.

To control a convulsion you want the blood level to rise rapidly to the level required for diazepam to work.

Pharmacokinetic studies in African children showed that a dose of 0.3 mg/kg achieves the correct levels rapidly and reliably.

Next we shall proceed to look at Diazepam given rectally.

After rectal administration the time to reach the right, effective blood level is a little longer than with the IV route. A dose of 0.5 mg/kg usually achieves the right levels within 5 minutes

Now let us look at Figure 4.2.4. This illustrates how to correctly administer rectal diazepam.

Giving rectal diazepam

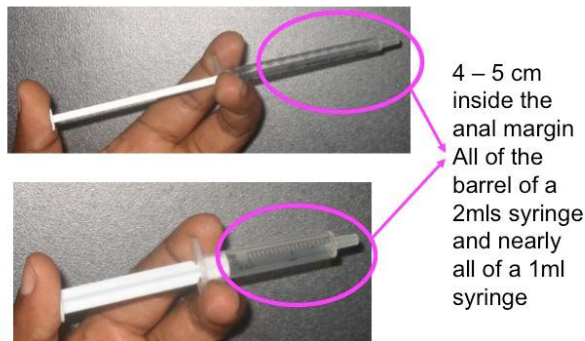


Figure 4.2.4 How to correctly give rectal diazepam

Let us take note that inserting the syringe less than this distance will encounter squamous epithelium of the anal margin, which would be as effective as pouring the drug on to the palm of your hand! There will be very little if any absorption.

Answer question 4.2.4 before we proceed to discuss the adverse effects of diazepam



In-text Question 4.2.4

What is the danger of administering diazepam intramuscularly (IM)?

Good effort!

After intramuscular (IM) administration the drug levels achieved are much more unpredictable and it takes much longer to reach an effective level. Thus its delayed onset of action may lead one to give a second and even a third dose to control an on-going convulsion. This can result in a very dangerous, very high level after 30-60 minutes which may cause respiratory arrest.

It should now be clear that Diazepam **should not** be given IM as it is unreliable when trying to stop a convulsion in a child. rectal and intravenous routes should be used

In text Question 4.2.5

What is the half-life of diazepam?

Thank you for your attempt! Diazepam has a long half-life of 10-20 hours which means that after you inject this drug, 10 hours later, half of it is still present in the body.

The half-life of Diazepam is even longer in neonates and therefore its use is contraindicated in this age group.

Diazepam is inactivated by the liver therefore if there is liver disease, the drug lasts even longer in the body and adverse effects are even more common.

We shall now look at the properties of phenobarbitone

Phenobarbitone

Phenobarbitone has a half-life of more than 2 days. There is therefore danger of accumulation like Diazepam. It is also eliminated by the liver. Phenobarbitone should be given by deep intramuscular (IM) injection.

Let us now look at pharmacokinetics of phenobarbitone

In Figure 4.2.8, Phenobarbitone levels in the blood are indicated on the Y axis, time after injection on the X axis on. The level required to control seizures is indicated by the blue line.

The black line illustrates that after an IM injection of 15 mg/kg, levels required to stop seizures are achieved within 10 minutes.

Note that administration of a loading dose is essential to rapidly achieve adequate levels of phenobarbitone to control seizures.

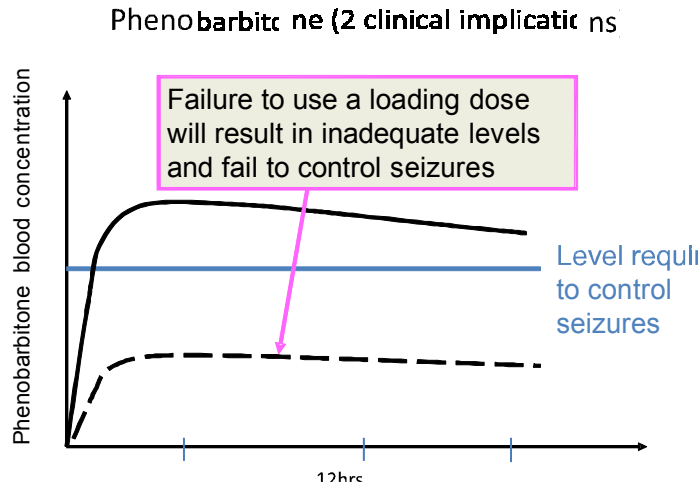


Figure 4.2.5: Phenobarbitone pharmacokinetics without a loading dose

Don't be apprehensive about giving 'large' doses of phenobarbitone to children because if we do not give the correct first dose then the level required to stop convulsions will not be achieved and it will be a waste of time.



Take note 4.2.3

The recommended loading dose of phenobarbitone (15 mg/kg) should be used to achieve a level that can stop convulsions.

Let us also note that the very long half-life means that once a large loading dose has been given and the correct levels in the blood have been achieved that it is only necessary to give small doses to keep the levels up.

Pharmacokinetics studies done in African children have shown that a dose of 2.5 mg/kg once a day is adequate to maintain effective levels. This dose may be increased if there are persistent seizures.

Good! You now know important properties of two commonly available anticonvulsants. Answer question 4.2.6



In text Question 4.2.6


What are the adverse events of using diazepam and phenobarbitone?

Well done!

Both diazepam and phenobarbitone are known to cause respiratory depression in some cases and more commonly if the dose is high.

Respiratory depression causes a rise in carbon dioxide in the blood – this causes dilation of blood vessels in the brain and raises intracranial pressure. In cases of meningitis, head injury, perhaps malaria and other diseases this effect may be enough to cause respiratory arrest. Respiratory depression also can worsen delivery of oxygen to the body. In overdose, phenobarbitone causes coma and hypotension.

We have come to the end of this unit. Please take note of the following key points

	<p>4.2.6 Summary</p> <ol style="list-style-type: none"> 1. The ABCD approach should be used when managing children with convulsions 2. Diazepam and phenobarbitone when used appropriately are safe and effective for controlling convulsions in children 2. Overdosing/use of wrong routes of administration can have deleterious effects. 3. Concerning administration of diazepam, the IV route is best, rectal is OK if IV access cannot be obtained but the IM route should NOT be used
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4.2.7 Review Questions

Now answer the review questions to test your understanding of the topic

1. What is the first step in managing convulsions in a child?
2. What dose of diazepam should be used when diazepam is given intravenously?
3. How many times can the dose of diazepam be repeated?
4. What is the loading dose of phenobarbitone and what is the route of administration?
5. What are some of the adverse effects of diazepam and phenobarbitone?

You can go back to the respective sections to answer the questions. Once satisfied, please proceed to Unit 4.3 dealing with hypoglycaemia in children



4.2.8 References

1. **Ogutu B. R et al.** Pharmacokinetics and clinical effect of diazepam in children with severe falciparum malaria and convulsions. *Br J ClinPharmacol* 2002;**53**: 49-57
2. **Kokwaro G et al.** Pharmacokinetics and clinical effect of phenobarbital in children with severe falciparum malaria and convulsions. *Br J ClinPharmacol* 2003;**56**: 453–457
3. **World Health Organization (2013).** Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources.

UNIT 4.3: MANAGEMENT OF THE CHILD WITH MENINGITIS

Unit Outline

- 4.3.1: Unit Objectives
- 4.3.2: Unit Introduction
- 4.3.2: Aetiology of acute bacterial meningitis in children
- 4.3.3: Clinical features of altered consciousness and differential diagnoses
- 4.3.4: Indications for lumbar puncture (LP) and interpretation of LP results
- 4.3.5: Antibiotics for acute bacterial management in children older than one month
- 4.3.6: Summary
- 4.3.7: Review questions
- 4.3.8: References

4.3.1 Unit Introduction

Acute bacterial meningitis is a serious condition associated with high mortality and debilitating long-term complications. In this section we will review the common causes of bacterial meningitis in children.



4.3.2 Objectives

By the end of this unit, you will be able to: -

- i. List the common causes of acute bacterial meningitis in children
- ii. Identify the clinical signs of acute bacterial meningitis
- iii. Identify which child needs a lumbar puncture and how to interpret the results
- iv. 4. Outline the antibiotic treatment for child older than one month with acute bacterial meningitis

4.3.3 Aetiology of acute bacterial meningitis in children

As we start this unit, take some time and complete question 4.3.1



In text Question 4.3.1

Which organisms commonly cause meningitis in children?

You are likely to have identified the ones described in the next paragraph;

Acute bacterial meningitis (ABM), before the introduction of the *Haemophilus influenzae* type B (HiB) and, more recently, pneumococcal vaccines was caused by *Streptococcus pneumoniae* and *Haemophilus influenzae* in >80% of cases in children older than 1 month of age. This aetiology may change with the widespread coverage of the new vaccines. In children less than one month of age, the range of pathogens is wider including gram negative bacteria. Common organisms in this age group are *Group B streptococcus*; *Escherichia coli* and *Klebsiella spp.* (Management of these will be covered in Module 5 Unit 3: Neonatal Sepsis)

Acute bacterial meningitis has a mortality of 25% and 25-30% survivors have sequelae. It is very important for you to be able to correctly recognise and manage meningitis.

4.3.4 Clinical signs of acute bacterial meningitis

The child seen in **Scenario 4.3.1** is suspected to have meningitis. Have a careful look at the picture to prepare you for the accompanying scenario.

Scenario 4.3.1

The child in this picture is a two-year-old girl who is said to have had a prolonged seizure before becoming unresponsive. She has been unwell for the past seven days with poor feeding and hotness of the body.




1. List down the signs and symptoms you can see in the child.

Well done! Now let us see if your list included the following signs and symptoms:

- Fisting
- Scissoring
- Neck retraction (opisthotonus)
- Deviation of the eyes
- Decorticate posturing

This child may have meningitis, but several other conditions may present this way. Now proceed to answer question 4.3.2 in this regard



In-text question 4.3.2

What are the differential diagnoses in a child presenting to you with altered consciousness?

Good! Compare your answers with the differential diagnoses shown in Figure 4.3.1.

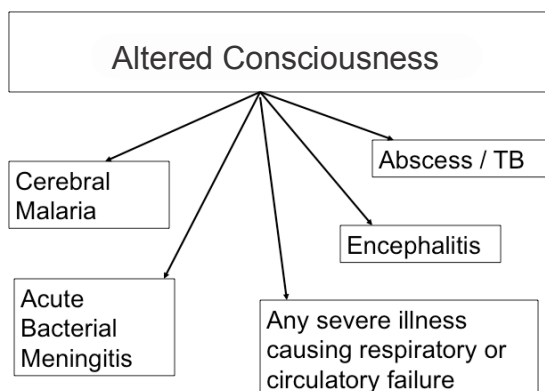


Figure 4.3.1 Differential diagnoses of altered consciousness

As you can see from Figure 4.3.1, there are many diverse conditions that may cause altered consciousness, within the central nervous system and without. Now let us consider the use of lumbar punctures (LP) in the diagnosis of such a child.

4.3.5 Indications for lumbar puncture (LP) and interpretation of LP results

Now learn how to correctly identify who needs a lumbar puncture. Begin by answering question 4.3.3

In-text question 4.3.3

Which clinical signs would make you consider a diagnosis of meningitis?

Good effort! Did your list include stiff neck, bulging fontanelle, arching of the back, convulsions and altered consciousness?. These signs would make one consider a diagnosis of meningitis, but this may also be cerebral malaria. It is difficult to clinically make a distinction between cerebral malaria and meningitis as illustrated in Figure 4.3.2.

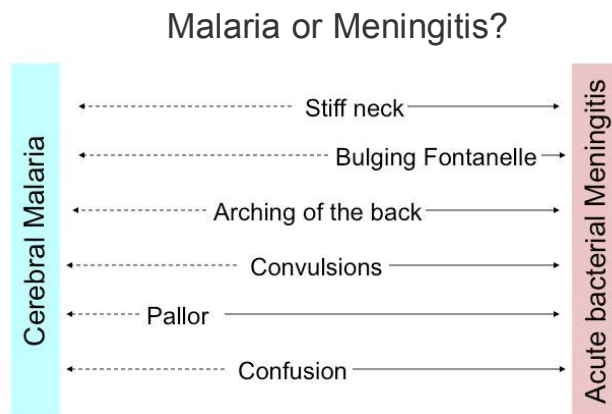


Figure 4.3.2: Signs of cerebral malaria vs acute bacterial meningitis


So although some of these signs are more suggestive of either cerebral malaria or meningitis, none are only found in one of the conditions and so none is specific.

What is the key to diagnosis? It is to take a good history, physical examination and investigations; in particular a lumbar picture and blood slide for malaria parasites to distinguish the two.

In doing so, we can avoid missing meningitis and its complications (death and handicap), and avoid inappropriate use of antibiotics:-

As a minimum, do a lumbar puncture for those with history of fever and one of the following:

- Bulging fontanelle
- Stiff neck
- Fits if age <6 months or > 6 yrs
- Partial or focal fits
- Reduced consciousness

	<p>Take note 4.3.1</p> <p>The contraindications to lumbar puncture include:</p> <ul style="list-style-type: none"> • Need for cardiopulmonary resuscitation • Pupils that respond poorly to light • Skin infection at LP site • Suspicion of intracranial mass <p>Bleeding disorders</p>
---	---

We will now review the bedside interpretation of a cerebrospinal fluid (CSF) sample.

Cerebrospinal fluid (CSF) Turbidity

Remember that CSF should be clear. So a simple test of CSF turbidity is to see if normal print can be read easily through the sample –

Let us look at figure 4.3.4. The figure on the left is clear; the one on the right is cloudy.

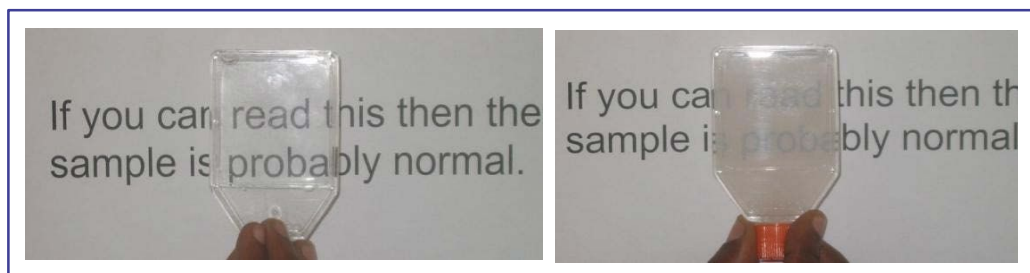



Figure 4.3.3 Inspection of CSF for cloudiness

Cloudiness usually appears at CSF white blood cell counts of $> 200 \times 10^6$ white blood cells per litre. It is widely felt that interpretation of CSF results requires good laboratory support. However there is good evidence to show that bedside examination of CSF samples for turbidity alone can detect up to three quarters of the cases of meningitis.

Once you have collected a sample of CSF and noted the appearance at the bedside, you should take the sample to the laboratory for analysis.

Now answer question 4.3.4

	<p>In text Question 4.3.4</p> <p>Which laboratory tests would you request to be done on a sample of CSF?</p>
---	---

Good! The laboratory will assess the CSF sample by performing a cell count, biochemistry to detect the glucose and protein levels and finally microscopy culture and sensitivity to detect the causative organism and most appropriate antibiotic treatment. Note that empiric treatment with first-line antibiotics (discussed later in this unit) should be administered as you await results from the laboratory.

Remember, your results are only as good as the specimen you provide.

CSF must be processed within one hour of collection. Note that CSF should not be put in a fridge. Only put CSF in an incubator if the ambient temperature is less than 15°C and it cannot be taken to the lab quickly.

Ideally specimens should be collected before treatment is initiated. However, take note that it takes 24-36 hours of antibiotic therapy for CSF samples to become sterile and it takes 2-3 days of therapy to change the white blood cell count of CSF in true bacterial meningitis.



Take note 4.3.2

Prior antibiotic treatment is no excuse for not doing a lumbar puncture!

Good! You now know how to make a clinical diagnosis of meningitis and the appropriate laboratory investigations to request for after collecting a sample of CSF.

In the next section we will look at the Ministry of Health recommendations on management of meningitis. Management of meningitis in the neonatal age group is covered in Module 5.

4.3.6 Management of acute bacterial meningitis in children older than one month

Before we discuss the management of meningitis in children, test your knowledge by answering question 4.3.5



In-text Question 4.3.5

Which antibiotics should be used for management of acute bacterial meningitis in children older than 1 month of age?

Good! The Ministry of Health recommends the following combination of antibiotics for the first line treatment of acute bacterial meningitis:

• Ceftriaxone 50mg /kg 12 hourly (first-line for confirmed acute bacterial meningitis) OR

• Benzylpenicillin 100,000 IU/kg 6 hourly PLUS Chloramphenical at 25 mg/kg 6 hourly

Take note that we double the standard dose of penicillin

Now apply the knowledge you have gained by performing the task at the end of scenario 4.3.2.

Scenario 4.3.2

- A 15 month old child presents with a 3 day history of fever, refusal to feed and increasing lethargy. The mother reports having noted slight twitching of the mouth.
- One of your differential diagnoses is acute bacterial meningitis.
- The blood slide is negative for malaria parasites. You do a lumbar puncture and find turbid CSF.
- Write down the antibiotics you would use to treat this child and the respective dose of each drug (He weighs 11 kg).

Good! This child should be treated with IV Ceftriaxone 550mg 12 hourly or in its absence, IV Benzypenicillin 1.1Mega Units six hourly plus IV Chloramphenicol 275 mg six hourly.

Hopefully you have enjoyed going through this unit and are now more comfortable with managing meningitis in children. Make note of the summary points below:



4.3.7 Summary

In this unit, we have seen that:-

Streptococcus pneumoniae and *Haemophyllus influenza* are important causes of bacterial meningitis in children.

2. We need to use (at least) the AVPU scale to assess consciousness
3. We cannot distinguish cerebral malaria and meningitis clinically.
4. A febrile child with altered consciousness and / or neurological signs must be assessed with both a malaria slide and lumbar puncture

To conclude this unit, answer the review questions below to test your understanding of the topic.

4.3.8 Review Questions

1. What does an AVPU = P imply?
2. What are the differential diagnoses to consider in a child with altered consciousness?
3. What are the indications and contraindications of doing an LP?
4. What is the first line management of a child with acute bacterial meningitis?



4.3.9 References

1. **Berkley J.A et al.** Indicators of Acute Bacterial Meningitis in Children at a Rural Kenyan District Hospital. *Paediatrics* 2004;**114**: 713-719
2. **World Health Organization (2013).** Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. WHO.
3. **Ministry of Health (2016):** Basic Paediatric Protocols

UNIT 4.4 MANAGEMENT OF THE CHILD WITH SEVERE MALARIA

Unit Outline

- 4.4.1 Unit Objectives
- 4.1.2 Unit Introduction
- 4.4.3 Definition of cerebral malaria
- 4.4.4 Other forms of severe malaria
- 4.4.5 Quinine for severe malaria
- 4.4.6 Summary
- 4.4.7 Review questions
- 4.4.8 References



4.4.1 Unit Objectives

By the end of this unit, you should be able to:

- i. Describe the management of cerebral malaria in children
- ii. Discuss the management of severe malaria in children

4.4.2 Unit Introduction

Malaria is still a leading cause of death in Sub-Saharan Africa, causing 500,000 deaths of individuals under five years of age annually. In endemic areas, children are repeatedly exposed to malaria from very early in life. Severe malaria is seen most frequently in children less than five years of age, after which age most individuals have clinical immunity to severe disease.¹ Let us review how to identify and manage severe forms of malaria

4.4.3: Definition of cerebral malaria

Cerebral malaria is one of the forms of severe malaria. Before proceeding further, answer question 4.4.1



In-text Question 4.4.1

What is the definition cerebral malaria?

Have a look at Figure 4.4.1. Illustrating the components of defining cerebral malaria.

