MANAGEMENT OF SICK AND SMALL NEWBORNS

TRAINEE MANUAL

FIELD TEST VERSION
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INTRODUCTION

Each year in South Africa, 20,000 newborns die, most from preventable causes, thus contributing significantly to both infant and child mortality. Most births and most newborn deaths occur in hospitals. Improving the quality and timeliness of care is a critical step to save these lives. Since 2003 the Limpopo Initiative for Newborn Care (LINC) has advanced the quality of care of newborns in district and regional hospitals in the Limpopo province. LINC is a joint venture between the Department of Paediatrics and Child Health in Polokwane and the provincial Maternal, Child and Women’s Health directorate.

The Newborn Care Charts for Management of Sick and Small Newborns in Hospital are designed to be used by doctors and nurses at the district and regional hospital level and provide a ready reference for assessment, classification, and treatment of sick and small newborns as well as an overview of routine care that should be provided to all newborns.

The training modules are designed around the charts, providing detailed and systematic approaches to the assessment, recognition and management of the numerous conditions of sick and small newborns.

The package of materials including this training manual is intended to be used by provinces, districts and health facilities to assess, plan and systematically improve the newborn care service in their efforts to reduce newborn deaths and morbidity and overall infant and child mortality.
ACKNOWLEDGEMENTS

This training package on the Management of Small and Sick Newborns was developed to improve newborn care in the Limpopo Province of South Africa as part an initiative called LINC (the Limpopo Initiative for Newborn Care). Saving Newborn Lives (as part of Save the Children) has supported the LINC initiative particularly to extend the work beyond Limpopo to other provinces and countries that recognize the need to improve newborn care.

The training modules and chart book on newborn care has been developed by the Limpopo Initiative for Newborn Care, University of Limpopo and Department of Health, Limpopo Province. We would like to acknowledge the Centre for Rural Health, University of KwaZulu-Natal, Save the Children US and UNICEF for their support. The South African adaptation of the WHO IMCI guidelines and the KMC Training Manuals from the Ministry of Health and Social Welfare in Tanzania also informed the development of these training manuals.

The package of materials was developed, tested and reviewed by the following people:

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</tr>
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<tbody>
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<td></td>
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</tbody>
</table>
ABOUT THIS MANUAL

The Management of Sick and Small Newborn reference chart and training manual provides an approach to the assessment, classification and management of sick and small (i.e. preterm and low birth weight) babies from birth, during their stay in a health care facility up to the time of discharge, and also at follow up.

The training method is competency-based and the information and skills in this manual may be used to train health workers how to care for sick and small newborns in hospital. The training manuals are intended for in-service training of health care workers who already have basic skills in maternal and newborn care, however they could be adapted for pre-service training.

There is also a facilitator’s manual that provides guidelines to trainers on how to conduct the training session sessions.

This manual is divided into five basic modules that correspond and follow the five sections in the Newborn Care Charts. The first module deals with assessment and classification of the newborn for emergency care, priority signs, birth injuries and risk factors. The second module covers the principles of treatment, monitoring and care of sick and small newborns in hospital, and also addresses important specific conditions of the newborn period. The third module deals with the vitally important aspects of feeding sick and small newborns, including the assessment, support and counselling of mothers and families. The fourth module deals with issues around discharging babies and identifying those at high risk, and subsequent follow up.

The fifth module provides an overview of routine newborn care, including resuscitation and is therefore useful for participants as a refresher or for those who have not been trained in other basic newborn care programs.

Each module consists of a number of sub-sections that comprise the core curriculum. Each subsection will be dealt with separately in a training session following which a variety of exercises, activities and / or practicals will be undertaken to reinforce learning. At the beginning of each section or sub-section there is an overview of the content and learning objectives.
TRAINING OUTLINE

All the modules in this manual correspond exactly with the Newborn Care Charts in both order and numbering. Any reference chart can thus be easily found while using the training modules by turning to the corresponding section number in the chart book.

Each module in this manual is comprised of numerous sub-sections. Each module and sub-section follows a similar same pattern: Introduction and Objectives; Sub-section and Specific Learning Objectives; Examples, Case Studies and Exercise instructions.