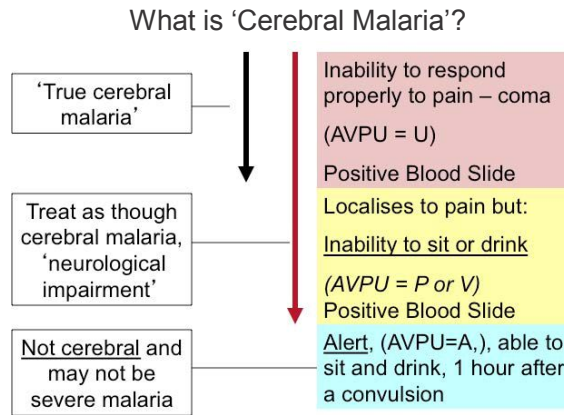



Figure 4.4.1: Diagnostic algorithm cerebral malaria

As you can see from Figure 4.4.1, a child in coma is regarded as one that cannot respond to his or her environment (in this case a painful stimulus). They are unconscious (AVPU=U). In a child with a positive malaria blood slide, this is what is regarded as true cerebral malaria.

However let us not forget that less severe forms of reduced consciousness (being unable to respond to a voice, being unable to sit up or unable to drink) are also associated with death from malaria. In practice we often consider all these children as having 'cerebral malaria' or severe malaria.¹

	<p>Take note 4.4.1</p> <p>Children, who are alert, can sit and drinks DO NOT have cerebral malaria!</p>
---	---

Good. Let us now have a look at the other forms of severe malaria

4.4.4: Other forms of severe malaria

In this section we will discuss the other forms of severe malaria. First perform the task at the end of scenario 4.4.1

Scenario 4.4.1 You are asked to see 9 month old boy who was triaged as an emergency because he was found to be very drowsy.

You assess his airway and position it. While assessing his breathing, you find him to be tachypnoeic with deep sighing respirations. In assessment of his circulation, you find he has severe palmar pallor and a fast, easily palpable peripheral pulse. You assess his AVPU and rank him at U.

You establish IV access and give him 10% dextrose. You do a lumbar puncture and his CSF is clear. His blood slide for malaria parasites comes back positive.

This patient has severe malaria.

List down all the forms of severe malaria in children.

Well done! Did your list include any of the following?

- Severe malaria with respiratory distress
- Severe anaemia
- Acute renal failure
- Pulmonary oedema
- Bleeding

We will now review these conditions a little more closely.

Severe Malaria with Respiratory Distress

Severe malaria with respiratory distress refers to evidence of deep, acidotic breathing (Kussmaul's breathing) and usually lower chest wall in-drawing. This reflects an underlying acidosis and is considered a form of severe disease in child with a positive slide for malaria parasites

Severe Anaemia

Good, the next form of severe malaria we will discuss is severe malaria with severe anaemia. First answer question 4.4.2.



In-text Question 4.4.2

How would you define severe anaemia?

Good! Severe anaemia is defined as a haemoglobin level less than 5g/dl or a haematocrit less than 15%. In the absence of laboratory results, consider severe palmar pallor with respiratory distress to represent severe anaemia.

Severe anaemia in children with a positive slide for malaria parasites makes their condition severe malaria

Great, we have now covered three important forms of severe malaria. What about:-

- Acute renal failure?
- Pulmonary oedema?
- Bleeding?

Acute renal failure, pulmonary oedema and bleeding are either so uncommon in malaria, or not caused by malaria at all in children in endemic areas, that you should assume another cause or disease is present.

Do not assume these are caused by malaria. It is very dangerous to do so. Instead, look for other causes of these conditions.

To see how the clustering of signs and symptoms influences the risk of dying from malaria see Figure 4.4.2

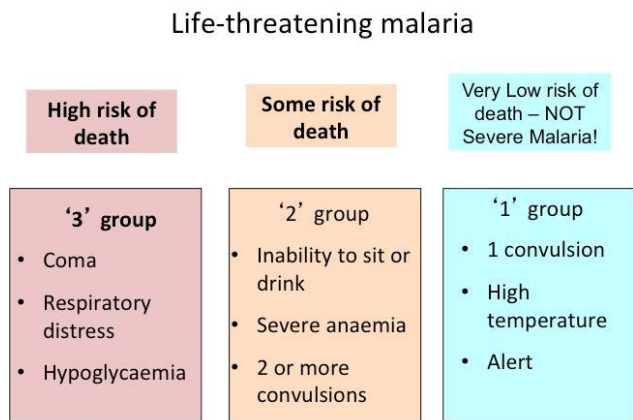


Figure 4.4.2 clustering of symptoms and life-threatening malaria

'3' group represents children at the highest risk of death. This includes children with coma, respiratory distress and hypoglycaemia.

'2' group includes children with inability to sit or drink, severe anaemia and multiple convulsions. These children have a moderate risk of dying.

'1' group are children with a low risk of death with signs such as high temperature or a single previous convulsion in a child who is fully alert. These children need oral treatment with artemether-lumefantrine which works faster than quinine!

We will now look at how best to manage severe malaria in children

4.4.5 Management of severe malaria

Before proceeding with this section, answer question 4.4.3



In text Question 4.4.3

Which antimalarial are currently recommended for the management of severe malaria in children by the Ministry of Health and WHO?

Well done! Now review your responses with the answers in the following section. Parenteral artesunate is the drug of choice for the treatment of severe *P. falciparum* malaria. If it is not available you can use parenteral quinine. You should give antimalarial agents by the parenteral route until the child can take oral medication or for a minimum of 24 hours even if the patient can tolerate oral medication earlier.

Artesunate: Give artesunate (2.4 mg/kg weight >20kg) or (3mg/kg weight ≤20kg) IV or IM on admission, then at 12 hours and 24 hours, then daily until the child can take oral medication but for a minimum of 24 hours even if the child can tolerate oral medication earlier.

Quinine: Give a loading dose of quinine at 20 mg/kg by infusion in 10 ml/kg of IV fluid over 2–4 hours. Then, eight hours after the start of the loading dose, give 10 mg/kg over 2 hours and repeat every eight hours until the child can take oral medication. The infusion rate should not exceed a total of 5 mg/kg per hour.



Take note 4.4.2

The loading dose of IV quinine should **never** be given as a bolus injection but as a four hour infusion in 5% dextrose under close nursing supervision

If intravenous quinine infusion is not possible then quinine can be given as a diluted divided IM injection. Studies show that a quinine loading dose reduces fever clearance time and parasite clearance time.² In considering the pharmacokinetics of quinine let us look at the graph in Figure 4.4.3

Quinine pharmacokinetics

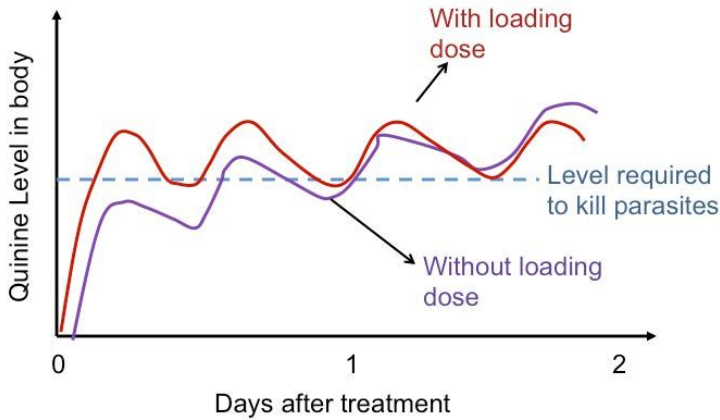


Figure 4.4.3 Quinine pharmacokinetics, with or without loading dose

The Quinine level in the body is on the Y axis and the time after treatment increases as we move along the X axis. If you give a loading dose, the drug rapidly increases to the level required to kill parasites and remains high as time progress (red line).

Not giving a loading dose (purple line) leads to an increased duration of time before blood levels required to kill parasites are reached Let us see how this is illustrated in Figure 4.4.4

Quinine pharmacokinetics

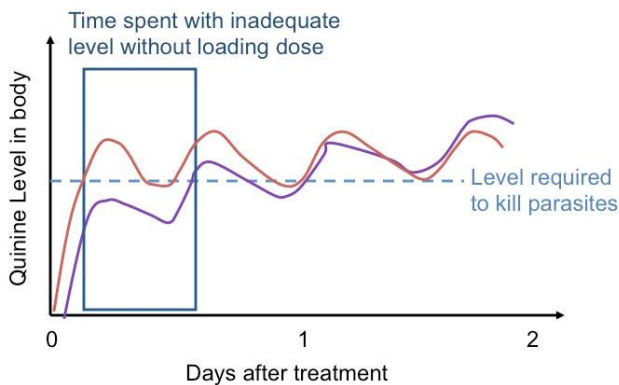



Figure 4.4.4 Quinine pharmacokinetics effect without loading dose

Good! We have seen in Figure 4.4.4 that not giving a loading dose exposes the malaria parasites to the drug at levels too low to kill and this is how resistance develops. Therefore, an

appropriate drug administered in the correct dose rapidly kills parasites and clears them all from the body.

Hopefully you have enjoyed going through this unit and are now more conversant with identifying and managing severe malaria in children.


Please make note of the summary points below:-

	<p>4.4.6 Summary</p> <p>In this unit, you have learnt that :-</p> <ol style="list-style-type: none"> 1. In a child with a positive malaria blood slide, severe malaria is defined as one or a combination of: <ul style="list-style-type: none"> • Coma & neurological impairment (Cerebral Malaria) • Respiratory distress (acidosis) • Severe anaemia 2. Artesunate is used for severe malaria. If artesunate is not available, quinine is an appropriate alternative 3. A loading dose of quinine is required to achieve adequate blood levels of the drug to effectively treat malaria
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If you are satisfied, please proceed to attempt the review questions below to test your understanding of the topic

4.4.7 Review Questions

1. Define cerebral malaria
2. What are the other forms of severe malaria in children?
3. What is the dose of Quinine for the management of severe malaria in children?

	<p>4.4.8 References</p> <ol style="list-style-type: none"> 1. Idro R. et al, 2005. Clinical manifestations of severe malaria in the highlands of south-western Uganda. <i>Am. J. Trop. Med. Hyg</i>:72(5)2005; 72 (5): 561–567 2. Lesi A, Meremikwu M. High first dose quinine regimen for treating severe malaria. <i>The Cochrane Database of Systematic Reviews</i> 2004, Issue 3. Art. No.: CD003341.pub2. DOI: 10.1002/14651858.CD003341.pub2. 3. World Health Organization (2013). Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. WHO
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MODULE 5

Care of the Sick and
Low Birth Weight Neonate

INTRODUCTION

Welcome to module 5 of ETAT+. In this module we shall cover the common causes of neonatal morbidity and mortality and their management. Module 5 has four units

- 5.1: Newborn resuscitation
- 5.2: Neonatal sepsis and commonly used drugs in neonates
- 5.3: Neonatal Jaundice
- 5.4: Managing the Preterm/Low birth weight infant.



UNIT OBJECTIVES

By the end of this module you should be able to:

- i. Describe the structured approach to newborn resuscitation
- ii. Outline the management of the neonate with neonatal sepsis
- iii. Explain the management of the neonate with jaundice
- iv. Describe the management of low birth weight infants

UNIT 5.1: NEWBORN RESUSCITATION

Unit Outline

- 5.1.1 Introduction
- 5.1.2 Objectives
- 5.1.3 Background to newborn resuscitation
- 5.1.4 Newborn and warmth
- 5.1.5 Newborn resuscitation equipment
- 5.1.6 Structured approach to newborn resuscitation
- 5.1.7 Meconium in newborn resuscitation
- 5.1.8 Summary
- 5.1.9 Review questions
- 5.1.10 References

5.1.1 Introduction

Welcome to unit 1 of module 5. The aim of this unit is to describe the optimum approach to newborn resuscitation in line with global best practice guidelines.

**5.1.2 Objectives**

By the end of the unit you should be able to;

- i. Explain the background to newborn resuscitation
- ii. State the importance of newborn resuscitation
- iii. Explain the importance of keeping newborns warm
- iv. List the equipment needed for newborn resuscitation
- v. Describe the structured approach to newborn resuscitation
- vi. Describe the management of meconium in newborn resuscitation

5.1.3 Background to newborn resuscitation

About 25% of all neonatal deaths are caused by birth asphyxia. According to the World Health Organization, for the purposes of resuscitation, birth asphyxia may be defined as *the failure to initiate and sustain breathing at birth*. Effective resuscitation at birth by skilled birth attendants can prevent a significant proportion of these deaths.

Before we proceed reflect on question 5.1.1

**Question 5.1.1**

Have you ever been involved in or observed newborn resuscitation? If you have, reflect on what was done. If not, reflect on what you may know about newborn resuscitation.

5.1.4 Newborns and warmth.

Before birth, the fetal environmental temperature is the mother's body temperature (36.6-37.2 °C). After birth, the external environmental temperature is significantly lower than this. This means that the newborn will immediately start losing heat even in hot climates.

Before we proceed do activity 5.1.1



Activity 5.1 .1

List the mechanisms of heat loss in newborns.

Good. Your list should include these mechanism evaporation, convection and conduction .Let us now describe the mechanisms in more detail:

a) Evaporation

Newborns are covered in fluid at birth. If left to evaporate, the heat energy that converts this liquid to vapor will come from the newborn's body thus lowering their temperature. This is the main route of heat loss immediately after birth. You should prevent this by drying the newborn immediately after delivery.

b) Convection

This refers to the transfer of heat from one place to another by the movement of fluids. Draughts in the delivery room will thus cause heat loss. Prevent this by ensuring that there are no draughts in the delivery room coming through open windows and doors.

c) Conduction

This is transfer of heat through contact. Contact of newborn's skin with a cold surface will cause heat loss. Ensure that the newborn is received in a warm dry towel to prevent this.

If a newborn gets cold, he/she will try to generate heat by increasing the break down glucose which can lead to hypoglycaemia and respiratory distress.

You must therefore keep newborn babies warm and dry.

5.1.5 Newborn Resuscitation Equipment

Preparation is the most important factor in successful newborn resuscitation. The equipment is divided into those that are needed by all skilled birth attendants and those that are required by a skilled paediatrician or anaesthetist.

Before we proceed do activity 5.1.2



Activity 5.1 .2

List the resuscitation equipment required by all skilled birth attendants.

Well done. Your list should have the following equipment:

- 2 warm dry towels for drying and wrapping the newborn respectively
- A firm stable surface for placing the newborn (where warmth can be maintained) for example a table with a radiant heater nearby or a resuscitate
- An overhead light source
- Bag Valve Mask device: Size 500ml bag, size 0 and 1 face masks are recommended. The round and clear masks are recommended. This is illustrated in figure 5.1.1
- Wide bore sucker
- A clock
- A stethoscope
- Oxygen

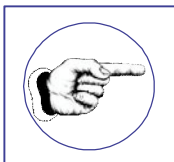
Other equipment that may be needed by a skilled paediatrician or anaesthetist is:

- Laryngoscope
- Endotracheal tube
- Drugs like adrenaline and naloxone
- Scissors and tape

Bag Valve and Mask equipment is the most essential tool in newborn resuscitation. Have a look at the one in figure 5.1.1. Familiarize yourself with the components



Figure 5.1.1: Bag Valve Mask device: Neonatal self-inflation resuscitation bag with round mask

**Take Note 5.1.1**

The bag valve mask *must* be tested during preparation to ensure that it is working

Now look at figure 5.1.2 to see which right size of mask to use in the bag valve mask device

The recommendation is to use a 500ml BVM device in newborn resuscitation. The smaller 250ml BVM are too small to provide effective ventilation even in the preterm babies and therefore not recommended.

Appropriate size of face mask:

You should have noted that the right size mask is one that covers the nose and the mouth without extending below the chin or covering the eyes.

Figure 5.2.2 shows the recommended fitting.

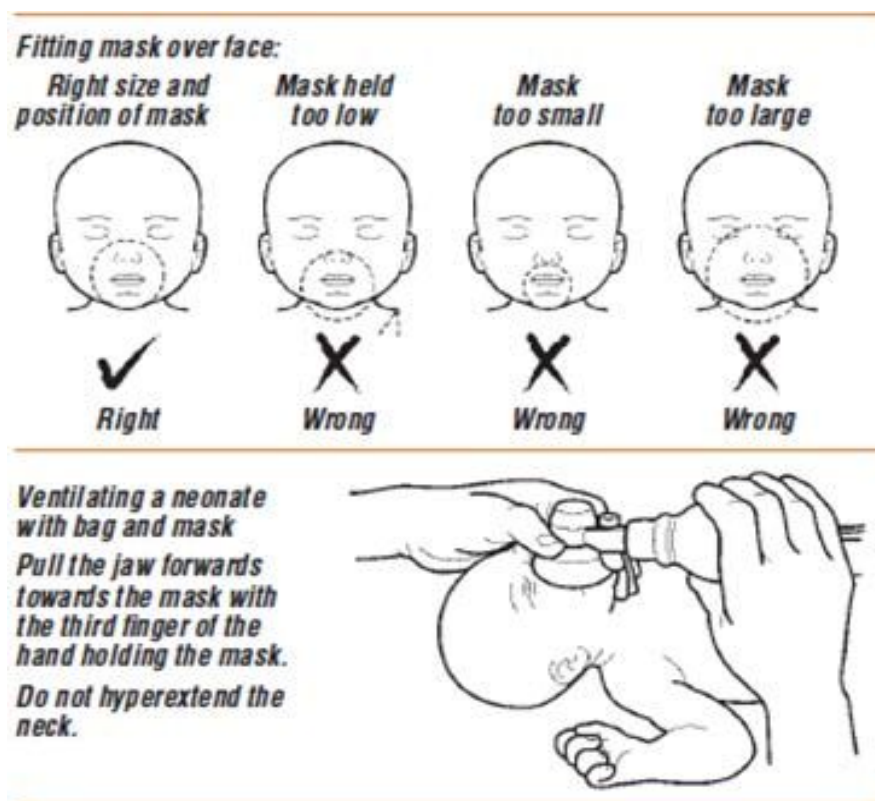


Figure 5.1.2: Fitting the right size mask

After going through the equipment required for newborn resuscitation do assignment 5.1.1



Assignment 5.1.1

In your free time, visit the delivery room in the labour ward of your facility and list down the equipment available for newborn resuscitation.

You should always remember that adequate preparation is as important as the actual.

5.1.6 Structured approach to newborn resuscitation

We have identified the equipment required for newborn resuscitation. Let us proceed to look at the indications for resuscitation and then follow a structured approach to newborn resuscitation.

The approach to resuscitation covered in this unit only applies to resuscitation at birth and is not appropriate for the rest of the neonatal period.

Indications for resuscitation

The following are the indications for newborn resuscitation:

- Failure to initiate breathing: this is the most common reason for newborn resuscitation
- Heart rate less than 60 beats per minute

These may manifest as absence of crying, cyanosis or pallor and poor tone/absence of spontaneous activity.

Before you proceed answer question 5.1.2



Question 5.1.2

What problem can you observe in this baby?



This newborn appears floppy and cyanosed.

How does this problem come about?

When subjected to hypoxia the fetus attempts to breathe, persistence of the hypoxia lead to loss of consciousness and eventually breathing stops. At this stage the circulation remains intact. In the early phases of asphyxia, the newborn can maintain an effective circulation, however, at birth, in the absence of effective resuscitation to aerate the lungs, circulatory failure sets in and may result in death. We can see that newborn.

ABC of newborn resuscitation

As we had said earlier, you should ensure you have all the required resuscitation equipment and in working order and that the environment is warm

After delivery, receive the newborn in a warm dry towel. As you dry the newborn check for crying, breathing and muscle activity

If breathing, pink and active place the newborn on the mother for skin to skin contact and initiate breast-feeding. The majority of newborns will not require any further intervention beyond this step.

If the newborn is not breathing, pale, cyanotic or floppy proceed to check the airway

Airway

Insert checking for breathing picture

For the newborn that is not breathing you will do the following:

- ÿ Look in the mouth for any visible material.
- ÿ If there is any visible material, gently suction, using a wide bore catheter only as far as you can see. Avoid blind vigorous or prolonged suctioning as this may cause trauma to the airway and slowing of the heart rate.