The training modules follow a systematic approach to assessing, classifying, managing, discharging and following up sick and small newborns from modules 1 to 4. In module 5, an overview of routine care of newborns is included. Module 6 contains the exercises.

The modules are as follows:

- Module 1: Assess & Classify
- Module 2: Treat, Observe & Care
- Module 3: Assess Feeding and Counsel
- Module 4: Discharge and Follow Up
- Module 5: Routine Care
- Module 6: Exercises
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INTRODUCTION

When the baby is born, routine care and resuscitation is provided. Triage is done to determine if the baby is sick or small and requires referral to the neonatal care ward. Babies who are not sick or small can receive routine care with their mothers in the postnatal ward.

This module describes how to assess and classify sick and small newborns using the Newborn Care Charts. A neonate is the name used for babies up to 28 days of age. All neonates may be assessed using these charts, and if requiring admission to hospital should be admitted to the newborn care (neonatal) unit.

Assess the newborn by taking a history (Ask, Check, Record) and performing an examination (Look, Listen, Feel) These findings are then used to Classify the condition.

<table>
<thead>
<tr>
<th>ASSESS</th>
<th>CLASSIFY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask, Check &amp; Record</td>
<td>Look, Listen &amp; Feel</td>
</tr>
</tbody>
</table>

Your facilitator will demonstrate the Assessment process on the wall chart.

OBJECTIVES

At the end of the module you will be able to

- Assess and classify the newborns “need for emergency care”
- Provide immediate care for newborn requiring emergency care
- Assess and classify the newborn for priority signs
- Assess and classify the newborn for congenital abnormalities and birth trauma
- Provide immediate care
- Assess and classify the infant for risk factors
1.1 ASSESS AND CLASSIFY THE NEED FOR EMERGENCY CARE

Every time you assess a baby first assess his need for emergency care and ACT NOW to provide the care needed. Any sick baby coming to the ward or casualty may have changed condition in transit, so it is important to assess the breathing, circulation and blood glucose level before you get further information about the baby. This process will only take a minute if the baby is breathing well and has a normal circulation.

1.1.1 ASSESS AND CLASSIFY THE NEED FOR EMERGENCY CARE

<table>
<thead>
<tr>
<th>LOOK, LISTEN, FEEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assess breathing</td>
</tr>
<tr>
<td>• Is baby breathing?</td>
</tr>
<tr>
<td>• Is baby gasping?</td>
</tr>
<tr>
<td>• Count the respiratory rate?</td>
</tr>
<tr>
<td>• Is the baby’s tongue blue?</td>
</tr>
<tr>
<td>Assess circulation</td>
</tr>
<tr>
<td>• Count the heart rate</td>
</tr>
<tr>
<td>• Is the baby pale?</td>
</tr>
<tr>
<td>• Is the baby extremely lethargic or unconscious?</td>
</tr>
<tr>
<td>Assess for hypoglycaemia</td>
</tr>
<tr>
<td>• Check the blood glucose with a glucose test strip?</td>
</tr>
</tbody>
</table>

Assess Breathing and Circulation
Look at the baby to see the breathing. Is the breathing normal and regular, or is the baby gasping for breath? Gasping breaths are deep slow respirations. If you are not sure then count the respiration in one minute. Is the respiration less than 20 breaths per minute?
Look to see if the baby’s tongue is blue.

Look to see if the baby is pale. Look at the tongue and the palms.
Feel the pulse and count the heart rate in 1 minute. Is it more than 180 beats per minute or less than 100 beats per minute.
Look to see if the baby is extremely lethargic or unconscious. A baby who is lethargic or unconscious does not cry and is not easily roused.