Open the airway by placing the newborn on their back with the head in a neutral position. You may need to place a towel under the newborn's shoulder to help maintain this position. This is important because the newborn head is as the relatively larger than their body and may cause flexion of the neck and obstruct the airway

Next, you will assess the breathing

Breathing

Take a moment and reflect on how you would assess breathing in a newborn. This is done by LOOK, LISTEN and FEEL for 5-10 seconds. If the newborn is not breathing

you use the bag valve mask to aerate the newborn's lungs. Initiate ventilation at 40-60 breaths/min for the first 1 minute.

All babies are born with fluid in the lungs, and the first spontaneous breath or assisted breaths helps to clear this fluid. In all instances of ventilation, **make sure the chest rises** as this is the easiest way to tell that you have successfully aerated the lungs. If the chest does not rise consider:

- Is the newborn's head and neck in neutral position?
- Is there any obstruction in the airway?
- Is your bag valve mask working properly?

The final step will be to assess the circulation.

Circulation

Circulation is best assessed by auscultating the chest using a stethoscope. Alternatively you can palpate the umbilical cord to feel for the umbilical pulse. Chest compression is only commenced after effective ventilation for at least 60 seconds the heart rate remains less than 60 beats per minute.

The best way to do this is as demonstrated in figure 5.1.3- 2 fingers and 2 thumbs technique

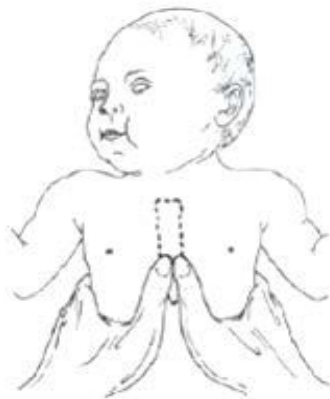


Figure 5.1.3: Neonatal chest compression

The key points to note are;

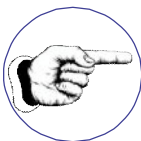
- Compress over the sternum(dotted line)
- Place your thumbs one finger breadth below an imaginary line joining the two nipples
- Keep your thumbs together
- Compress to one third of the depth of the chest

Oxygen and drugs in newborn resuscitation

Drugs are not recommended for newborn resuscitation and will not be discussed further in this unit

A child who does not improve with these initial measures requires advanced resuscitation. Continue BVM, link to oxygen and call for help.

Always start resuscitation with room air and only use oxygen after the first minute. Immediate resuscitation with oxygen can cause harm. However about a quarter of resuscitated babies may need oxygen *after 4-5 minutes of resuscitation*. This means that the priority is effective ventilation using the bag valve mask – do not stop resuscitation to look for oxygen.



Take note 5.1.2

The most important problem for asphyxiated babies is failure to breath and therefore the priority is aeration of the lungs effectively.

Post resuscitation care

What should you do once you have resuscitated the infant?

Well done! When adequate ventilation and circulation have been established you can stop ventilation, return the newborn to the mother for skin to skin contact as soon as possible and closely monitor breathing difficulties, signs of asphyxia and anticipate need for further care.

Criteria for breastfeeding: babies who are breathing well and are active should be put on the breast. If the newborn is suckling well then you can keep him with mother, but if not suckling well you need to admit to NBU.

This sequence is suited for the majority of babies you will be called to resuscitate, those born through clear liquor. Now let's have a look at what you need to do differently when there is meconium in the liquor.

5.1.7 Meconium in newborn resuscitation

Let us now consider how to manage meconium during newborn resuscitation. Aspiration of meconium before during or after delivery may lead to meconium aspiration syndrome.

When there is thick meconium at delivery- clear the airway before the baby's first breath

- ÿ If a newborn is born through meconium and has already cried then do not suck unless there is something in the airway. This is because the cry means the airway must be patent and the newborn is breathing.

- If the newborn has never taken a gasp or cried, then check the airway and suction before drying and stimulating. Suction what you can see and then dry and stimulate the newborn.

This therefore means that:

- Routine suction of the lower airway is not recommended.
- If there is no meconium then the first action is to dry and stimulate the newborn.

Newborn resuscitation by two workers

Having gone through the ABC of newborn resuscitation, we will now look at the sequence of resuscitation expected when two trained staff are available and needed.

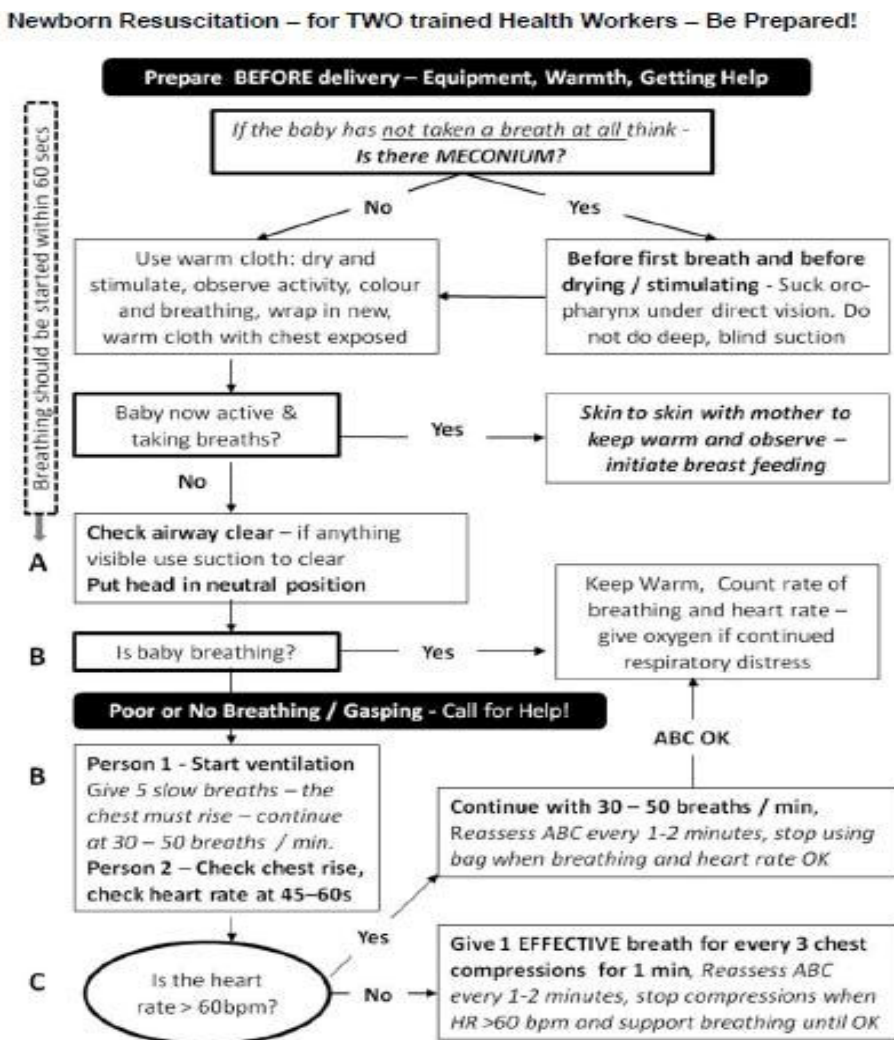
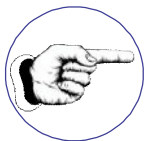


Figure 5.1.4: Newborn resuscitation



Take Note 5.1.3

- ÿ A single resuscitator must concentrate on **Airway** and **Breathing** and not worry about:
 - Lack of oxygen
 - Giving drugs

Using the approach to newborn resuscitation described, respond to the following scenarios.

Scenarios 5.1.1

A term newborn has been delivered after prolonged labour. The cord has been cut and the newborn is not crying and is floppy.

What action will you take?

Scenario 5.1.2

A term newborn has been born through caesarian section due to fetal distress. The cord has been cut and the newborn is covered in grade three meconium and is not crying.

What action will you take?



5.1.8 Summary

In this unit we have learned that;

- ÿ We must ensure all newborn babies are warm and dry
- ÿ Correct management of **Airway** and **Breathing** will save most babies
- ÿ Routine suction of babies born through meconium is not recommended.
- ÿ A single resuscitator must concentrate on **Airway** and **Breathing** and not worry about:
 - Lack of oxygen
 - Giving drugs
- ÿ We must make sure the chest moves when ventilating with a bag valve mask!

5.1.9 Review Questions

- What is the most common problem in newborns that requires resuscitation?
- List the mechanisms of heat loss and how each may be prevented
- List the essential equipment required by all skilled birth attendants for newborn resuscitation
- Briefly describe the structured approach to newborn resuscitation where there is no meconium

**5.1.10 References and Material for Further Reading**

- Guidelines on basic newborn resuscitation-WHO
www.who.int/maternal_child_adolescent/documents/basic_newborn_resuscitation/en/
- Kenya Clinical Guidelines, 2013**; <http://www.idoc-africa.org>
- Ministry of Health-Kenya (2016)**. Basic Paediatric Protocols
- Newborn Resuscitation Guidelines 2010**-Resuscitation Council of UK
- World Health Organization (2013)**. Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. WHO.


UNIT 5.2: NEONATAL SEPSIS AND COMMONLY USED DRUGS

Unit Outline

- 5.2.1 Introduction
- 5.2.2 Objectives
- 5.2.3 Signs and symptoms of neonatal sepsis
- 5.2.4 Antibiotic treatment of neonatal sepsis
- 5.2.5 Explain the usage of common drugs in neonates
- 5.2.6 Summary
- 5.2.7 Review questions
- 5.2.8 References

5.2.1 Introduction

Welcome to unit 2 of Module 5. In this unit we will be discussing neonatal sepsis (severe infection in the neonate) and explain the use of common drugs.

	<p>5.2.2 Objectives</p> <p>By the end of the unit you should be able to;</p> <ol style="list-style-type: none"> i. List the signs and symptoms of neonatal sepsis. ii. Describe the antibiotic treatment of neonatal sepsis iii. Explain the use of common drugs used in the neonatal period
--	--

5.2.3 Signs and symptoms of neonatal sepsis

In resource limited settings with limited diagnostic support (laboratory and imaging), a key set of symptoms and signs have been found to be predictors of morbidity and mortality in neonates.

These key symptoms and signs of neonatal sepsis are listed in figure 5.2.1. Have a look at this list and familiarize yourself with it. It should be displayed at relevant points in your work station.

Neonatal Sepsis

These signs and symptoms indicate the need for empiric antibiotics

Systemic Signs

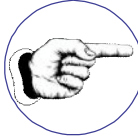
- History of feeding difficulty
- History of convulsions
- Temperature $\geq 37.5^{\circ}\text{C}$ or $< 35.5^{\circ}\text{C}$
- Fast breathing / respiratory rate ≥ 60 bpm
- Grunting
- Change in level of activity
- Severe chest indrawing

Localized Signs


- Many or severe skin pustules
- Periumbilical Flaring (Redness)
- Umbilicus draining pus
- Bulging fontanelle
- Painful joints, joint swelling, reduced movement and irritability
- Severe Abdominal Distention

Remember Jaundice, Prolonged Capillary Refill and Pallor may also be associated with infection

Figure 5.2.1: Symptoms and signs of illness in neonates

	<p>Take Note 5.2.1</p>
	<p>Figure 5.2.1 provides the essential clinical signs and symptoms and does not replace the conventional history taking and physical examination of the neonate. Empirical antibiotics should be started in neonates with signs and symptoms listed in figure 5.2.1</p>

Before we proceed, answer question 5.2.1

	<p>Question 5.2.1</p>
	<p>• Is this a sign of severe illness?</p>
	

Most likely not: You will need more information to determine whether the neonate has severe illness. This neonate has mastitis, but you will still need to consider whether the neonate is systemically unwell.

5.2.4 Antibiotic treatment of neonatal sepsis

Having decided to start empiric antibiotics based on the evaluation of signs and symptoms in section 5.2.1, we shall now consider the extra information you need to make a rational antibiotic choice. The factors you need to consider are:

- Causative bacteria
- Antibiotic sensitivity
- Presence of meningitis

a) Causative bacteria

The gold standard for diagnosis of bacterial causes of neonatal sepsis is blood culture. The largest Kenyan study dataset - (2002-2009, 552 positive blood cultures) - is shown in figure 5.2.2

Age < 7 days			Age 7 – 59 days		
1	E. coli	13%	1	Group A Strep	13%
2	Acinetobacter	10%	2	Strep. Pneumo	11%
3	Klebsiella	10%	3	Staph. aureus	11%
4	Staph Aureus	9%	4	Group B Strep	10%
5	Group B Strep	7%	5	Klebsiella	9%
Gram +ve 35%, Gram -ve 65%			6	Acinetobacter	9%
			Gram +ve 53%, Gram -ve 47%		

Figure 5.2.2: Blood culture results for community acquired neonatal sepsis in a Kenyan hospital

	Under 7 days	Over 7 days
Gram Negative	65%	47%
Gram Positive	35%	53%

The key things to note are;

- ÿ At age < 7 days the organisms are predominantly gram negative bacteria reflecting maternal genital flora
- ÿ Above 7 days we see a predominance of gram positive bacteria representing organisms acquired from the community.

The best guide is local data from your hospital. However, in the absence such data, this is a reasonable guide to the likely organisms causing Neonatal sepsis. *Hospital acquired infections are NOT covered by this list.*

b) Antibiotic sensitivity

Once we know the likely organism(s), the next step is to know their sensitivities to antibiotics especially the ones that are locally available.

From the same series seen in figure 5.2.2. *in vitro* sensitivities demonstrated that there was an overall;

- 82% sensitivity to Penicillin and Gentamicin
- 94% sensitivity to Ampicillin and Gentamicin
- 77% sensitivity to Cefotaxime (a third generation cephalosporin)

This shows good sensitivity to commonly available drugs. Again local data when available is the best guide but this is a reasonable guide to empirical antibiotic guide in Kenyan hospitals without their own data.

c) Presence of meningitis

After considering the likely organism(s) and their antibiotic sensitivity, the next key factor to think about is whether the neonate could be having meningitis.



Activity 5.2.1

Take a few minutes and list down the clinical signs of meningitis in an infant


Well done! Now compare your response to the following.

You should always suspect meningitis if the infant has signs of serious bacterial infection and any one of the following:

- Drowsy, lethargic or unconscious
- Convulsing
- Bulging fontanelle
- Irritable
- Has a high-pitched cry

Clinical symptoms and signs alone cannot tell you if there is or there isn't meningitis. It is therefore vital to perform a lumbar puncture where possible and obtain cerebrospinal fluid (CSF) for analysis to confirm the diagnosis.

Before proceeding, answer question 5.2.2


	<p>Complications of meningitis</p> <p>Question 5.2.2</p> <p>ÿ What do you see?</p>
---	---

Well done. The picture shows a child with hydrocephalus. This is a serious possible complication of meningitis. This means every effort must be made to recognize and treat meningitis appropriately to reduce the incidence of this and other serious complications.

Common drugs used in treating sick neonates.

1. Gentamicin

As you begin to look at the use of Gentamicin in neonates, complete the assignment 5.2.1

	<p>Assignment 5.2.1</p> <p>Visit the paediatric ward in your local hospital and note the dosing and frequency of Gentamicin in the treatment sheet of neonates and older children.</p>
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Special considerations when using Gentamicin

Let us now outline some special considerations in the use of Gentamicin:

Toxicity

The serious side effects associated with Gentamicin are;

- ÿ Deafness / balance disturbance which is rare
- ÿ Renal impairment which is uncommon

Both of these are more likely if Gentamicin is given in multiple low doses, used together with frusemide (lasix), especially in high dose. In addition, they are also more likely if Gentamicin is used over a long period and/ or there is pre-existing renal impairment.

Administering Gentamicin as a single large dose reduces these toxicities.

Having outlined the rationale of giving Gentamicin as a single large daily dose, use the dosing information given to answer question 5.2.3



Question 5.2.3

Using information on the table below, calculate the dose of Gentamicin for:

- 4 day old baby weighing 2.3kg?
- A 24 day old baby weighing 3.8kg?

Babies <2kg, <7 days old	3 mg/kg/day OD
Babies ≥2kg, <7 days old	5 mg/kg/day OD
Age > 7 days	7.5 mg/kg/day OD
Age > 10 years	6 mg/kg/day OD

Well done. The answers are as follows

- IV Gentamicin 11.5mg once daily
- IV Gentamicin 28.5mg once daily

5.2.5 Other commonly used drugs

Apart from antibiotics we also want to consider the appropriate use of other drugs that are commonly prescribed for neonates. We shall briefly describe the use of vitamin K, phenobarbitone and antipyretics.

a) Vitamin K

Have you ever seen a neonate with bleeding tendencies?

It is important to note that the majority of neonates have mild vitamin K deficiency and can present with coagulation indices which are less than adults. In fact, approximately 1 in 1,000 infants may have a severe deficiency, this can result in:

- Haemorrhage from incisions
- Gastrointestinal haemorrhage
- Intra-cranial bleeding.
- Death

Vitamin K should be given at 1 mg (0.5mg if weight <1.5kg) stat at birth regardless of gestation or weight.

b) Phenobarbitone

You shall now look at the use of Phenobarbitone in neonates. It is used in the treatment of neonatal convulsions especially in babies with Birth Asphyxia. In contrast to other age groups, diazepam is dangerous in babies < 1 month and should not be used. This is because there is a

higher risk of respiratory depression in this age group; their liver is relatively immature and diazepam tends to accumulate in the body for a longer period of time. For this reason the first line treatment is Phenobarbitone given at a dose of 20 mg/kg IM. Maintenance dose is usually 5mg/kg IM, oral or through nasogastric tube every 24 hours.

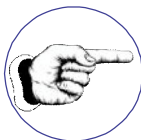
Consider the use of Phenobarbitone in a 2 week old fitting baby weighing 3.1 kg

- ÿ Start phenobarbitone:
 - ÿ 60 mg IM
 - ÿ NOT as an IV bolus.
- ÿ If the child continues to convulse after 30 minutes a further 5 - 10 mg / kg IM can be given BUT continuous monitoring for respiratory depression is required.
- ÿ Then no more phenobarbitone for 24 hours unless directed by a consultant.

c) Antipyretics

Finally, you will review the use of antipyretics in neonates.

Fever is a common sign in sick neonates and can be effectively treated by removing covers/clothes in the first weeks of life.



Take Note 5.2.2

Anti-pyretics may have side effects and there is no routine indication for their usage.



5.2.6 Summary

In this unit we have learnt that:

- ÿ Basic clinical symptoms and signs are good indicators of who is at high risk of neonatal sepsis in neonates
- ÿ The first line antibiotics for empirical treatment of severe neonatal infection are penicillin (or Ampicillin) and Gentamicin
- ÿ A single high dose of Gentamicin given every 24 hours is safer and more effective than multiple low doses.
- ÿ The other common drugs used in neonatal period include Vitamin K, Phenobarbitone
- ÿ Antipyretics are not used in the neonatal period
- ÿ Describe the antibiotic treatment of neonatal sepsis
- ÿ Explain the use of common drugs used in the neonatal period
- ÿ You need to perform a lumbar puncture to confirm meningitis in sick neonates
- ÿ Hand washing is key in infection prevention in nursery

5.2.7 Review questions

1. List the signs and symptoms of neonatal sepsis
2. List the three factors to consider before making a choice of antibiotic(s) for the treatment of neonatal sepsis.
4. Write down the recommended first line antibiotics for *empirical* treatment of neonatal sepsis.
5. What is the loading dose for phenobarbitone in the treatment of neonatal convulsions?
6. Why is the use of vitamin K important in neonates?



5.2.8 References

1. **Kenya Clinical Guidelines**, 2013; <http://www.idoc-africa.org>
2. **Ministry of Health (2016)**. Basic Paediatric Protocols – Revised Protocols. Ministry of Health: Kenya.
3. **World Health Organization (2013)**. Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. WHO.

UNIT 5.3: NEONATAL JAUNDICE

Unit Outline

- 5.3.1 Introduction
- 5.3.2 Objectives
- 5.3.3 Indications for treatment of jaundice
- 5.3.4 Phototherapy
- 5.3.5 Summary
- 5.3.6 Review questions
- 5.3.7 References

5.3.1 Introduction

Welcome to unit 5.3. In this unit we shall first cover the indications for phototherapy and then outline how phototherapy works.