Assess for hypoglycaemia
With a drop of heelprick blood and a haemoglucotest, check the blood glucose on arrival. Is it less than 2.5 mmol/l or more than 2.5 mmol/l.
### 1.1.2 CLASSIFY NEED FOR EMERGENCY CARE AND ACT NOW

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RESPIRATORY</td>
<td>Resuscitate the baby using a bag &amp; mask (p. 65)</td>
</tr>
<tr>
<td></td>
<td>FAILURE</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Not breathing at</td>
<td></td>
</tr>
<tr>
<td></td>
<td>all or</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Gasping or</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>RR &lt; 20</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Heart rate &lt; 100</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tongue blue</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>HR &gt; 180</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Pallor</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Extreme lethargy</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Unconscious</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Glucose &lt; 2.5 mmol/L</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HYPOGLYCAEMIA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The baby has **RESPIRATORY FAILURE** if he / she is not breathing at all, having gasping respiration or if the respiratory rate is less than 20 per minute. In this situation the baby will also usually have a heart rate less than 100 per minute. The baby will usually also have a blue tongue.

**ACT NOW** by resuscitating the baby with a bag and mask. Place baby on a warm resuscitation table, and place the bag and mask firmly over the nose and mouth while you bag the baby with oxygen. **Call for help.** If you are applying bag and mask ventilation, someone else will need to assist you with further resuscitation.

The baby has **CIRCULATORY FAILURE** if he / she has a HR > 180, and is pale, unconscious or extremely lethargic.

**ACT NOW** by giving the baby oxygen. **Call for Help.** Establish an IV line and infuse a bolus of 10 mg / kg of Normal Saline over 1 hour followed by maintenance IV neonatalyte at the appropriate volume for weight. If the baby is pale, check that there is no bleeding and Vitamin K has been administered. Keep the baby warm on the resuscitation table.

The baby has **HYPOGLYCAEMIA** if he / she has a blood sugar < 2.5 mmol / l.

**ACT NOW** by administering a 10% glucose infusion (Neonatalyte) at the recommended volume for weight and age. Follow guidelines on treatment for hypoglycaemia on p. 21.

---

Always have the resuscitation table warm, the oxygen connected to the bag and mask and all equipment ready for resuscitation.
The Initial Assessment Form

The Initial Assessment form makes it easy to record the findings of your initial assessment and the Action to be taken. There are three columns, Assess, Classify and Act Now.

- **Assess:** What do you see, hear or feel? **Look at the Chart Book.** Under “LOOK, LISTEN, FEEL” are the signs which you must look for. Look for all the signs.

  Record the signs, which you have identified, on the Initial Assessment Form, in the block under “ASSESS”, usually a “yes / no”. When you have identified the signs, they will immediately enable you to classify the problem(s).

  **For example:** You identify the sign “Respiratory rate < 20”. Circle the “Y” for yes” in the ASSESS column.

- **Classify:** **Look at the Chart Book.** Look for all the signs listed under “LOOK, LISTEN, FEEL”. The CLASSIFY column will tell you the classification.

  **For example:** You have assessed the baby as “Respiratory rate < 20”. This enables you to classify the baby as “Respiratory failure”.

  **Record** this on the Initial Assessment Form as “Yes” for respiratory failure.

  **Remember** that there may be more than one classification on the form, meaning that the baby may have more than one problem. Each of these problems (classifications) needs action.

- **Act Now:** The Chart Book will inform you about what action you should take.

  **Record** what action has been taken.
## INITIAL ASSESSMENT: SICK AND SMALL NEWBORNS IN HOSPITAL

**Date:** ________  **Time:** ________  **Name:** ________________________________________  **Date of birth:**_______________  **Weight:**_______ kg

**ASK:**
- How old is the baby? ____________________
- Where was the baby born?______________________________
- What is the baby’s current problem? _________________________________________________________________________________
- Is the baby having a problem with feeding? ____________________________________________________________________________
- Has the baby had any convulsions or abnormal movements? ______________________________________________________________________

### ASSESS

#### ASSESS NEED FOR EMERGENCY CARE

<table>
<thead>
<tr>
<th>Breathing well?</th>
<th>Y</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasping?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Respiratory Rate &lt; 20</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

| Pale or cold? | Y | N |
| Heart Rate > 180 or < 100 | Y | N |

| Is baby extremely lethargic? | Y | N |
| Glucose test strip |________|

#### ASSESS FOR PRIORITY SIGNS: APNOEA AND RESPIRATORY DISTRESS

| Central cyanosis | Y | N |
| Apnoea | Y | N |

| Fast breathing | Y | N |
| Respiratory Rate |________|

| Severe chest indrawing | Y | N |
| Grunting | Y | N |

#### ASSESS FOR OTHER PRIORITY SIGNS:

| Temperature |________| Birth Weight |________| Jaundice | Y | N |
| Increased tone | Y | N |
| Decreased tone / floppy | Y | N |
| Irregular jerky movements | Y | N |
| Reduced activity | Y | N |
| Lethargic or Unconscious | Y | N |
| Bulging fontanel | Y | N |
| Abdominal distension | Y | N |
| Bile stained vomiting | Y | N |

#### ASSESS FOR BIRTH INJURIES, MALFORMATIONS, LOCAL INFECTIONS

| Head circumference |________| < 3rd centile | Y | N | > 97th centile | Y | N | Normal | Y | N |
| Swelling of scalp | Y | N |
| Unusual appearance | Y | N |
| Eyes: Pus draining | Y | N |
| Red/swollen eyelid or Subconjunctival haemorrhage | Y | N |
| Cleft lip / Cleft palate | Y | N |
| Neural tube defect | Y | N |
| Imperforate anus | Y | N |
| Gastrochisis / omphalocele | Y | N |
| Pustules / rash | Y | N |
| Umbilicus red / pus | Y | N |
| Abnormal position | Y | N |
| Asymmetric movements | Y | N |
| Cries if limb touched | Y | N |
| Club foot | Y | N |
| Extra digit | Y | N |
| Swollen limb or joint | Y | N |
| Other |________|

#### ASSESS RISK FACTORS AND SPECIAL TREATMENT NEEDS

| Mother has diabetes | Y | N |
| Baby > 4 kg | Y | N |
| Mother’s blood group: | Rh Neg | Y | N | Gp O | Y | N | Unknown | Y | N |
| Rupture of membranes > 18 hours | Y | N |
| Maternal fever | Y | N |
| Offensive liquor | Y | N |
| Apgar < 7 at 5 minutes | Y | N |
| Mother’s RPR/VDRL: | Positive | Negative | Unknown |
| Mother HIV status: | Positive | Negative | Unknown |
| Mother has TB, or has been on TB treatment within the last 6 months | Y | N |

### ACTION

- **Respiratory failure**
  - Yes
  - No

- **Circulatory failure**
  - Yes
  - No

- **Hypoglycaemia**
  - Yes
  - No

- **Apnoea**
  - Yes
  - No

- **Respiratory distress**
  - Yes
  - No

### Classify for:

- All problems
- All risk factors
- Priority signs
1.2 ASSESS FOR PRIORITY SIGNS
After having assessed the baby’s need for emergency care, assess every sick and small baby for priority signs. Assess the signs according to the order on the chart. Assess for respiratory problems, for birth weight and temperature, for tone movement and fontanelle and then for jaundice and serious abdominal problems. (p 6 – 7 Newborn Care Charts)

INITIAL ASSESSMENT: SICK & SMALL NEWBORNS

Ask the mother or nurse bringing the baby about the current problem, any difficulty in feeding and if the baby has had apnoea, convulsions or abnormal movements. You will take a more detailed history and evaluate antenatal care, labour and birth after assessing for priority signs.

<table>
<thead>
<tr>
<th>What is the baby’s current problem?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Let the mother or nurse describe in her own words what the problem is.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Is the baby having a problem with feeding?</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the baby is coming from home or the postnatal ward, ask if there has been a problem with feeding. This is often an indication that the baby is unwell.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Has the baby had any apnoea, convulsions or abnormal movements?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The mother or nurse may describe abnormal jerky movements of one or more limbs or fingers. The baby may become stiff. These are all convulsions.</td>
</tr>
<tr>
<td>• The baby may also have apnoea, which may be a sign of prematurity, a convulsion, or be due to respiratory distress.</td>
</tr>
<tr>
<td>• If the mother or nurse describes these signs, even though you do not observe them, you will tick the sign on the chart.</td>
</tr>
</tbody>
</table>

Record your findings on the recording form

Date: _____ Time _____Name: _____________________ Date of birth: _______ Weight: _____ kg

How old is the baby? ______________________ Where was the baby born? ______________________

What is the baby’s current problem? _______________________________________________________

Is the baby having a problem with feeding? _________________________________________________

Has the baby had any convulsions or abnormal movements? _________________________________
1.2.1 ASSESS FOR APNOEA AND RESPIRATORY DISTRESS

COUNT THE RESPIRATORY RATE AND LOOK FOR CHEST INDRAWING

Count the breaths taken in a full minute, as babies may breathe irregularly for short periods of time, or stop breathing for a few seconds. The normal respiratory rate of a newborn baby is 30 – 60 breaths per minute. If the first count is more than 60 breaths per minute, repeat the count.