5.3.2 Objectives

By the end of the unit you should be able to;

- I. List the indications for treatment of neonatal jaundice
- ii. Describe the use of phototherapy in the management of neonatal jaundice

5.3.3 Indications for treating neonatal jaundice

We have learnt how to assess for the presence and severity of jaundice in module 1 unit 2. Before we proceed answer question 5.3.1



Question 5.3.1

What factors will you consider before starting phototherapy in babies with jaundice?

The key points to consider are the age of the baby, the gestation at birth, postnatal age and total bilirubin levels (if available). Let us outline these points in more detail.

a) Jaundice on the first day of life

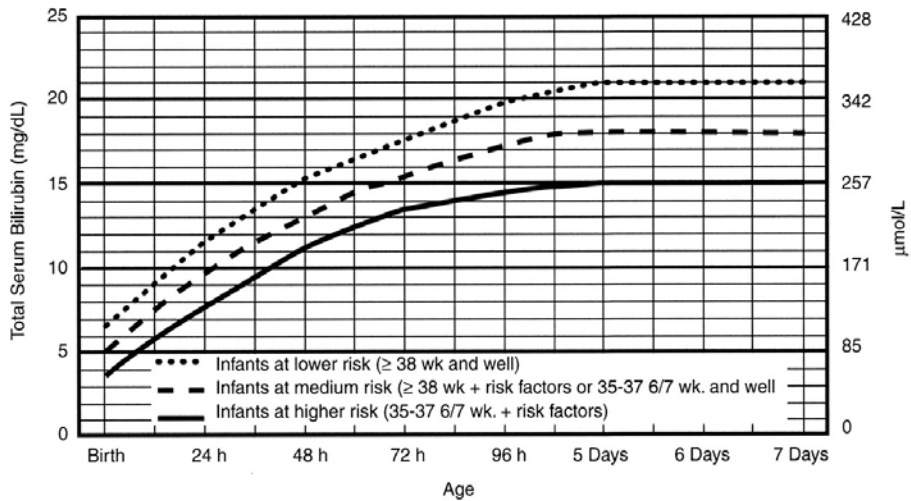
- Investigate if possible (haemoglobin and direct Coombs test on baby's blood).
- Refer for possible exchange transfusion as the risk of severe jaundice and thus kernicterus is high.
- Start phototherapy immediately even if jaundice is mild.

b) Jaundice on second day of life and after

Investigate and treat based on the table 5.3.1

- Gestational age
- Post-natal age
- Bilirubin Level

Table 5.3.1: Phototherapy in hospitalized infants of 35 or more weeks' gestation



- Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin.
- Risk factors = isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis, or albumin < 3.0g/dL (if measured)
- For well infants 35-37 6/7 wk can adjust TSB levels for intervention around the medium risk line. It is an option to intervene at lower TSB levels for infants closer to 35 wks and at higher TSB levels for those closer to 37 6/7 wk.
- It is an option to provide conventional phototherapy in hospital or at home at TSB levels 2-3 mg/dL (35-50mmol/L) below those shown but home phototherapy should not be used in any infant with risk factors.

American Academy of Pediatrics (Pediatrics 2004;114:297-316)

c) Day 2+ (second day of life) and unable to measure bilirubin start phototherapy if;

- Jaundice easily visible on the sole of the foot
- Preterm baby with any visible jaundice
- Visible jaundice PLUS inability to feed or other signs of neurological impairment. *For this group consider exchange transfusion*

Take Note 5.3.1

If there are neurological signs exchange transfusion is needed

5.3.4 Phototherapy

Do you use phototherapy in your facility? If you do then you may already know that phototherapy entails the use of a source of light to reduce the level of bilirubin. The baby with jaundice is placed under the light source until the serum bilirubin level is lower than the threshold range or until the infant is well and there is no jaundice of palms and soles.



Figure 5.3.1: Phototherapy

Having read the meaning of phototherapy, complete activity 5.3.1

	<p>Activity 5.3 .1</p> <p>List what needs to be considered to ensure effective phototherapy</p>
--	--

Now compare your responses with the following:

- I) Light source: blue fluorescent tube or white fluorescent light. This is effective for a period of 2000 hours (or 6 months of continuous use)
- ii) Effectiveness of whatever light source depends on;
 - ÿ Total power: use of high watt tube light (40 – 60W) in sets are recommended. Figure 5.3.2 illustrates use of a set of 5 tubes.
 - ÿ Distance from the lights: It is recommended that the baby is placed 30 cm away from the light source. . For instance, by increasing the distance to 60cm you decrease power by 50%.
 - ÿ Surface area exposed to light; the more the surface area exposed the more effective the treatment will be. Keep the napkin in place and cover the eyes to prevent damage to the retina and

iii) Maintenance of the bulbs

- ÿ Keep the tubes cool by allowing free flow of air around them.
- ÿ Ensure that the tubes are not too old. This means a record should be kept of the date of installation and aim to replace them if;
 - § Been in use for greater than 6 months (or after 2000hrs of continuous use).
 - § Tube ends have blackened
 - § Lights flicker

IV) Check baby's temperature to avoid overheating and allow the baby to breastfeed. It is worth noting that babies on phototherapy do not require extra fluids.

Remember to protect the eyes (to avoid damage to the retina) and scrotum (to avoid infertility)

You are doing very well. You are coming to the end of this unit take time to undertake assignment 5.3.1

**Assignment 5.3.1**

Visit your facility's neonatal unit and note the following:

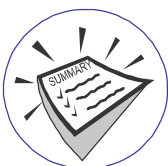
1. Is there a phototherapy machine?
2. If there is;
 - ÿ Is it working?
 - ÿ How long have the bulbs been in use?

Scenario 5.3.1

1. A neonate was born at term two days ago at home. He presents with jaundice visible in the eyes, is breastfeeding well, weighs 3 kilogrammes and the rest of the physical examination is normal. What is the appropriate management?
2. A preterm was born in hospital 3 days ago at 34 weeks gestation. She now presents with inability to breastfeed. On examination jaundice is visible on her feet and she is hypertonic.

What do you do?

You may now go through the summary of the unit



5.3.5 Summary

In this unit we have learnt;

ÿ The key factors to consider in phototherapy are:

- Ø Age of the baby
- Ø Gestational age at birth(preterm versus term)
- Ø Postnatal age
- Ø Total bilirubin levels

ÿ Effective phototherapy is dependent on;

- Ø The source of light and its power(blue lights)
- Ø The distance from the light
- Ø The surface area exposed
- Ø Proper maintenance of the lights

ÿ Consider exchange transfusion if jaundice is noted:

- Ø On the first day of life
- Ø Visible on the feet

Associated with neurological signs

5.3.6 Review Questions

1. List the indications for initiating phototherapy for neonatal jaundice in the following circumstances;
 - a) First day of life
 - b) After the second day of life and you are not able to obtain the serum bilirubin levels.
2. List 3 factors that determine effectiveness of phototherapy
3. List 3 indications for exchange transfusion



5.3.7 References and Material for Further Reading

1. **Clinical Guidelines, (2013)** <http://www.idoc-africa.org>
2. **Ministry of Health (2016)**. Basic Paediatric Protocols Kenya
3. **World Health Organization (2013)**. Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. WHO.

UNIT 5.4: MANAGEMENT OF LOW BIRTH WEIGHT INFANTS

Unit Outline

- 5.4.1 Introduction
- 5.4.2 Objectives
- 5.4.3 Standards of care
- 5.4.4 Warmth
- 5.4.5 Kangaroo Mother Care
- 5.4.6 Feeding and fluids
- 5.4.7 Summary
- 5.4.8 Review questions
- 5.4.9 References

5.4.1 Introduction

Welcome to unit 5.4. The purpose of this unit is to present the recent evidence on best practice in care of the low birth weight babies

**5.4.2 Objectives**

By the end of the unit you should be able to;

- i. List the minimum standards of care for low birth weight neonates
- ii. Explain the importance of keeping neonates warm
- iii. Describe Kangaroo Mother Care
- iv. Describe the structured approach to feeding low birth weight neonates

5.4.3 Standards of care

Before we look at the standards of care, let us define the terms low birth weight and preterm. Low birth weight baby can be defined as a baby weighing less than 2500 grammes while preterm baby is a baby that is born before 37 completed weeks of gestation.

You can now perform activity 5.4.1

**Activity 5.4.1**

List the minimum basic requirements in the in-patient care of preterms and low birth weight babies

Good. Your list should include the following:

- A clean environment to prevent hospital acquired infections
- Staff and careers practice good hand hygiene to help prevent transmitting hospital acquired infections
- Ability to maintain environmental temperature
- Appropriate oxygen therapy
- Provision of appropriate nutrition especially the promotion of breast feeding
- Ability to offer phototherapy
- Inclusion of parent as partner in care.


After going through the basic requirements that are needed in the in-patient care of the premature and low birth weight babies answer question 5.4.1

	<p>Question 5.4.1 Do you recognize the equipment below?</p>
	

I am sure you have recognised the incubator on the left and probably also the ventilator on the right. Well done. You must remember that if you can't provide the basics as outlined in the standards of care, you don't need this sophisticated and expensive equipment.

5.4.4 Warmth



In unit 5.1 we discussed the importance of warmth immediately after delivery. Warmth still continues to be a vital component of supportive care thereafter. Remember that if the baby is cold he/she uses energy (glucose) to stay warm, this can cause hypoglycaemia and even poor gaining weight.

	<p>Take Note 5.4.1 The smaller the baby the greater the need for an actively warmed environment, even in warm, regions this should be provided because night-time temperatures are rarely $>28^{\circ}\text{C}$.</p>
---	---

5.4.5 Kangaroo mother care

We shall first define what Kangaroo care is and then go on to outline its indications, requirements and benefits.

Before defining kangaroo care answer the question 5.4.2

	<p>Question 5.4.2</p> <p>Describe what you see in the picture below</p> 
---	--

You most likely saw a mother with a small baby wrapped close to her chest. This is known as Kangaroo mother care. You may also have noted the cap on the neonates head. You have done well.

Now how does this work?

The baby is placed skin to skin on the chest of care giver and wrapped firmly including a head cap which is necessary to minimize heat loss. The process also improves the chances of early commencement of breast feeding

b) Which baby is suitable for Kangaroo mother care?

Only offer Kangaroo care to a **stable** premature or small for gestational age (SGA) baby weighing 1200g and upwards.

Its successful implementation requires informed and willing mother as well as trained health care workers providing support

c) Benefits

When successfully implemented. In comparison to standard care, kangaroo care reduces morbidity/mortality, improves growth and promotes early establishment of breast feeding.

Having learnt the meaning, requirements and benefits of kangaroo care, do assignment 5.4.1



Assignment 5.4.1

In your free time find out if kangaroo mother care is offered in the neonatal unit of your institution

5.4.6 Feeding and fluids

In this section we shall look at how to manage the feeding/fluid requirements of low birth weight and premature infants.

As a health care provider you will often encounter the question “Should all low birth weight children should be breastfed or given breast milk by another method?”

Your emphatic answer should always be YES. You add the statement; there is no baby who is too small or sick to receive breast milk. Mothers should be shown how to express breast milk as early as possible following delivery of a low birth weight infant.

Please familiarize yourself with the essential steps involved in breast milk expression illustrated in table

Table 5.4.1 Demonstration on how a mother can express milk

	1. Wash your hands well with soap and water
	2. Place a clean container below your breast to collect milk
	3. Massage the breasts gently toward the nipples
	4. Place your thumb and index finger opposite each other just outside the dark circle around the nipple
	5. Now press back toward your chest, then gently squeeze to release milk
	6. Repeat step 5 at different positions around the areola



b) When to feed

As soon as the baby's condition allows, breast milk feeds should be initiated. This will usually be on the second day after birth.

You can now look at the flow chart in figure 5.4.1 on when to initiate feeding in neonates.

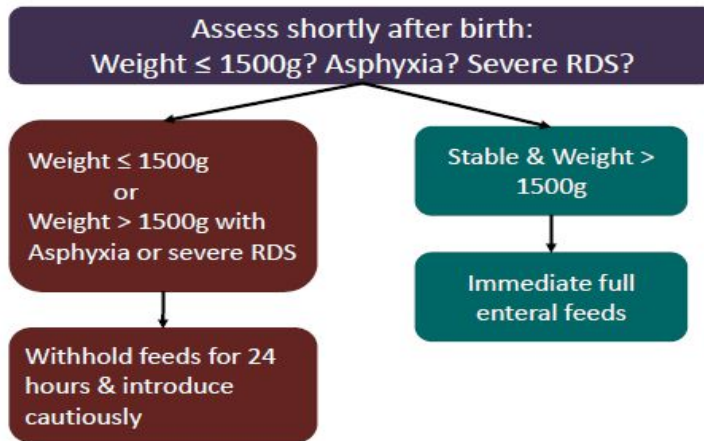


Figure 5.4.1: When to initiate feeding in neonates

We must balance between the risk of withholding feeds and early feeding for the sick newborn and the preterm/low birth weight.

What risk factors do you think may influence when to initiate breast milk feeds in these newborns?

Look at figure 5.4.2 on balancing the risks of withholding or initiating feeds early.

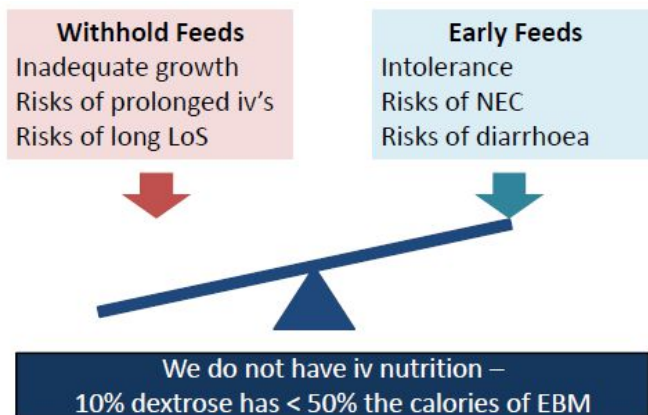


Figure 5.4.2 Risks of withholding feeds versus risks of early feeding in low birth weight infants.

The abbreviations used in figure 5.4.2 are as follows;

*EBM: Expressed Breast Milk

*LoS: Length of Stay

*IV: intravenous

As you can see in Figure 5.4.2, the risks of withholding feeds outweigh the risks of early initiation of feeds.

c) How to provide fluids and feeds

Having looked at when to start feeds, we shall now describe a standard approach to providing fluids or feeds. First let us consider a situation where we are providing *only enteral feeds*. Keenly look at table 5.4.2

Table 5.4.2: Initiation of full volume enteral feeds



	Weight less than 1500 gms	Weight 1500gms and above
Day 1	Calculate feeds at 80mls/kg/day	Calculate feeds at 60mls/kg/day
	Starting volume is 3mls and increase by the same amount at every feed until the calculated amount for the day is reached.	Starting volume is 6mls and increase by the same amount at every feed until the calculated amount for the day is reached
Day 2 onwards	Increase feeds by 20mls/kg daily up to 200mls/kg/ day.	
	Feeds mls/kg/day	Feeds mls/kg/day
Day 1	80	60
Day 2	100	80
Day 3	120	100
Day 4	140	120
Day 5	160	140
Day 6	180	160
Day 7	200	180
Day 8	200	200

The key points to note are for either feeds or fluids:

- Increase feeds by a standard 20 mls/kg per day up to a maximum of 200 mls/kg per day

Potential complications of early enteral feeding


Early enteral feeding could have serious complications. Before you proceed with this section, take some time and answer question 5.4.3

		<p>Question 5.4.3</p> <p>What is your observation of the child's abdomen in the picture below?</p>
---	---	---

Well done. You notice that the baby has a distended abdomen which can be caused by amongst other things necrotizing enterocolitis (NEC). Necrotizing enterocolitis is a serious disorder of the gastrointestinal tract in neonates

This problem is seen more often in low birth weight infants, those who suffered hypoxia of any origin, those on enteral feeds and in the presence of bacterial infection.

You can now practice calculating feed volume in Activity 5.4.1

	Activity 5.4.1
Calculate the 3 hourly feeds of one day old, preterm who weighs 1.5 kg and is not breastfeeding?	

Your feed volumes for the baby described in activity should be as follows:

- Start at 11.25 mls of 3hourly feeds (equivalent to 90 mls per day at a rate of 60 mls/kg per day)
- Rather than manually calculating you can also check the baby's weight against the day of life to get the required 3 hourly volume as shown in the Table in figure 5.4.3 for those weighing less than 1.5KG and 5.4.3 for the 1.5 kg or more.

Table 5.4.3: Three hourly feeds for newborns 1.5kg and more


Weight (kg)	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
Day 1	11	12	14	14	15	15	17	17	18	18
Day 2	15	16	18	18	19	20	21	22	23	24
Day 3	19	20	21	23	24	25	26	28	29	30
Day 4	23	24	26	27	29	30	32	33	35	36
Day 5	26	28	30	32	33	35	37	39	40	42
Day 6	30	32	34	36	38	40	42	44	46	48
Day 7	34	36	38	40	45	45	47	50	52	54

Now let us consider a situation where we are *only giving intravenous fluids*. Before proceeding keenly look at the table 5.4.4 and use it to answer question 5.4.5

Table 5.4.4 Intravenous fluid rates for sick newborns who cannot be fed Full volume.

	Weight less than 1500 gms			Weight 1500gms and above		
Day 1	Calculate intravenous fluids at 80mls/kg/day			Calculate intravenous fluids at 60mls/kg/day		
Day 2 onwards	Increase feeds by 20mls/kg daily up to 200mls/kg/ day.					
Weight in kg	0.8-0.9	0.9-1.0	1.0-1.1	1.1-1.2	1.2-1.3	1.3-1.4
Day 1	3	3	4	4	4	5
Day 2	4	4	4	5	5	6
Day 3	4	5	5	6	6	7
Day 4	5	6	6	7	7	8
Day 5	6	6	7	8	8	9
Day 6	6	7	8	9	9	10
Day 7	7	8	9	10	10	11

Now take some time to complete activity 5.4.2 and calculate the volume of fluids for a neonate

	<p>Activity 5.4.2</p> <p>Calculate the volume of intravenous fluid that should be provided per hour for a neonate weighing 1.25 kilos on day one and is not being fed</p>
---	--

Well done, the answer is 4.2 mls per hour. This totals to 100mls in 24 hours (1.25kg * 80mls = 100)

Having looked at feeds and fluids separately let us now consider how you would transition from full volume intravenous fluids to nasogastric tube feeds. First look at Table 5.4.5 and note that there are two columns one marked IVF and the other NGT

Table 5.4.5 Standard regimen for introducing nasogastric feeds.