For Severe Chest Indrawing

The baby has chest indrawing if the lower chest wall goes IN when the baby breathes in. In normal breathing the whole chest wall & the abdomen move OUT when the baby breathes in. Babies < 2.5kg normally have mild chest indrawing. Severe chest indrawing is very deep & easy to see. If the baby has severe chest indrawing this is abnormal & a sign of a severe chest problem. In a preterm baby this could be due to hyaline membrane disease or pneumonia. In a term baby this may be due to meconium aspiration or pneumonia.

LOOK & LISTEN for GRUNTING

Grunting is the soft, short sound a baby makes when breathing out. Grunting occurs when a baby is having difficulty breathing. It is common with pre-term babies who have hyaline membrane disease. Babies who are grunting need oxygen. If the grunting continues while they are receiving oxygen, they may need CPAP.

LOOK FOR APNOEA

For Apnoea

Apnoea is when the baby ceases breathing for more than 20 seconds, or for long enough to result in cyanosis. Observe whilst examining the baby if there is any apnoea. A baby with apnoea may need stimulation to breathe. If the baby does not breathe or becomes cyanosed, stimulate by rubbing the baby’s back for 10 seconds. If the baby still does not breathe you may need to resuscitate him / her with a bag & mask. Preterm babies less than 34 weeks gestation frequently have apnoea. Apnoea in a term baby may be a convulsion or a sign of sepsis & needs further investigation.

For Central cyanosis

Central cyanosis occurs when the tongue is blue. Central cyanosis can occur with a respiratory or cardiac problem.

Record your findings on the recording form.
1.2.2 ASSESS LOW WEIGHT AND TEMPERATURE

LOOK FOR LOW BIRTH WEIGHT

<table>
<thead>
<tr>
<th>Low Weight</th>
<th>For Low Weight</th>
</tr>
</thead>
</table>
| Look       | Use the birth weight to classify the baby for low birth weight. If the baby weighs less than 2.5 kg, then classify according to weight & then move on to other priority signs. If the baby is low birth weight you will need to commence specific care for the low birth weight newborn.

MEASURE TEMPERATURE

<table>
<thead>
<tr>
<th>Measure Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feel</td>
</tr>
</tbody>
</table>
| Take the baby’s axillary temperature with a low reading thermometer. Place the thermometer in the baby’s armpit for 2 minutes before reading. The normal axillary temperature is 36.0 – 37.0 degrees. If the baby’s axillary temperature is less than 36 degrees you will classify as HYPOTHERMIA. If the baby has a temperature below 32 degrees, this is classified as SEVERE HYPOTHERMIA OR SEVERE DISEASE.

1.2.3 ASSESS TONE, MOVEMENT AND FONTANELLE

LOOK AND FEEL THE BABY’S TONE

<table>
<thead>
<tr>
<th>Look &amp; Feel</th>
</tr>
</thead>
</table>
| Is the baby floppy? A normal, term baby has a flexed posture and moves a lot. A floppy baby has weak muscle tone and the limbs are not flexed well and fall loosely when picked up and released.

<table>
<thead>
<tr>
<th>Increased Tone</th>
</tr>
</thead>
</table>
| Is there increased tone? The baby has increased flexion and often has clenched fists. He / she may also be stiff or if severe lies in a hyperextended position (Opisthotonus) Has the baby difficulty in opening his / her mouth (the jaw feels stiff)? This is trismus, and is usually present in tetanus.
LOOK FOR ABNORMAL MOVEMENTS AND LEVEL OF CONSCIOUSNESS

<table>
<thead>
<tr>
<th>Are there irregular jerky movements?</th>
<th>Irregular jerky movements of the limbs, body or face are usually due to seizures. The baby may become stiff or have apnoea.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the baby have reduced activity?</td>
<td>A baby will normally move his arms and legs when awake. Reduced movement is a sign of severe disease. Sometimes there may be decreased movement in a single limb eg. an arm.</td>
</tr>
<tr>
<td>Is the baby lethargic or unconscious?</td>
<td>A baby is lethargic if he is drowsy or is only roused with difficulty or does not move much even when awake. An unconscious baby is unresponsive to stimuli.</td>
</tr>
</tbody>
</table>

LOOK AT AND FEEL THE FONTANELLE

| Is the fontanelle full? | Place the flat of your hand over the occiput and bring it to the front. You will feel the fontanelle, which is a slight depression where the bones are separated. If the fontanelle is filled in or feels tense, or occasionally bulges above the bone, it means that there is raised intracranial pressure, and the baby may have meningitis or hydrocephalus. |

LOOK FOR SERIOUS ABDOMINAL SIGNS

<table>
<thead>
<tr>
<th>For Serious Abdominal Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the baby’s abdomen distended and large?</td>
</tr>
<tr>
<td>Is the baby vomiting bile?</td>
</tr>
</tbody>
</table>

LOOK FOR JAUNDICE

<table>
<thead>
<tr>
<th>For Jaundice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Look at the sclera of the eyes &amp; gently press the forehead. If the sclera are yellow, or the skin is yellow the baby has jaundice. Jaundice is common in babies, but can also be very serious. You will evaluate &amp; manage according to the severity of the jaundice &amp; look for a cause.</td>
</tr>
<tr>
<td>If the mother’s blood group is O or rhesus positive, the bilirubin level must be done on the baby at 6 hours of age. If the bilirubin level is 80 umol / l or more the baby must be started on phototherapy even if he / she does not look jaundiced.</td>
</tr>
</tbody>
</table>
Record your findings on the recording form

### ASSESS

#### ASSESS FOR OTHER PRIORITY SIGNS:

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Birth Weight</th>
<th>Jaundice</th>
<th>Y</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased tone</td>
<td>Y</td>
<td>N</td>
<td>Decreased tone / floppy</td>
<td>Y</td>
</tr>
<tr>
<td>Irregular jerky movements</td>
<td>Y</td>
<td>N</td>
<td>Reduced activity</td>
<td>Y</td>
</tr>
<tr>
<td>Lethargic or Unconscious</td>
<td>Y</td>
<td>N</td>
<td>Bulging fontanel</td>
<td>Y</td>
</tr>
<tr>
<td>Abdominal distension</td>
<td>Y</td>
<td>N</td>
<td>Bile stained vomiting</td>
<td>Y</td>
</tr>
</tbody>
</table>

### 1.2.4 CLASSIFY FOR PRIORITY CONDITIONS & ACT NOW

You will classify the baby in the following order:
- Classify for apnoea and respiratory distress
- Classify for low weight
- Classify for hypothermia
- Classify for other priority illness
- Classify for jaundice

The baby does not necessarily have a classification in every section but can have more than one classification. For example a baby may be classified as low birth weight but can also be classified as respiratory distress. Both of these must be recorded. Once you have classified the baby, **ACT NOW**. This means: Commence immediate care, and then refer to the section in the charts for specific treatment, for ongoing care, investigation and observation.

### 1.2.5 CLASSIFY FOR RESPIRATORY DISTRESS

If the baby had apnoea classify as **APNOEA**. If the baby had any signs of respiratory distress, then classify for **RESPIRATORY DISTRESS**. A baby with apnoea and / or respiratory distress may, in addition, have another classification.