	Weight	Less than 1500gms	1501-2000gms	More than 2000gms
Day 2	Total Daily volume	80mg/kg/day	60mg/kg/day	60mg/kg/day
	NGT Feeds volume	5mls 3 hourly	7.5 mls 3 hourly	10 mls 3 hourly
	IVF volume	Total daily volume – Total daily NGT volume	Total daily volume – Total daily NGT volume	Total daily volume – Total daily NGT volume
Day 3 Onwards	Total Daily volume	Increase by 20mg/kg/day	Increase by 20mg/kg/day	Increase by 20mg/kg/day
	NGT Feeds volume	Increase NGT feed volume by 5mls daily	Increase NGT feed volume by 7.5 mls daily	Increase NGT feed volume by 10 mls daily
	IVF volume	Total daily volume – Total daily NGT volume	Total daily volume – Total daily NGT volume	Total daily volume – Total daily NGT volume

Table 5.4.6 Standard regimen for introducing NGT feeds after the first 24 hours in Newborn less than 1.5kg

Weight (kg)	0.8 -0.9		0.9 -1.0		1.1 -1.2		1.3 -1.4		1.4 -1.5	
	IVF	NGT	IVF	NGT	IVF	NGT	IVF	NGT	IVF	NGT
Day 1	3	0	3	0	4	0	4	0	5	0
Day 2	2	5	3	5	3	5	4	5	4	5
Day 3	1	10	2	10	2	10	3	10	4	10
Day 4	0	15	1	15	1	15	3	15	4	15
Day 5	0	18	0	20	0	18	2	20	3	20
Day 6	0	21	0	22	0	21	1	25	3	25
Day 7	0	21	0	22	0	24	0	30	0	30

Practice calculating the IV fluid and NGT feed volumes using the following examples for a baby weighing 1.3kg;

• Day 1: IV fluid at 4.3mls per hour ($1.3\text{kg} * 80\text{ mls} = 104$) **no** NG (nasogastric) tube feed

• Day 2: Start NG tube feeds at 5mls 3 hourly (Total $5*8 = 40\text{mls}$)

Continue IV fluid at 3.8 mls per hour

(Total daily $1.3\text{kg}*100 = 130$)

IV Fluids for the day: $130-40=90$

Hourly IV Fluids: $90/24=3.75\text{mls}$

• Day 3: The feed volume is increased by the *same amount from 5 to 10 mls 3hrly*

IV fluid is reduced to 3.2 mls per hour

(Total daily $1.3\text{kg}*120 = 156$)

IV Fluids for the day: $156-80=76$

Hourly IV Fluids: $76/24=3.2\text{mls}$

• The process is repeated until on full volume feeds for weight. Rather than manually calculating you can also check the baby's weight against the day of life to get the required volume as shown in the table in figure 5.4.4

If it is unsafe to give intravenous fluids; start nasogastric feeds immediately.

d) Choice of feeds

What is the recommended feed for LBWs? Good! Breast milk is the recommended feed.

We have come to the end of this session. Before proceeding to the summary, take time and complete assignment 5.4.2




Assignment 5.4.2

Find out from the WHO lactation guidelines:


- a) The nutritional content of breast milk and cow's milk.
The benefits of breast milk.

You may now go through the summary of the unit.

	<p>5.4.7 Summary</p> <p>In this unit we have learned the care of low birth weight:</p> <ul style="list-style-type: none"> ÿ Basic hygiene, warmth, feeding and oxygen are more important than high technology. ÿ Kangaroo mother care has considerable potential in reducing morbidity and mortality of low birth weight infants ÿ Use breast milk as the feed of choice ÿ Follow the simple, stepwise approach provided in the basic paediatric protocol to increase feeds ÿ Where intravenous fluids cannot be given safely start enteral feeds on the first day
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5.4.8 Review questions

1. List the minimum standards of care for low birth weight neonates?
2. Define elements of Kangaroo Mother Care
3. List the benefits of Kangaroo Mother Care
4. List the reasons why breast milk is the feed of choice for neonate

	<p>5.4.9 References</p> <ol style="list-style-type: none"> 1. Basic Paediatric Protocols (2016) Ministry of Medical Services, Government of Kenya. 2. Guidelines on basic newborn resuscitation-WHO www.who.int/maternal_child_adolescent/documents/basic_newborn_resuscitation/en/ 3. Kenya Clinical Guidelines, (2013), http://www.idoc-africa.org 4. Newborn Resuscitation Guidelines (2010)-Resuscitation Council of UK 5. World Health Organization (2013). Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. WHO.
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MODULE 6

Severe Acute Malnutrition

MODULE INTRODUCTION

This module will introduce you to recognition of severe acute malnutrition (SAM), the ten steps of managing severe acute malnutrition and feeding calculation for children with severe acute malnutrition.

The module is divided into 3 units:

UNIT 1: Recognition of severe acute malnutrition (SAM)

UNIT 2: Initial management of the child with SAM

UNIT 3: Nutritional treatment of a child with SAM



MODULE OBJECTIVES

By the end of this module you will be able to

- i. Explain the criteria for recognition of severe acute malnutrition
- ii. Describe the initial management of the child with severe acute malnutrition
- iii. Describe the feeding management of the child with severe acute malnutrition

UNIT 6.1: RECOGNITION OF SEVERE ACUTE MALNUTRITION

Unit Outline

- 6.1.1 Introduction
- 6.1.2 Unit Objectives
- 6.1.3 Define severe acute malnutrition
- 6.1.4 Clinical diagnosis of severe acute malnutrition
- 6.1.5 Summary
- 6.1.6 Review Questions
- 6.1.7 References

6.1.1 Introduction

In this unit you will learn the clinical signs used for diagnosis of severe acute malnutrition

**6.1.2 Unit Objectives**

By the end of this unit, you will be able to:

- i. Define severe acute malnutrition
- ii. Describe the clinical diagnosis of severe acute malnutrition

6.1.3 Definition of severe acute malnutrition

Just before we proceed, please answer the following question.

**Question 6.1.1**

What will make you decide that a child admitted on your ward has severe acute malnutrition?

Well done! Now let us look at the following information.

Severe acute malnutrition is the presence of severe wasting (weight-for-height/length $< -3SD$ or mid upper arm circumference < 11.5 cm) or oedema of both feet (Kwashiorkor with or without severe wasting). The main features of SAM are:

- Weight-for-height/length $< -3SD$, or
- Mid upper arm circumference (MUAC) < 11.5 cm or
- The presence of pitting oedema of both feet

Table 6.1.1 illustrates the classification of acute malnutrition

Table 6.1.1: Classification of acute malnutrition

	MUAC cm	WHZ
None	Greater than 13.5	Greater than - 1
At Risk	12.5 to 13.4	-2 to -1
Moderate	11.5 to 12.4	-3 to less than -2
Severe	11.4 and below	Less than -3
	Or Oedema of both feet	

MUAC is preferred for age 6-59 months.

Oedema is used to differentiate two classes of severe acute malnutrition (marasmus and kwashiorkor.)



Question 6.1.2

Why do you think MUAC is preferred for children age 6-59 months?

Well done. MUAC is a single linear measurement that does not require arithmetic, table look-up or plotting data on growth charts.

The colour coded MUAC tapes are simple to use and allow instant classification of nutritional status.

Neither MUAC nor WHZ is ideal for predicting mortality; however MUAC appears to show consistently better predictive power. Thus MUAC is the best anthropometric predictor of mortality currently available.

Weight for age may not accurately identify wasting and therefore, the preference for use of MUAC (or weight for height or length Z scores)

Visible severe wasting is very insensitive for identifying severe malnutrition. It identifies only severe cases of SAM. It is better to use MUAC.

Note that correcting MUAC for age or height does little to improve the sensitivity and specificity to predict mortality. Use of both WHZ and MUAC together does not appear to increase value in assessment over MUAC alone.

However, classification systems based on WHZ is preferred in infants aged <6 months because unlike in the older age group there is no data suggesting association between MUAC and mortality that is independent of age in this age group. Furthermore internationally recognized reference curves remain unavailable for this age group.

(Or weight for height or length).



Question 6.1.3

What items are required for assessing nutritional status?

Good! Weighing scales, MUAC tapes, length measuring board, height measuring board are needed.

Let us now see how to take these anthropometric measurements.

Taking the Height

This measurement is taken for children aged two years and above and/or for those greater than 85 cm.

Steps for taking accurate height measurements

- Set the measuring board vertically on a stable level surface.
- Remove the child's shoes and any head covering
- Place the child on the measuring board, standing upright in the middle of the board. The child's heels and knees should be firmly pressed against the board by the assistant while the person taking the measurement positions the head and the cursor. The child's head, shoulders, buttocks, knees and heels should be touching the board.
- Read and announce the measurement to the nearest 0.1 cm
- Record and repeat the measurement to the person taking the measurement to make sure it has been correctly heard.

These steps are illustrated in Figure 6.1.1

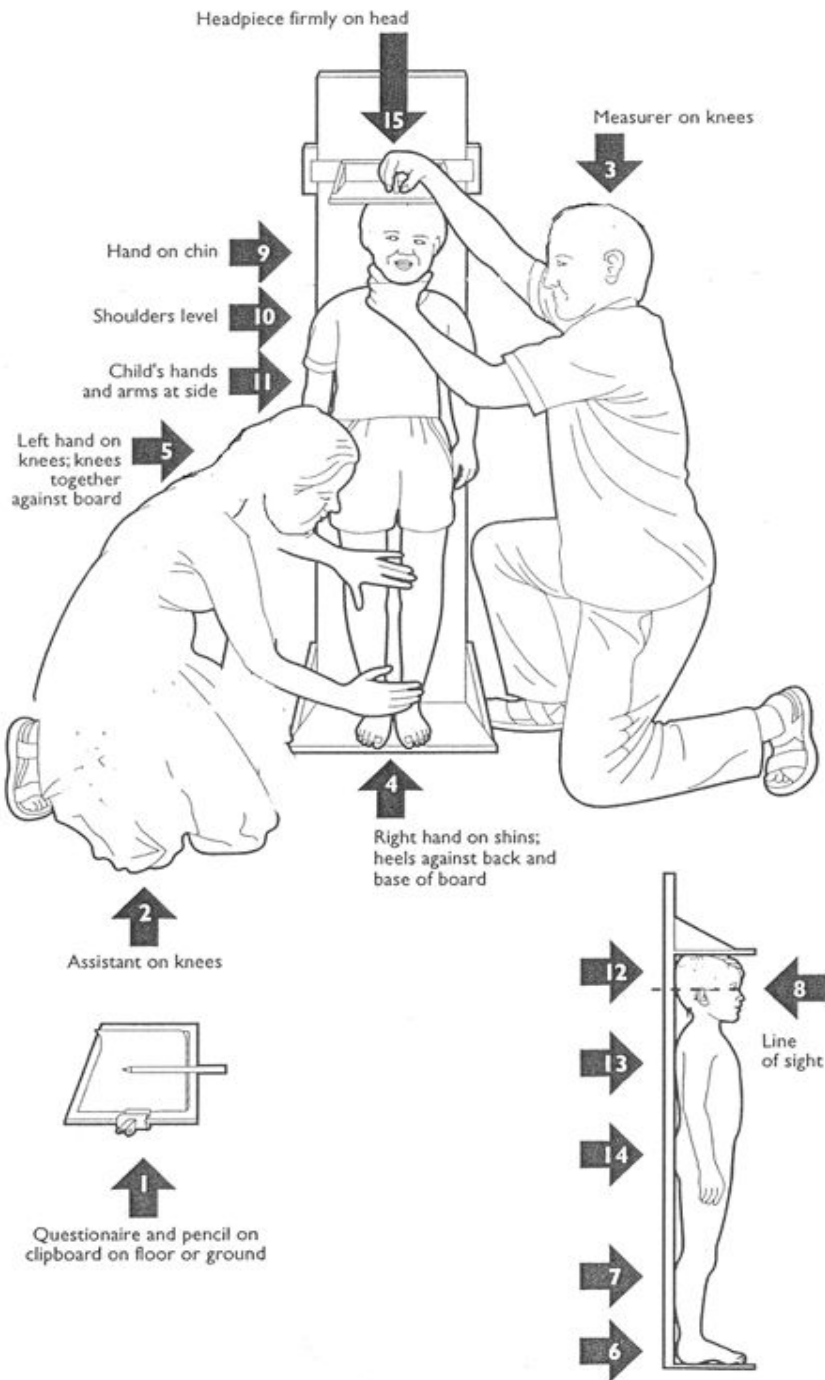


Figure 6.1.1: Steps for taking accurate height measurements

Taking the Length

This measurement is taken for children below two years of age and/or for those who are less than 85 cm.

Steps for taking accurate length measurements:

- ÿ Place the measuring board horizontally on a flat, level surface.
- ÿ Remove the child's shoes and any head covering
- ÿ Place the child so he/she is lying down and face up in the middle of the board
- ÿ Allow the assistant to hold the sides of the child's head and position the head until it is touching the head board. The assistant should hold the head so that an imaginary vertical line from the ear canal to the lower border of the eye socket is perpendicular to the board.
- ÿ Allow the person taking the measurement to place his/her hands on the child and firmly hold the child's knees together while pressing down. The soles of the feet should be flat on the foot piece, toes pointing up at right angles.
- ÿ The person taking the measurement should immediately remove the child's feet from contact with the footboard with one hand while holding the footboard securely in place for reading visibility.
- ÿ Read and record the measurement as shown in the diagram next.

These steps are illustrated in Figure 6.1.2

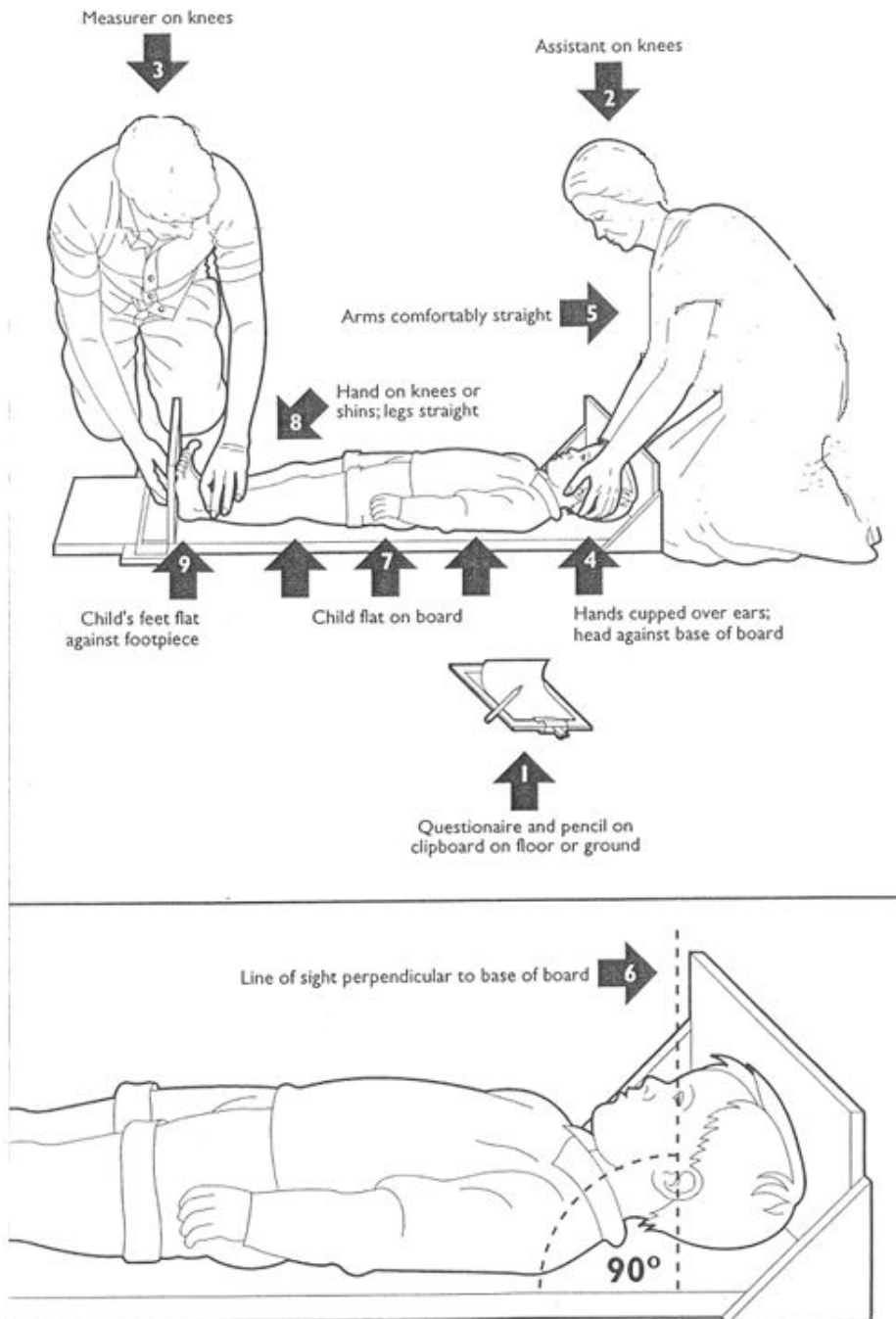


Figure 6.1.2: Steps for taking accurate length measurements:

Taking the Mid Upper Arm Circumference (MUAC)

MUAC tapes are colour coded; the colour codes and the gradations vary. **Using a 3-colour tape:** a measurement in the green zone means the child is not malnourished (it includes those properly nourished plus those at risk); a measurement in the yellow zone means that the child is moderately malnourished; and a measurement in the red zone means that the child is severely malnourished.



Figure 6.1.3: MUAC tape (3 colour tape)

Steps for taking the MUAC measurement of a child

- Determine the mid-point between the elbow and the shoulder (acromion and olecranon) as shown on Figure 6.1.4
- Place the tape measure around the LEFT arm (the arm should be relaxed and hang down the side of the body)
- Measure the MUAC while ensuring that the tape neither pinches the arm nor is left loose
- Read the measurement from the window of the tape or from the tape.
- Record the MUAC to the nearest 0.1 cm.

These steps are illustrated in Figure 6.1.4

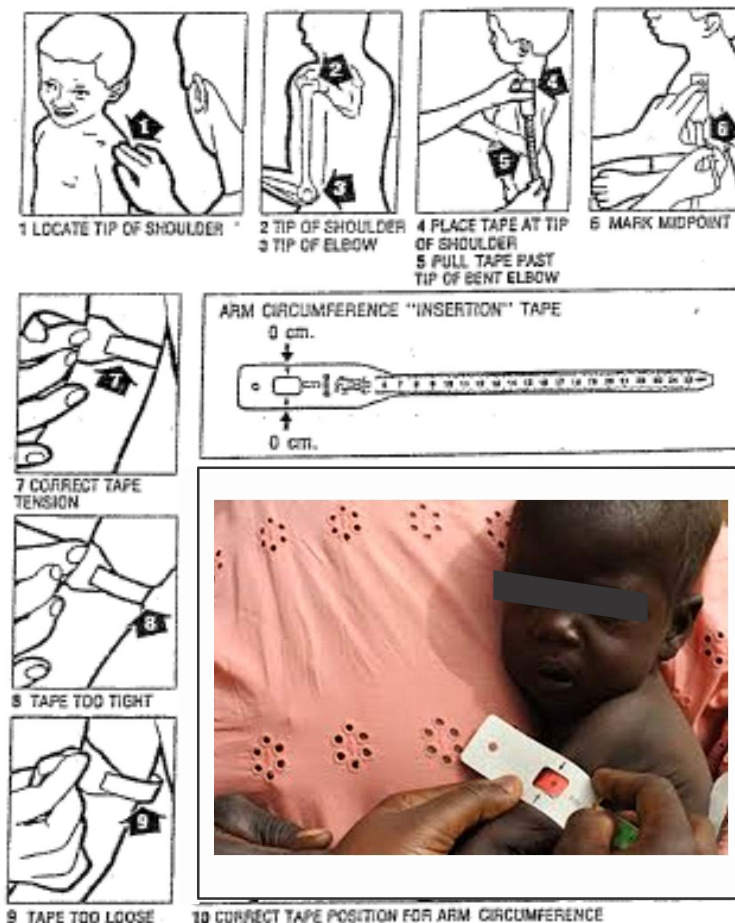


Figure 6.1.4 Taking MUAC measurements



Question 6.1.4.

Not all patients with severe acute malnutrition as defined by above criteria will require in-patient care. Most of these patients can be managed in programmes for community management of severe acute malnutrition.

List some of the conditions that will lead you to admit a child with SAM for in-patient care.

Thank you. Your list should include the following:

- Any of the emergency signs
 - Inadequate breathing
 - Severe or some circulatory compromise
 - Altered consciousness
 - inability to feed
 - Convulsions
- Medical conditions that require in-patient care.
- Poor appetite/unwilling to feed

6.1.4 Clinical diagnosis

Take a few minutes to carry out the following activity

Scenario 6.1.1

A 4 year old weighing 10 kg is brought to you at the outpatient clinic with swollen feet and poor feeding. This is his picture.



1. Is he malnourished?
2. What features of malnutrition can you see?

Good. Let us learn more about the clinical features of severe acute malnutrition.