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
</table>
| Apnoea for > 20 seconds & needs stimulation | APNOEA | - Stimulate or resuscitate, as required  
- Manage for apnoea (p.28) |
| Severe chest indrawing  
and / or  
grunting and / or  
RR > 80 / min | SEVERE RESPIRATORY DISTRESS | - Start oxygen (p. 17-20)  
- If preterm and CPAP available, commence CPAP (p. 20)  
- Monitor the response to Oxygen (p. 17)  
- Mobile CXR (p. 28)  
- Observe hourly  
- Start antibiotics (p. 29)  
- Keep nil by mouth for 24 hours  
- Treat, care & observe (p. 28-29) |
| RR 60 - 80 / min without cyanosis, grunting or chest indrawing | MILD RESPIRATORY DISTRESS | - Check oxygen saturation – if O₂ saturation is < 88% or cyanosis, manage as moderate or severe respiratory distress  
- Monitor 3 hourly  
- Start antibiotics if at risk for sepsis  
- CXR if no improvement after 6 hrs |
| Central cyanosis but NO chest indrawing or grunting | POSSIBLE HEART ABNORMALITY | - Give oxygen (p.17-20)  
- Consult specialist for possible referral |
APNOEA
Apnoea can be a sign of immaturity of the brain in preterm babies. All pre-term babies, of less than 35 weeks gestation are treated with oral theophylline or caffeine to prevent apnoea. In term babies apnoea is serious, it may be due to a convulsion, or a sign of meningitis or neonatal encephalopathy. Treat infants by stimulating the back for ten seconds. If this does not work resuscitate with a bag and mask. Investigate term infants for sepsis, convulsions or asphyxia.

SEVERE RESPIRATORY DISTRESS
Babies with severe respiratory distress have significant pathology in the lungs. In pre-term babies this is most often due to hyaline membrane disease, which is caused by the lack of surfactant in the immature lungs. These babies need oxygen. Some might need additional support with Continuous Positive Airway Pressure (CPAP). Where semi-artificial surfactant is available, this can assist. Pre-term babies can also have a congenital pneumonia if there has been chorioamnionitis. In term babies, severe respiratory distress is usually due to pneumonia or meconium aspiration.

MILD RESPIRATORY DISTRESS
Babies with mild respiratory distress may have a mild lung immaturity called transient tachypnoea or wet lung syndrome. This usually resolves in 1 – 2 days. They may need oxygen. They need careful observation and assessment for pneumonia.

POSSIBLE HEART ABNORMALITY
A baby with cyanosis and no features of respiratory distress may have a congenital cyanotic heart lesion. However, a baby with respiratory distress with or without cyanosis may also have a congenital heart lesion. All children with cyanosis and / or respiratory distress need careful examination by the doctor to exclude congenital heart lesions.

1.2.6 CLASSIFY FOR LOW WEIGHT

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth wt &lt; 1 kg</td>
<td>EXREMELY LBW</td>
<td>• Ensure warmth</td>
</tr>
<tr>
<td>Birth wt 1 – 1.49 kg</td>
<td>VERY LBW</td>
<td>• Commence fluids or feeds (p. 22-24)</td>
</tr>
<tr>
<td>Birth wt 1.5 – 1.99 kg</td>
<td>LBW (&lt; 2 kg)</td>
<td>• Check blood glucose (p. 21)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• See low birth weight chart (p. 30-34)</td>
</tr>
<tr>
<td>Birth wt 2 – 2.5 kg</td>
<td>LBW (2 - 2.5 kg)</td>
<td>• Keep skin to skin / KMC (p. 14)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Assess before discharge for KMC, warmth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and feeding</td>
</tr>
</tbody>
</table>

CLASSIFY FOR HYPOTHERMIA

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp &lt; 36.00C</td>
<td>HYPOTHERMIA</td>
<td>• Re warm (p. 12-16)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check blood glucose (p. 21)</td>
</tr>
</tbody>
</table>

ACT NOW: Babies with HYPOTHERMIA need rapid re-warming. Skin to Skin is the fastest way to do this, but this may not be feasible if the mother is not available or if the baby has other problems. Then use a radiant warmer or warm incubator. Observe and record the temperature every 30 minutes.