The diagnosis of severe acute malnutrition involves taking a relevant history and clinical examination. You are required to take a relevant history that will help to understand why the child is malnourished. **You must ask.**



Activity 6.1.1

Make a list of the questions you would ask the caregiver of the child shown in the picture above.

Good. Did your list of questions include the following?

- ÿ How is the child's appetite?
- ÿ What is the child usually fed on? (before the current illness)
- ÿ Is he breastfeeding at this time? If not when did he stop to breastfeed and why?
- ÿ Does he have diarrhoea or vomiting?
 - If yes how frequently?
 - What type of diarrhoea (watery/bloody)
- ÿ What kind of family does he come from?
 - What is the level of education of the parents?
 - What is their level of income?
 - What is their source of water and is there a toilet? (understand the child's social background)
- ÿ Does the child have a cough for longer than two weeks (chronic cough)?

Thereafter, you should examine the child very thoroughly. You must look and feel.



Activity 6.1.2

List down the signs you will you look for when examining a child with severe acute malnutrition

Well done!

Did you have the following in your list?

Signs of some or severe circulation impairment,

Severe palmer pallor

Bilateral pitting oedema,

Eyes signs of Vitamin A deficiency

- Dry conjunctiva or corneal, Bitots spots
- Cornea ulceration
- Keratomalacia

Vitamin A deficiency may cause photophobia and the children tend to keep their eyes closed. Open the eyes gently to prevent corneal ulceration. Look for localizing signs for infection including skin infection and pneumonia. Visible severe wasting as mentioned earlier is insensitive in identifying severe acute malnutrition, tends to identify the extreme cases. It is better to use either MUAC or WHZ score as measures of wasting.

Let us now see how to examine for oedema as illustrated in Figure 6.1.5. Hold both feet with your thumb on top. Press gently for 10 seconds. A child has oedema if a dent remains when the thumb is removed.

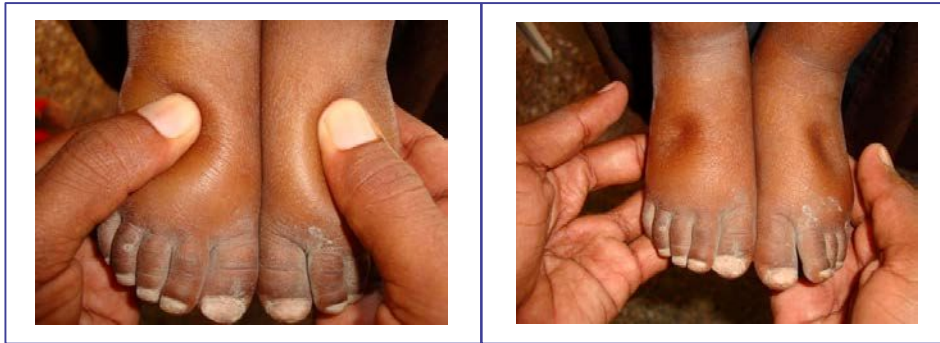


Figure 6.1.5: Checking for oedema of the feet (Photo: Geno Teofilo/Oxfam)

Check for oedema of the both feet. Look for oedema from the feet all the way up to the face and classify the severity of oedema as illustrated in the table below.

Table 6.1.2: Classification of the oedema severity

Mild (+)	Feet only
Moderate (++)	Both feet and lower legs(below the knees), hands and lower arms:
Severe (+++)	Generalized oedema including oedema on feet, legs, hands, and face.

Next you need to examine for other clinical features that may be present in a child with SAM:

- ÿ Signs of some or severe circulatory impairment (shock). These include cold hands, slow capillary refill, weak and rapid pulse
- ÿ Signs of dehydration
- ÿ Severe palmar pallor
- ÿ Eye signs of vitamin A deficiency; dry conjunctiva or cornea, Bitot's spots, corneal ulceration, keratomalacia. Vitamin A deficiency may cause photophobia and the children tend to keep their eyes closed. Open the eyes gently to prevent corneal ulceration.
- ÿ Localizing signs of infection, including ear and throat infections, skin
- ÿ Infection or pneumonia fever (temperature 37.5°C) or hypothermia (rectal temperature 35.5°C)
- ÿ Mouth ulcers
- ÿ Skin changes of kwashiorkor :
 - ÿ hypo- or hyperpigmentation
 - ÿ desquamation
 - ÿ ulceration (spreading over limbs, thighs, genitalia, groin, and behind the ears)
 - ÿ Exudative lesions (resembling severe burns) often with secondary infection (including Candida).
- ÿ Conduct an appetite test: give the ready to use therapeutic feed and assess the appetite.

You must do a full examination of the child!

The following figures illustrate the WHO WHZ score charts for boys and girls aged less than 2 years of age. These are used for a quick assessment of the nutritional status of the child



Figure: 6.1.6: WHO Weight for length chart for boys 0 to 2 years



Figure: 6.1.7: WHO Weight for height chart for boys 2 to 5 years

Weight-for-length GIRLS

Birth to 2 years (z-scores)

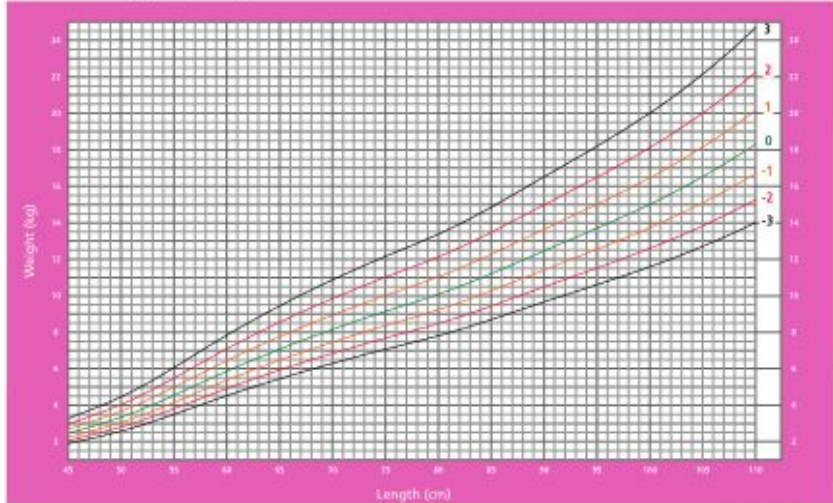


Figure 6.1.8: WHO Weight for length chart for girls 0 to 2 years

Weight-for-Height GIRLS

2 to 5 years (z-scores)

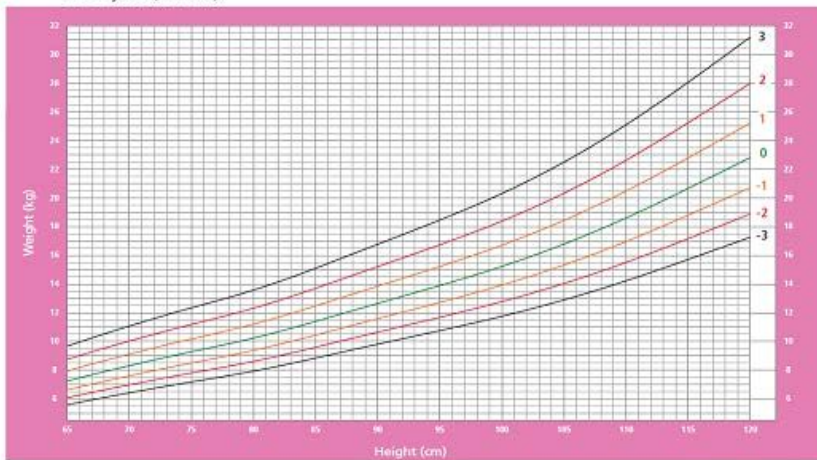


Figure 6.1.9: WHO Weight for height chart for girls 2 to 5 years

As we complete this unit take some time to carry out the following exercise



Assignment 6.1.1

Go to the Mother Child Clinic in your hospital and look at some weight for height (W/H) charts of children attending the clinic. Take and record relevant history and physical examination on two cases you identify to have a problem.

Now that we have come to the end of this unit, you should remind yourself of the highlights



6.1.5 Summary

As we come to the end of this unit, please remember that

1. Oedema and wasting (measured by MUAC or WHZ score) are two clinical signs important to diagnose severe malnutrition
 2. A relevant history and thorough examination are essential for all children with suspected severe acute malnutrition.
 - a) History should include the recent meals, previous dietary habits, appetite and history of contact with persons with measles or TB.
 - b) The child should be examined for dehydration, pallor, eye changes, and changes to mucosa and the skin
- MUAC colour coded tapes and weight for height charts are crucial in determining the level of malnutrition

6.1.6 Review Question

Please answer the following questions

1. Define the term severe acute malnutrition
2. What important questions would you like to ask the parent/guardian of a child with severe acute malnutrition
3. List some of the physical signs found in a child with severe acute malnutrition



6.1.7 References

1. **Ann Ashworth and Ann Burgess (2007).** Caring for severely malnourished children.
2. **Ministry of Health (2009)** The National Guideline for Integrated Management of Acute Malnutrition
3. **Ministry of Health (2016)** Basic Paediatric Protocols – Revised Protocols. Ministry of Health: Kenya.
4. **Reference for images images UNICEF 1986**
World Health Organization (2013). Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. WHO.

UNIT 6.2: INITIAL MANAGEMENT OF A CHILD WITH SEVERE ACUTE MALNUTRITION

Unit Outline

- 6.2.1 Introduction
- 6.2.2 Unit Objectives
- 6.2.3 Altered physiology of child with severe acute malnutrition
- 6.2.4 The 10 steps of management of severe acute malnutrition
- 6.2.5 Summary
- 6.2.6 Review questions
- 6.2.7 References

6.2.1. Introduction

This unit shall cover the altered physiology in severe acute malnutrition and the 10 steps of management



6.2.2 Unit objectives

By the end of this unit you will be able to

- i. Explain the altered physiology of the child with severe acute malnutrition
- ii. Describe the 10 steps of management of severe acute malnutrition

6.2.3 The altered physiology of the child with severe acute malnutrition

Before we continue take some time to perform the following activity



Activity 6.2.1

Look at the photograph of the child with severe acute malnutrition shown in figure 6.2.1. List down the problems you think the child may have.



Figure 6.2.1: Child with severe malnutrition

Good! All these problems arise from an alteration of the normal physiology. **Reductive adaptation** explains the unique physiology in children with severe acute malnutrition.

The basic physiology of severe acute malnutrition is protein and energy deficiency. This is the core problem but it is often accompanied by other deficiencies such as those of electrolytes, minerals, micronutrients and vitamins.

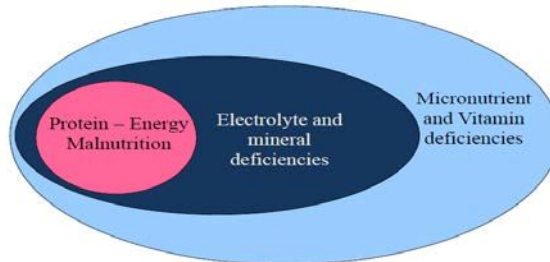


Figure 6.2.2: Deficiencies in severe acute malnutrition

Apart from the various nutrient deficiencies, the child also has increased risk of developing infections due to an impaired immune response. These children lack subcutaneous fat and therefore they are prone to hypothermia. Changes in liver function, the endocrine system and hypothermia make them prone to hypoglycaemia.

Many of these children also have a poor cardiac function that may lead to congestive cardiac failure especially if given intravenous fluid or blood transfusion without caution. At the intestinal level, there is poor motility of the intestine and also poor absorption. They also tend to have high sodium and low potassium levels in the body.

With all these derangements, a systematic approach is required to make sure that nothing is missed in the identification of problems and in managing them. This is the rationale for the 10 step approach.

6.2.4 The (10) step approach to management of severe acute malnutrition (SAM)



Question 6.2.1

With the understanding of the altered physiology of a child with SAM, what aspects should you include in the management of these children?

Good! Let us now look at the approach to the management of the child with severe acute malnutrition

The approach should be structured so that all aspects of the condition are managed appropriately

W.H.O recommends the 10 step approach of management of a child with severe acute

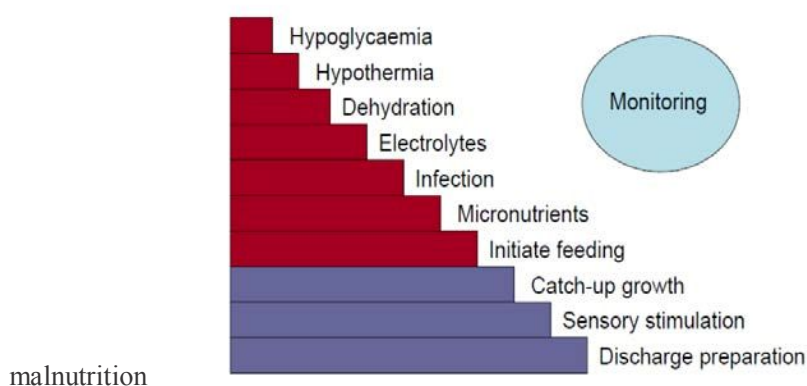


Figure 6.2.3: The 10 Step approach of management of severe acute malnutrition

The first seven steps are called the **rescue phase**. The interventions in this phase are initiated at the point of admission. The last 3 steps are the **recovery phase**, which occur after the child is stable. Throughout this management there should be constant monitoring.

Let us now look at the first seven steps (Rescue Phase). The first of these steps considers hypoglycaemia.

Step 1- Hypoglycaemia

All severely malnourished children are at risk of hypoglycaemia. Blood sugar should be measured immediately but if this is not possible it should be assumed that all children with severe malnutrition have hypoglycaemia. They should be given a feed or 10% glucose or sucrose immediately upon admission. Frequent feeding thereafter is important.

A blood sugar less than 3mmol/l is hypoglycaemia in a child with SAM.

**Question 6.2.2**

Once you have diagnosed hypoglycaemia, what measures will you take to correct it?

Good! You should indeed correct it at once.

The following actions should be taken once hypoglycaemia has been diagnosed.

- ÿ Give the first feed of F-75 if it is readily available and then continue with 2–3 hourly feeds.
- ÿ If the first feed cannot be obtained quickly give 50 ml of 10% glucose or sucrose solution (1 rounded teaspoon of sugar in three and a half tablespoons of water) orally or by nasogastric tube, followed by the first feed immediately (at least within the first 30minutes)
- ÿ Give 2–3-hourly feeds, day and night, at least for the first day.
- ÿ If the child is unconscious, treat with IV 10% glucose 5 ml/kg or, if there is no IV access 10% glucose or sucrose solution by nasogastric tube

Ensure you monitor the blood sugar levels if the equipment is available. The next step to be considered is hypothermia.

Step 2 -Hypothermia

Hypothermia is very common in malnourished children and often indicates coexisting hypoglycaemia or serious infection. If the axillary temperature is $<35^{\circ}\text{C}$ or does not register on a normal thermometer, assume hypothermia. Where a low-reading thermometer is available, take the rectal temperature. A reading $<35.5^{\circ}\text{C}$ confirms hypothermia.

Make sure the child is clothed (including the head), cover with a warmed blanket and place a heater (not pointing directly at the child) or lamp nearby. Alternatively put the child on the mother's bare chest or abdomen (skin-to-skin) and cover them with a warmed blanket and/or warm clothing. Ensure that the child is covered at all times, especially at night. Keep the head covered, preferably with a warm bonnet to reduce heat loss. Monitor the temperature two hourly.

Remember you need to check for hypoglycaemia whenever hypothermia is found.

**Activity 6.2.2**

List the measures you will take to prevent hypothermia in a child with severe acute malnutrition

Good! You should include the following measures

- ÿ Feed the child 2-hourly, starting immediately after the diagnosis is made.
- ÿ Always give feeds throughout the night and day.
- ÿ Place the bed in a warm, draught-free part of the ward and keep the child covered.
- ÿ Change wet nappies, clothes and bedding to keep the child and the bed dry.
- ÿ Avoid exposing the child to cold (e.g. after bathing, or during medical examinations).
- ÿ Let the child sleep with the mother for warmth in the night.

Now that you have taken care of hypoglycaemia and hypothermia, it is time to address dehydration

Step 3- Dehydration

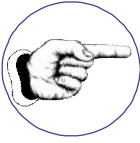
It is difficult to estimate dehydration status accurately in the severely malnourished child using clinical signs alone. Assume that all children with watery diarrhoea may have some dehydration. Severely impaired circulation (Shock) is diagnosed in these children using the same core signs as in those without malnutrition:

- ÿ Reduced level of consciousness,
- ÿ Absent or weak (low volume) peripheral.

Severely impaired circulation (Shock) is treated with special fluid plans using Ringer's lactate solution (Hartmann's solution). Administer the fluid as a slow bolus at a rate of **20mls/kg** given over **two** hours. At the end of the two hour, continue with oral (or NG) fluids. Repeat boluses are not recommended even if the child still has features of severely impaired circulation.

- ÿ Give ReSoMal (rehydration solution for malnutrition) at 10mls/kg/hour per oral or using NG for the first two hours.
- ÿ The give fluids at 5-10mls/kg.hr for the next 4-10 hours; alternate the ReSoMal with same volume of F75. The volume to give will depend on how much the child wants, volume of stools and whether child is vomiting. The Basic Paediatric Protocols provides guidance with assumption that you will give ReSoMal at 10ml/kg/hr.
- ÿ After the rehydration therapy, give F75 at the appropriate volume every 3hours as explained in Step 7.
- ÿ If the child has severe palmer pallor transfuse 10mls/kg whole blood over 3 hours as soon as it is available and then continue with appropriate volume of F75 every 3 hours.

After the IV fluid bolus for management of severely impaired circulation, if it not possible to give NG fluids (child in unarousable coma or acute abdomen) give maintenance fluids – Half Strength Darrow's (HSD) in 5% Dextrose at 100mls/kg/day (4mls/kg/hr) until it is possible to use NG route.



Take Note 6.2.1

For children with severe acute malnutrition do not routinely use the IV route for rehydration except in cases of Severely impaired circulation (Shock). The oral (or NG) route is the preferred one.

In severely impaired circulation DO NOT give more than one bolus of intravenous fluid.

Introduce F75 (same volume as the ReSoMal) after two hour of initiating ReSoMal.

Rehydration therapy in SAM is illustrated in a worked example below.



Activity 6.2.3

A 4yr old boy presents at the outpatient at 9.00am with a history of diarrhoea and vomiting for 2 weeks. When you examine him, his weight is 7kg and a MUAC of 10cm. You have stabilised him and want to correct for dehydration. His circulation is not severely impaired. He has no oedema.

How would you proceed with STEP 3 of management of this child?

Thank you.

Let us see how to correct his dehydration using ReSoMal (10ml/kg) and how to introduce F75 feeds. Check dose from the Basic Paediatric Protocols

Time	Fluid/Feed	Volume in mls
9 am	ReSoMal	70
10 am	ReSoMal	70
11 am	ReSoMal	70
12 noon	F 75	70
1 pm	ReSoMal	70
2pm	F 75	70
3pm	ReSoMal	70
4 pm	F 75	70
5 pm	ReSoMal	70
6 pm	F 75	70
7 pm	ReSoMal	70
8 pm	F 75	70
11pm	F75	113
2.00am	F75	113

Continue breast feeding throughout. Check the respiratory rate, pulse rate, urine frequency, frequency of stools and vomit. If you find signs of over hydration (increasing respiratory rate by 5/min and pulse rate by 15/min), stop ReSoMal immediately and reassess after 1 hour.

Now proceed to consider the status of the electrolyte balance in this child with severe acute malnutrition

Step 4- Electrolyte imbalances

Pre-packaged formulations F75, F100 and RUTF used in SAM contain adequate electrolytes to meet the needs of these children. The next step should now be that of infection.

Step 5 Infection

Children with SAM often do not develop fever and most times the white cell count is not elevated even when there is confirmed infection.

Assume that all children with SAM have an infection on their arrival in hospital and treat with appropriate antibiotics straightaway.



Question 6.2.3

Which antibiotics should you prescribe for the child with SAM?

Good. Antibiotics offering a broad spectrum of cover are ideal. **All** sick children with severe acute malnutrition in hospital should be started on:

- Crystalline Penicillin (or Ampicillin) for two days then high dose oral amoxicillin for 5 days.
- AND IV/IM Gentamicin 7.5mg/kg for 7 days.

In addition they also receive:

- Nystatin / Clotrimazole for oral thrush,
- Mebendazole after 7 days treatment. (deworming),
- Tetracycline eye ointment (+ atropine drops) for pus / ulceration in the eye.

You are doing well so far. It is now time to look at micronutrient deficiencies.

Step 6 Micronutrient deficiencies

Before we proceed with the discussion, please answer the following question.



Question 6.2.4

Which vitamin deficiency is associated with the signs shown in the photograph (6.2.4)

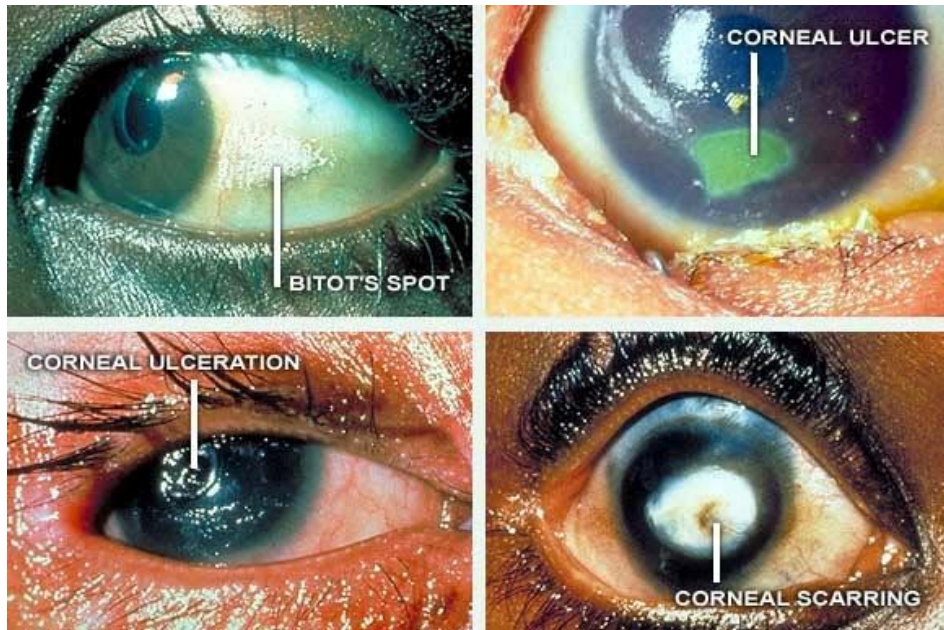


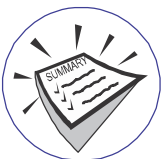
Figure 6.2.4: Eye signs of Vitamin deficiency

Was your answer Vitamin A deficiency?

Good! To treat these complications (Bitot spots, corneal ulcer, corneal ulcerations and corneal scarring) and irreversible blindness – high dose vitamin A must be given. If there are no eye signs high dose Vitamin A is not recommended, the Vitamin in the pre-packaged F75/F100 is adequate.

To correct micronutrient deficiencies give:

- o High dose Vitamin A to children with eye signs: 200,000 iu on admission, on Day 2 and on Day 14 (100,000 iu if aged < 12 months).
- ÿ The pre-packaged F75/F100 had adequate micronutrients, if given at the right dosage, to correct micronutrient deficiencies. These micronutrients include Vitamin A and other vitamins, folic acid, zinc and copper. However, should be prescribed be given if pre-packaged F75/100 are not available.
- ÿ Start iron ONLY when the child is gaining weight.



6.2.5 Summary

As you conclude this unit

- Severe acute malnutrition causes an alteration in the normal physiology resulting from:
 - o Protein and energy deficiency;
 - o Deficiencies such as those of electrolytes, minerals, micronutrients and vitamins;
 - o Impaired immune response leading to infection;
 - o Lack of subcutaneous fat making them prone to hypothermia;
 - o Changes in liver function, the endocrine system and hypothermia makes them prone to hypoglycaemia
- A structured approach is required in management of SAM and the 10 step approach.

We have discussed the first six steps:

1. Hypoglycaemia
2. Hypothermia
3. Dehydration
4. Electrolytes
5. Infection
6. Micronutrients no iron with iron

6.2.6 Review questions

1. What are the physiological changes that occur in a child with severe acute malnutrition
2. List the ten steps of managing SAM
3. How do we prevent hypothermia and hypoglycaemia?
4. How do we manage dehydration in a child with severe acute malnutrition?
5. What are the first line antibiotics that we use in a child with severe acute malnutrition?
6. List the minerals and electrolytes that we replace in a child with severe acute malnutrition



6.2.7 References

1. **Ann Ashworth and Ann Burgess (2007).** Caring for severely malnourished children.
2. **Ministry of Health (2009)** The National Guideline for Integrated Management of Acute Malnutrition
3. **Ministry of Health-Kenya (2016).** Basic Paediatric Protocols
4. **World Health Organization (2013).** Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. WHO.

UNIT 6.3: NUTRITIONAL TREATMENT OF A SEVERELY MALNOURISHED CHILD

Unit Outline

- 6.3.1 Introduction
- 6.3.2 Unit objective
- 6.3.3 Initiation of feeding
- 6.3.4 Catch up feeding
- 6.3.5 Rehabilitation and Monitoring
- 6.3.6 Discharge of patient
- 6.3.7 Summary
- 6.3.8 Review Questions
- 6.3.9 References

6.3.1 Introduction

In unit 6.2 we have discussed initial six steps of the rescue phase. In this unit we shall look at Step 7, last and very important step of the rescue phase: the initiation of feeds, the recovery phase, and the criteria for discharging home.



6.3.2 Unit Objectives

By the end of this unit, you should be able to:

- i. Describe the initiation of feeds in a severely malnourished child
- ii. Describe the feeding process during the recovery phase
- iii. Explain the process of monitoring and rehabilitation
- iv. Describe the criteria for discharging the child home.

6.3.3 Starting the initial feeds – F75



Question 6.3.1

At your hospital, how do you initiate with feeds in a child with severe malnutrition?

Good. Now let us compare with the following information

In the initial phase, a cautious approach is required because of the child's fragile physiological state.

Essential features of initial feeding are:

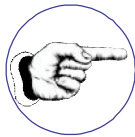
- Frequent small feeds of low osmolality and low lactose
- Oral or nasogastric feeds (never parenteral preparations) should be used. Vomiting is NOT a contraindication to feeding. If the child is breastfed, continue with this, but make ensure the prescribed amounts of feeds are given
- Feeds are the 'drug' to cure malnutrition; they are a priority (after correction of dehydration if required).

The preferred starter formula is called F-75; it provides 75 Kcal and 0.9 grams of protein/100ml. This is a pre-packed formula. If it is not available, you can make F75 from water, skimmed milk, oil and sugar. [Refer to the WHO Pocket Book for Hospital Care of Children for preparation formula]

F-75 is used as follows;

- 130 ml/kg/day in a child without oedema (or has mild/moderate)
- 100 ml/kg/day in a child with severe oedema.

This starter feed is maintained at this volume until when the child's appetite improves. At this point the child is ready receive F100 or ready to use therapeutic feed (RUFT).



Take Note 6.3.1

We don't give more because the body of a child with SAM cannot tolerate more

- Too vigorous re-feeding has been associated with increased mortality.

The starter feeds should be given 3 hourly (8 feeds per day). This means at night too! The very sick children may be feed every 2 hours, if staffing allows, but graduate to 3 hourly feeds as the child improves.

During this period that lasts 2 - 7 days, you should monitor and record the following

- Amounts of feed offered and left over
- Vomiting
- Stool frequency and consistency
- Daily body weight

Before we proceed, take some time to perform activity 6.3.1



Activity 6.3.1

Prescribe the initial feeds of F-75 for this wasted child weighing 10 kg. He has no oedema.



Good! $130\text{mls/kg/day} = 1300\text{mls}$ (165mls feed 3 hourly) of F-75

We have managed the initial phase of this child with SAM well and can expect that he will progress into the recovery phase.

6.3.4 Catch up Growth (Recovery Phase)



Question 6.3.2

How will you know that the child has stabilised and is ready to move on to larger volumes of feed?

Good. Now compare your answer the following information

Appetite and activity level, not weight change, denotes recovery in the first week. F-75 feeding is usually **not** associated with weight gain. Weight loss may even occur in children whose oedema is improving so **Do not panic!** Ensure at least 100 mls/kg/day of F75 has been given.

Changing to F-100 from F-75:

Change to F-100 at same volume as F-75 and maintain that volume for two days while monitoring the child.

F-100 has more calories and protein per volume compared with F-75 as illustrated in table----

Table 6.3.1: Contents of selected components of F-75 and F-100

Contents per 100ml	F-75	F-100
Energy (Kcal)	75	100
Protein (grams)	0.9	2.9
Potassium (mmol)	4.0	6.3
Sodium (mmo l)	0.6	1.9
Magnesium (mmol)	0.43	0.73

By giving the volume of F-100 as F-75 given in the initial period, the child receives higher energy while the protein and sodium content is more than tripled. It is therefore important to have gradual translation to F-100. On the third day, after changing to F-100, increase each successful feed by 10ml until some feed remains uneaten. At this point the child should be able to feed using cup (with or without a spoon).



Question 6.3.3

What are the complications that can develop during the introduction of F-100 and how can they be prevented?

Well done! Acute heart failure may develop during the introduction of F-100 and can be prevented by carefully monitoring the patient and decreasing the volume of feeds if necessary. Alternatively ready-to-use therapeutic food (RUTF) may be used after two days of successful translation to F-100. This will be applicable if the child has good appetite.

A sachet of 92gm of RUTF provides 500kcal. The amount of RUTF should provide 200kcal/kg/day. Unlike F100, RUTF contains iron in addition to other minerals and vitamins and thus it is not necessary to give iron during the recovery phase.

Encourage the child to eat as often as possible. A child on RUTF should drink plenty of clean water, from a cup, as the child eats the RUTF. If child still breastfeeding, the child should breastfeed before every RUTF feed.

Ask yourself if this child needs to be in hospital. Home is best for rehabilitation

Appetite is the most important criterion in choosing feeds. If the appetite is clearly very good, use Ready-to-Use Therapeutic Feeds (RUTF) or F100 if still admitted



Figure 6.3.1: A child in the catch up growth phase (recovery phase)

We can end by remembering that the management of a child with severe acute malnutrition should follow a well structured feeding plan

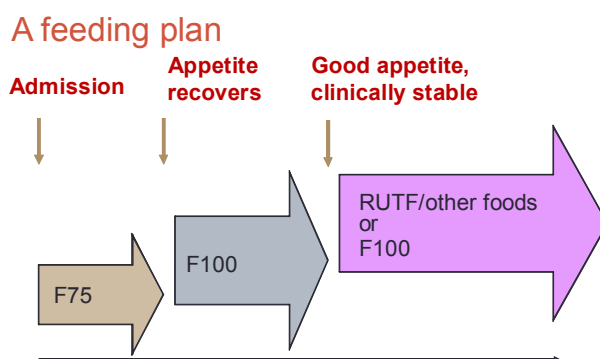


Figure 6.3.2: A feeding plan for a child with severe acute malnutrition

6.3.5 Rehabilitation and Monitoring

Before proceeding to the next section, take some time to undertake the following activity (6.3.2)

	<p>Activity 6.3.2</p> <p>write down the measures undertaken at your institution to rehabilitate children with severe acute malnutrition</p>
--	--

Good! We will proceed with the rehabilitation phase of the care of a child with severe acute malnutrition.

At this point solid food can be introduced slowly, increasing to 5 meals a day. Make sure the caregiver is aware what kinds of foods the child should be taking. Pure maize porridge is inadequate.

Let the child feed in between the main meals. Continue breast feeding throughout. One week after admission, if the child is feeding well iron and mebendazole can be introduced.

The child should by now be much more lively and interactive (normal!). This should be encouraged ideally by providing toys and an environment in which the child can play. As the child is showing signs of recovery it is also very important to educate the mother about nutritional care of children and begin the process of preparation for discharge.

The process of monitoring is crucial during the recovery phase. This includes clinical symptoms and weight. The monitoring requirements at the various phases of care is shown in Figure 6.3.3

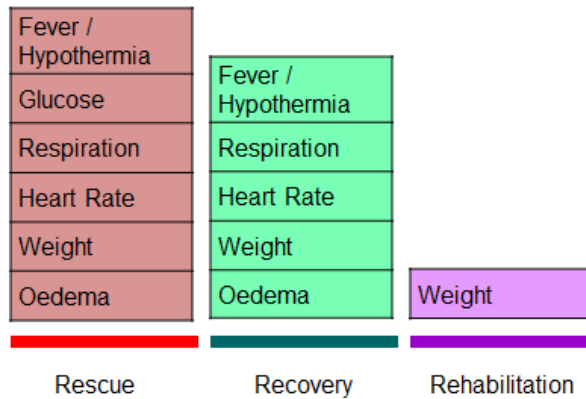


Figure: 6.3.3 Monitoring parameters in severe acute malnutrition

Please remember that feed intake must be monitored throughout. If there is concern for heart failure due to overfeeding (increased pulse rate and respiratory rate), then you should reduce the feed amount/ volumes to 100ml/kg for 24 hours after which it can be increased gradually to 115ml/kg after 24 hours and to 130ml/kg after 48 hours.

Progress at this stage is measured by weight gain. Calculate and record the weight gain every 3 days as g/kg per day.

Target weight gain is > 10g/kg/day. Lower rates warrant action:

- < 5g/kg/day - child requires a full re-assessment
- 5 – 10g/kg/day - is intake inadequate or there is untreated infection
- > 10g/kg/day - continue with feeding plan



Activity 6.3.3

Calculate the weight gain for a child who currently weighs 6.3 kg and weight 3 days ago was 6.0kg.

Good. Compare your findings with the calculation in table 6.3.2

Table 6.3.2: Calculating weight gain

CALCULATING WEIGHT GAIN
<p>This example shows how to calculate weight gain of a child. It is for a weight gain over 3 days:</p> <ul style="list-style-type: none"> ■ Current weight of the child in grams = 6300 g ■ Weight 3 days ago in grams = 6000 g <p>Step 1. Calculate weight gain in g ($6300 - 6000 = 300$ g)</p> <p>Step 2. Calculate average daily weight gain ($300\text{g} \div 3 \text{ days} = 100\text{g/day}$)</p> <p>Step 3. Divide by child's average weight in kg ($100 \text{ g/day} \div 6.15\text{kg} = 16.3 \text{ g/kg/day}$).</p>

6.3.6 When to discharge

You should be comfortable to discharge, if the patient has:

- ÿ Completed antibiotics
- ÿ Good appetite and gaining weight
- ÿ Lost any oedema
- ÿ Appropriate support in the community or home

You should discharge on RUTF and ensure the Mother / carer:

- ÿ Is Available
- ÿ Understands child's needs
- ÿ Is able to supply needs



6.3.7 Summary

1. Initiation of feed for the severely malnourished child is with F75 at 100ml/kg/day if oedema is present and 130ml/kg/day without oedema
2. Feeds should be maintained with F75 at the same volume until the child's appetite improves. The feed can then be changed to F100 or RTUF and increased gradually until there is some leftover
3. In the recovery phase the child should be monitored using amounts of:
 - ÿ feed offered and left over
 - ÿ daily body weight
4. The child is fit for discharge if he has completed antibiotics
 - ÿ Good appetite and gaining weight
 - ÿ Lost any oedema
 - ÿ Appropriate support in the community or home

6.3.8 Review Question

1. Define severe acute malnutrition
2. Describe the clinical criteria for diagnosis of severe acute malnutrition
3. List the 10 steps of management of severe acute malnutrition
4. Which is the preferred starter formula for children with severe acute malnutrition?
5. What is the starting volume of the first feed for a child with no oedema?
6. When do you change from the F-75 to F-100?
7. When do you prescribe RUTF to patients?
8. Which parameters should be monitored during the recovery phase?
9. List the requirement for discharge of a child with severe acute malnutrition.



6.3.9 Reference

1. **Ministry of Health (2009) The National Guideline for Integrated Management of Acute Malnutrition**
2. **Ministry of Health-Kenya (2016).** Basic Paediatric Protocols
3. **World Health Organization (2013).** Pocket book of hospital care for children. Guidelines for the management of common illnesses with limited resources. WHO.

MODULE 7

Child Rights and Standards of Care

MODULE INTRODUCTION

Well done for the tremendous progress you have made so far!

In this last module of the ETAT+ curriculum, we will be reviewing the rights of children and the standard of health care offered to them based on the legislative framework and policies in place.

This module has 2 units:

Unit 7.1: The rights of the child

Unit 7.2: Standards of care



MODULE OBJECTIVES

By the end of this module, you should be able to:

1. Outline the rights of the child.
2. Describe the standards of care.


UNIT 7.1: THE RIGHTS OF THE CHILD

Unit Outline

- 7.1.1 Introduction
- 7.1.2 Objectives
- 7.1.3 Legislative framework for the rights of children
- 7.1.4 Summary
- 7.1.5 References
- 7.1.6 Review questions

7.1.1 Introduction

In this unit, we will be focussing on the rights of children and how we can ensure that these rights are respected within the health care system by offering child friendly services.

	<p>7.1.2 Objectives</p> <p>By the end of this unit, you should be able to: Discuss the legislative framework for the rights of children with regards to provision of health in the context of ETAT+</p>
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7.1.3 Legislative Framework for the Rights of Children

You may be aware of several legislative frameworks for the rights of children in existence. In this unit, we will focus on two of these frameworks that inform children's right to health.

United Nations Convention on the Rights of the Child

In 1989, the world's leaders officially recognized the human rights of all children and young people less than 18 years by signing the UN convention on the rights of children (UNCRC). This is the most complete statement of children's rights ever produced and is the most widely-ratified international human rights treaty in history. Kenya has been a signatory to the UNCRC since 1990.

You may be aware some of these rights, take a moment to carry out activity 7.1.1 before we proceed.

	<p>Activity 7.1.1</p> <p>List the rights of children you are aware of.</p>
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Good! The rights of children outlined in the UNCRC can be classified into four broad categories:

- The right to survival
- The right to development
- The right to participation
- The right to protection

In which categories do the rights you have listed fall in?

The current UNCRC is presented in 3 parts (I, II and III) and addresses various policies on rights under articles (1-54). You will notice that most of the articles that apply to health are in part I of the document and we will outline a few of them that apply in the context of ETAT+. We have provided a reference at the end of the units for further reading in your free time. Now let us go through some excerpts of the articles in the 1990 convention on the rights of the child that apply to you as a health care provider and to all responsible for a child's health.

The first is Article 1 which defines a child and states:

“For the purposes of the present Convention, a child means every human below the age of 18 years unless the laws of a particular country set the legal age for adulthood younger”



In text Question 7.1.1

What investigation discussed in previous modules in this course would require you to take the age of the patient into consideration before performing it? Why is the age factor to consider?

Good! The HIV test is one you would need to take age into consideration. This is because any one under the age of 18 years cannot give consent according to the laws of the land. A legal guardian should give an informed consent before you perform an HIV test on a child. There may be a few situations where a person under the age of 18 years may give consent but this is beyond the context of ETAT+ and will not be discussed in this course.

Another section applicable to you as a health care provider is article 6 that states that:

- “1. Parties recognize that every child has the inherent right to life”
- “2. Parties shall ensure to the maximum extent possible the survival and development of the child”

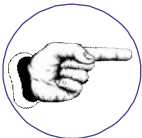
The modules you have covered so far have been aimed at helping you recognize conditions that are likely to cause severe morbidity and mortality and hence improve child survival.

Article 23 of the UNCRC recognizes the rights of the disabled as stated in the following excerpt:

“Parties recognize that a mentally or physically disabled child should enjoy a full and decent life, in conditions which ensure dignity...”

Lastly, article 24 addresses standards as well as quality of health care that a child is entitled to as the following excerpt states:

“Parties recognize the right of the child to the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health”

	<p>Take note 7.1.1</p> <p>We have focused only on sections that may be relevant to you in the context of ETAT+. We recommend that you familiarize yourself with the full convention in your own free time but you are not expected to memorize it.</p>
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We have discussed an important international legislative framework; next, let us discuss our national legislative framework.

Africa Charter for the Rights and Welfare of the Child 1999

In 1999, the African Charter for the Rights and Welfare of the Child came into force. This charter, signed by member states of the African Union, has several articles addressing the rights of the child. Some excerpts relevant to you as a health care provider include:

Article 4 section 1: *“In all actions concerning the child undertaken by any person or authority the best interests of the child shall be the primary consideration”*

Article 5 section 1: *“Every child has an inherent right to life. The right shall be protected by law”*

Article 14 section 1: *“Every child shall have the right to enjoy the best attainable state of physical, mental and spiritual health”*

You can access the full charter later via the link provided in the reference section of this unit and read the various articles further.

The Constitution of Kenya 2010

You may be aware of the provisions of the current constitution in addressing the rights of children.



Activity 7.1.2

In your notebook, list the provisions in the Kenyan constitution that touch on the rights of children

Thank you! Children are entitled to the rights and fundamental freedoms outlined in the bill of rights (chapter 4 of the constitution). In addition, section 53 addresses the specific application of rights to children. Some excerpts include:

Every child has the right:

• *to basic nutrition, shelter and health care*

• *to be protected from abuse, neglect, harmful cultural practices, all forms of violence, ...*

• *to parental care and protection*

Feel free to read more on this in a copy of The Kenyan Constitution, 2010.

The Children Act: Act Number 8 of 2001

This is an act of the Kenyan parliament that came into operation on 1st March 2002. Its purpose is:

- to make provision for parental responsibility, fostering, adoption, custody, maintenance, guardianship, care and protection of children;
- to make provision for the administration of children's institutions;
- to give effect to the principles of the Convention on the Rights of the Child and the African Charter on the Rights and Welfare of the Child and for connected purposes

Let us discuss some of the sections that were passed in the Children Act of Kenya 2001 will be relevant to you as health care worker include:

- i. “Every child shall have a right to health and medical care which shall be the responsibility of the parents and the Government”
- ii. “In all actions concerning children ... the best interests of the child shall be a primary consideration”
- iii. “No child shall be subjected to discrimination on the ground of origin, sex, religion, creed, custom... social, economic or other status...”
- iv. “A disabled child shall have the right to be treated with dignity”.

Now, take a look at the case scenario 7.1.1 and answer the questions that follow:

Scenario 7.1.1

A 4 years old boy is brought to your hospital. He is sick with fever and severe acute malnutrition. He looks neglected. His parents are both drunk and disorderly. They decline admission and want him to go home for the child to assist them brew more liquor for the upcoming public holiday.

Questions:

- 1) Are there rights of this child that are being infringed? If so, write down a list of these rights.
- 2) What are the responsibilities of the different stakeholders in addressing this scenario:
 - a) The parents
 - b) The health care givers

The government?

Thank you! Indeed the rights of these children are being infringed. You may want to refer to the previous sections in this unit outlining the rights of children as per the UNCRC, the African Charter for the Rights and Welfare of Children, the Kenyan Constitution and the Children's Act. Use the excerpts quoted to update the list that you had developed.

Various stakeholders have a responsibility to ensure the rights of these children are provided for:

- a) The parents or caregivers of the children are their primary providers. They ought to ensure the children are well fed and free from neglect and abuse. If they are not able to provide, they should seek help from well-wishers and the state
- b) The teachers and health care providers are advocates for the children to establish the best attainable education and health care. Measures that can be taken include parental education to address such things as alcohol abuse, involvement of security agents and the Children's Office at the District Commissioner's office. Establishing a school feeding program may also be an option.
- c) The government is the enforcer of the rights of its people, including children. Whether through Children's office, ministries of education and health, security enforcement agencies, the judiciary or other state machinery, the government ensures the provision of the rights of children.

It will be interesting to share the points you listed and your thoughts on this case with your colleagues during the attachment sessions of this training.



7.1.4 Summary

In this unit you have learnt the legislative framework for the rights of children with regards to provision of health in the context of ETAT+.

These are:

1. The UN Convention of the Rights of Children
2. The African Charter of the Rights and Welfare of the Child 1999
3. The Constitution of Kenya 2010
4. The Children Act: Act Number 8 of 2001

7.1.5 Review Questions

1. List the 5 basic rights that the UN Convention on the Rights of Children addresses.
2. Write down excerpts from the children act of Kenya that apply to you as a health care provider.



7.1.6 References

1. The African Charter on the Rights and Welfare of the Child:
<http://www.au.int/en/content/african-charter-rights-and-welfare-child>
2. The Children Act: Act Number 8 of 2001:
http://www.kenyalaw.org/kenyalaw/klr_app/frames.php
3. The Constitution of Kenya 2010:
<http://www.kenyalaw.org/klr/index.php?id=741>
4. The UN Convention on the Rights of Children:
<http://www.unicef.org.uk/UNICEFs-Work/Our-mission/UN-Convention/>

UNIT 7.2: STANDARDS OF CARE FOR CHILDREN

Unit Outline

- 7.2.1 Introduction
- 7.2.2 Objectives
- 7.2.3 The Standards of Care for Children
- 7.2.4 When to Admit and Discharge Children
- 7.2.5 Summary
- 7.2.6 Review Questions
- 7.2.7 References

7.2.1 Introduction

In the previous unit you were introduced to the legislative frameworks that are in place to address the rights of children. We will now focus on the standards of care that are expected of both you and your institution based on national policies that have been put in place.



7.2.2 Objectives

By the end of this unit, you should be able to:

1. Describe the standards of care for children
2. Determine when to admit and discharge children

7.2.3 The Standards of Care for Children

The approach of the care of the sick child extends from the individual patient encounter, to their living environment and health care facility and ultimately the government as has been illustrated as four levels in figure 7.2.1.

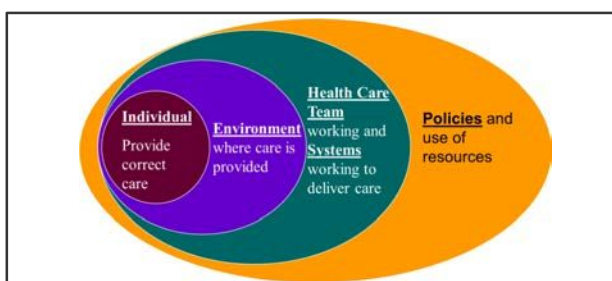


Figure 7.2.1: Conceptual framework of the standards care for the care of the sick child.

Let us now look at each level and describe the roles and responsibilities of each.

Individual Health Care Worker

As health care worker, you are the basic unit to quality health care to your patient.



In text question 7.2.1

What is the most important thing you can do for your patients as a health care worker?

Good try! Providing correct care is your key role.

You are therefore expected to make a correct diagnosis, institute correct treatment that is safe and effective and monitor progress of the patient. All these should be done with the utmost respect for the child and family. This includes the involvement of the caregiver in the management and care of the child.

Your role as a health care worker is directly linked to the environment in which you work. Let us see what this entails.

Environment

You should ensure that the environment, in which you work, is clean and safe for you to most importantly your patient. You should also ensure that the child will get continuous support from their caregivers.

Take a few moments and reflect on the facility where you work in answering the in-text question 7.2.2.



In-text Question 7.2.2

What key factor would you put in place to provide a good environment for caring for a sick child?

Hygiene – this is the most important factor in ensuring there is a good environment for caring for the sick child.

You should have access to hand washing facilities as illustrated in Figure 7.2.2; cleanliness of the all the clinical areas, as well as the rest of the facility; correct waste disposal practices as illustrated in Figure 7.2.2; maintenance of clean public toilets and bath areas; ensuring clean cots, mattresses and bed linen for the sick infants as well as their caregivers.



Figure 7.2.2: Un-clean, versus, clean sink for hand washing.



Figure 7.2.3: Improper waste disposal versus organized waste disposal.

You may have thought of many more factors; list them down in your notebook and share with the rest of the class when you meet them during your practical sessions.

	<p>Take Note 7.2.1 Environment here does not only refer to the health care facility but also the child's environment at home.</p>
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Having discussed these levels, let us now discuss how they are linked to the health care team and system.

Health Care Team and System

At the level of the health facility, it is vital to have a multi-disciplinary team (MDT) that periodically comes together to discuss matters that affect service delivery within the health facility.

	<p>In text question 7.2.3 What is the role of the MDT? Who should be represented in the MDT?</p>
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Good try! Let us discuss key elements.

The role of the MDT is to support a well-structured support system for quality assurance and quality control in service delivery. The MDT should also serve as a link to the community systems in place in that particular setting.

In general, anyone providing a service in a health facility forms a part of the multi-disciplinary team however, each service delivery point should have a representative. Usually these would be the people heading the various service delivery points or appointed by their head of department to take part in MDT activities. These would include medical doctors, clinical officers, nursing officers, pharmacy and laboratory representatives, nutritionists, social workers and counsellors, administrators and in some cases, community health workers and beneficiaries of services offered in the facility such as peer educators take part in MDT activities.

For these teams to work effectively to meet their objectives, supportive leadership and teamwork is required.



In-text Question 7.2.4

What should be available to all health care providers in order to provide quality care to their patients?

Good! An enabling working environment, a supportive team and yes! A supportive and well-structured health system should be in place. We will discuss these under the following categories:

- i. Organization of hospital care
- ii. Equipment
- iii. Diagnostic services
- iv. Essential drugs and fluids

Let us now see how each of these contributes to the standards of healthcare that should be offered to children.

- i. Organization of hospital care

The out-patient departments, including the casualty or accident and emergency departments, the maternal and child health (MCH) and where any other paediatric out-patient services are offered should have a system in place for assessment, triage and emergency services as well as adequate coverage by qualified health care providers throughout the departments' operational hours. An adequate number of skilled health care workers is essential to achieve quality health care.



In-text Question 7.2.5

I am sure most seriously ill children in your facility are cared for in the in-patient department. Why is this so?

You may have considered that this is the section where they would receive closest attention, monitoring modalities. We recommended that critically ill children have their vital signs observed at least 4 times a day, all patients should be reviewed daily (including weekends and holidays!) by a doctor or clinical officer and a clinician is available 24 hours a day to review very sick children when requested.

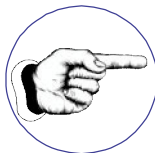
Having discussed how each of the service delivery area should be organized, what other modalities need to be in place in support of the system.

ii. Equipment

Here, we are referring to equipment that would be required for continuum provision of quality care from the moment the infant or child comes to the triage area to the in-patient department. The basic minimum comprises:

- ÿ Weighing scales, MUAC tapes, length/height boards (stadiometers), for infants and children
- ÿ Resuscitation equipment availed on a tray or trolley such that it is ready for immediate use as has been described in previous modules
- ÿ Pulse oximeters
- ÿ Oxygen sources, regulators and oxygen delivery equipment
- ÿ Suction equipment
- ÿ Nebuliser or spacer device to treat asthma
- ÿ Phototherapy equipment
- ÿ Infant warming devices

Also recall the lists of equipment you discussed in Modules 2 (triage and emergency care) and 5 (neonatal care)



Take Note 7.2.2

All appropriate job aids and equipment should be available and accessible to the health care provider at all times.

There should be a regular system of cleaning and checking the equipment taking place in each service delivery point.

iii. Diagnostic services

Diagnostic services refer to the laboratory and imaging support required as adjuncts to making a clinical diagnosis. These can be classified depending on need as essential, high priority or desirable as has been outlined in Table 7.2.1

Table 7.2.1: Prioritizing diagnostic tests.

Laboratory Test	Necessity of the Test
Malaria slide	Essential
HIV tests	
Cross match & blood bank	
Malaria Rapid Diagnostic Tests (RDT)	
Haemoglobin	
CSF - WBC and Gram	High Priority
Glucose	
Urinalysis	
Plain radiology	
Bilirubin	Desirable
Sickle cell test	
Culture of CSF, urine or aspirates	
Stool microscopy: Giardiasis, Amoebiasis	

iv. Essential Drugs and fluids

There are certain drugs and resources that you require to have at your facility as a minimum.

- ÿ Salbutamol for inhaled therapy
- ÿ Chloramphenicol injection
- ÿ Phenobarbitone injection
- ÿ Vitamin K, 1mg vials
- ÿ Oral potassium – tabs or syrup
- ÿ Feeds for malnourished children
- ÿ Supplementary feeding for neonates if expressed breast milk is inadequate

Essential Drugs and fluids

Hospitals should have as minimum the following drugs/ fluids in outpatient area and wards. The following list is related to the conditions covered in ETAT plus course:

1. Glucose 10% and 50%
2. Normal saline
3. Half strength Darrow's
4. Ringers lactate solution or Hartmann's
5. Diazepam
6. Phenobarbital
7. Corticosteroids
8. Crystalline Penicillin
9. Gentamicin
10. Injectable 3rd generation cephalosporins
11. Oral Chloramphenicol
12. Injectable Chloramphenicol
13. ORS
14. Ciprofloxacin
15. Cotrimoxazole
16. Fluconazole
17. Frusemide
18. Iron supplements
19. Zinc sulphate
20. Paracetamol
21. Nystatin
- 22.
23. Quinine
24. Artesunate
25. Artemisinin combination drugs
26. Mebendazole
27. Potassium chloride 15%
28. Metronidazole
29. Nevirapine for prophylaxis.
30. Isoniazid for prophylaxis.
31. ART for PEP
32. Multivitamins
33. Parenteral Vitamin K
34. Vaccines –BCG, polio, Pentavalent, pneumococcal, tetanus toxoid, measles.
35. salbutamol – metered dose inhaler , Respirator solution for use with nebulizers
36. Budesonide inhaler
37. ReSoMal
38. F75, F100, Ready-to-use therapeutic food:, Appropriate breast milk substitute
39. 4% Chlorhexidine solution
40. Anti-TB,
41. Atropine eye solution,
42. chloramphenicol or tetracycline eye drops
43. Vitamin A capsules

These essential drugs should be regularly checked and an updated check list kept. Older drugs nearer to expiry should be used first.

Let us now discuss the final level that is crucial in maintaining good standards of care.

Policy and use of resources

The health care team requires guidance and technical support in order to offer quality service delivery. This includes policies formulated and implemented from the international and national levels and extending to the facility level.



In text Question 7.2.6

What policy are you aware of that supports feeding of the newborn?

Good try! The Baby-Friendly Hospital Initiative supports promotion of breastfeeding of the newborn as shown in Table 7.2.2.

Table 7.2.2: Ten Steps to Successful Breastfeeding

1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within one half-hour of birth.
5. Show mothers how to breastfeed and maintain lactation, even if they should be separated from their infants.
6. Give newborn infants no food or drink other than breast milk, unless medically indicated.
7. Practice rooming in - that is, allow mothers and infants to remain together 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

More examples of policies that support standards of care include:

- a. All mothers should EXCLUSIVELY breastfeed for 6 months and encouraged to breastfeed up to 2 years (1 year in HIV infected mothers) as they give complimentary feeds.
- b. All babies born in hospital or admitted aged < 2 weeks should receive intramuscular Vitamin K.
- c. All babies born in hospital should receive prophylactic antibiotic eye drops / ointment.
- d. All admissions aged more than 2 months should receive oral Vitamin A according to guidelines unless the child has received a dose within the last 1 month.
- e. All children attending or admitted to hospital should have their immunisation status checked AND missed immunisations given.
- f. Weight and nutritional status must be assessed in all admissions.
- g. The mother or other caretaker is allowed to stay with the sick child at all times during the hospital stay if they wish.
- h. Oral rehydration: The mother administers the ORS to her child when appropriate.

- i. Child hygiene: the mother is encouraged to wash her child.
- j. Monitoring: The caregiver collaborates in monitoring the child's care, including when he/she is in a critical condition.
- k. Health personnel treat the families with respect and listen to them.
- l. The mother is informed about her child's diagnosis and treatment and is engaged as a partner in treatment particularly for chronic conditions.
- m. The mother receives health education and support focusing on the care of the child during his/her hospital stay such as the frequency and quality of feeding.

You can read more about the policies listed above using the links in the references section of this unit.

7.2.4 When to Admit and Discharge Children

So far we have learnt of the standards of care that we should aim to give based on national and international policies. We will now discuss about when to admit and later discharge children.

Admission of Children

You may have heard some people complaining of either unnecessary admissions or being turned away from a hospital facility when they expected an admission to have been done.

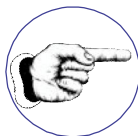


In-text Question 7.2.7

Is there a criterion for admitting children in Kenya?

Yes there is! You may have considered that children meeting any of the following criteria require admission:

- for diagnostic work up and treatment for one or more diseases with a severe classification
- children requiring parenteral fluids
- parenteral antibiotics
- oxygen therapy for acute illnesses
- nutritional rehabilitation for severe acute malnutrition
- nursing and surgical care
- poisoning should be admitted




Take Note 7.2.3

- Painful procedures should be avoided when less traumatic alternatives are available e.g. use oral therapy where possible.
- Blood sampling and other tests should be planned to avoid multiple procedures.

Discharge of Children

Consider the case below and do the exercise that follows:

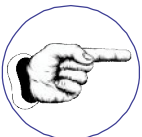
	<p>Activity 7.2.1</p> <p>A 5 year old girl was admitted 5 days ago with a diagnosis of very severe pneumonia. She is now doing much better: has been off oxygen for 3 days, able to feed orally, on oral antibiotics for two days now and tolerating it well. The doctor would like to discharge her, but her mother is resistant given that the child was “very sick” and she is not comfortable to go home with her as yet.</p> <p>You are asked to counsel her mother regarding the management of this case.</p> <p>Note down your responses to the following:</p> <ol style="list-style-type: none"> Outline the factors in this case that may have influenced the decision to discharge her. What additional factors will you ask about to determine whether there can be reason to reverse the discharge decision?
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Thank you. You may have noted that in general, no child should stay in hospital if

- ÿ they are able to feed normally
- ÿ parenteral medication, fluids or oxygen have been stopped for more than 48 hours
- ÿ management does not require daily review by a health care provider

Remember to ensure that reasonable care can be expected at home.

Caregivers should be educated on the child's current diagnosis, the treatment they need to continue taking, duration and frequency of treatment, possible preventive measures and early warning signs that would warrant an urgent review prior to the scheduled follow up visit.

	<p>Take Note 7.2.4</p> <p>Always document the patient's diagnosis at discharge, management offered while in hospital, management planned upon discharge to facilitate continuity in management of the infant or child in the discharge summary which the caregiver will take home. A copy of the discharge summary should remain in the patient's file.</p>
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In all cases, you should ascertain that follow up visit is arranged for the patient, when needed, before discharge and this should be at the health facility closest to the patient's home that can provide the necessary care.



7.2.5 Summary

In this unit, you have we have described the standards of care for children that should be offered in four levels. These are:

- ÿ Individual health care worker.
- ÿ The environment
- ÿ Health teams and systems.
- ÿ Policy and use of resources.

We have discussed the criteria that should be used to admit and discharge seriously ill children.

7.2.6 Review questions

1. List the 4 levels of standards of care.
2. Write down the criteria for you would use for admitting a seriously ill child.
3. When would you discharge this seriously ill child?



7.2.7 References

1. 4th WHO Model List of Essential Medicines for Children's (April 2013)
2. **English M, Esamai F, Wasunna A**, et al. Assessment of inpatient paediatric care in the first referral level hospitals in 13 districts in Kenya. Lancet 2004.
3. **Nolan T, Angos P, Cunha AJ, et al**. Quality of hospital care for seriously ill children in less-developed countries. Lancet 2001.
4. The Baby-Friendly Hospital Initiative – UNICEF on <http://www.unicef.org/programme/breastfeeding/baby.htm>

Emergency Triage Assessment and Treatment - Plus (ETAT+)



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Kenya Medical
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