Babies with SEVERE HYPOTHERMIA (temperature less than 32°C) must be re-warmed under a radiant heater and the temperature monitored every 30 minutes. Set up a 10% glucose (Neonatalyte) infusion and administer oxygen until the temperature is normal.
1.2.8 CLASSIFY FOR SEVERE DISEASE

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Temp &gt; 38</td>
<td></td>
<td>• Treat convulsions if present (p. 37)</td>
</tr>
<tr>
<td>• Temp &lt; 32</td>
<td></td>
<td>• Commence IVI infusion at maintenance rate (p. 22-23)</td>
</tr>
<tr>
<td>• Not feeding well</td>
<td></td>
<td>• Check glucose now &amp; 3 hrly (p. 21)</td>
</tr>
<tr>
<td>• Decreased tone</td>
<td></td>
<td>• Rewarm if cold (p. 12-16)</td>
</tr>
<tr>
<td>• Increased tone</td>
<td></td>
<td>• Keep warm (p. 12-16)</td>
</tr>
<tr>
<td>• Irregular jerky movements / convulsions</td>
<td>SEVERE</td>
<td>• Check for risk factors &amp; determine the cause (p. 10)</td>
</tr>
<tr>
<td>• Reduced activity / lethargic</td>
<td>DISEASE</td>
<td>• Treat the cause</td>
</tr>
<tr>
<td>• Full fontanelle</td>
<td></td>
<td>• Start antibiotics if sepsis is suspected (p. 35)</td>
</tr>
<tr>
<td>• Abdominal distension</td>
<td></td>
<td>• Reassess 1 - 3 hourly</td>
</tr>
<tr>
<td>• Vomiting bile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Jaundice in the first 24 hours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Any one of a number of signs can lead to the classification SEVERE DISEASE. The baby may have sepsis, pneumonia, meningitis, congenital syphilis, a metabolic problem or asphyxia. They are all serious disorders and the initial management is the same. Further management is based on the risk factors and other signs. These are discussed further in the section under TREAT, MONITOR AND CARE.

For all infants with SEVERE DISEASE ACT NOW, to treat convulsions if present, set up an IV infusion of 10% Glucose or neonatolyte, keep warm and rewarm if necessary, and investigate the cause.

1.2.9 CLASSIFY FOR JAUNDICE

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Jaundice after the first 24 hours</td>
<td>JAUNDICE</td>
<td>• Determine bilirubin and manage (p. 39-41)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Determine cause (p. 39)</td>
</tr>
</tbody>
</table>

If the baby has developed jaundice after the first 24 hours of birth classify as JAUNDICE. The baby who has jaundice in the first 24 hours is classified as SEVERE DISEASE.

The baby may have other classifications, or jaundice may be the only classification. Measure the bilirubin level to determine the severity of the jaundice. Start phototherapy while waiting for the bilirubin result, and determine the cause of the jaundice.

Record your assessment and classification on the recording form

<table>
<thead>
<tr>
<th>ASSESS</th>
<th>CLASSIFY</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSESS FOR OTHER PRIORITY SIGNS:</td>
<td>Record your classification here</td>
</tr>
<tr>
<td>Temperature ________ Birth Weight _________</td>
<td></td>
</tr>
<tr>
<td>Jaundice</td>
<td>Y     N</td>
</tr>
<tr>
<td>Increased tone</td>
<td>Y     N</td>
</tr>
<tr>
<td>Decreased tone / floppy</td>
<td>Y     N</td>
</tr>
<tr>
<td>Irregular jerky movements</td>
<td>Y     N</td>
</tr>
<tr>
<td>Reduced activity</td>
<td>Y     N</td>
</tr>
<tr>
<td>Lethargic or Unconscious</td>
<td>Y     N</td>
</tr>
<tr>
<td>Bulging fontanel</td>
<td>Y     N</td>
</tr>
<tr>
<td>Abdominal distension</td>
<td>Y     N</td>
</tr>
<tr>
<td>Bile stained vomiting</td>
<td>Y     N</td>
</tr>
</tbody>
</table>

Now see Exercise Module 6.1 – and do exercises 1A, 1B and 1C
1.3 ASSESS AND CLASSIFY FOR BIRTH INJURIES, ABNORMALITIES OR LOCAL INFECTIONS

You have evaluated the baby for emergency and priority signs, and initiated emergency and urgent treatment if it was required. You are now able to ask the mother about the baby and find out the details of the pregnancy and birth.

Ask the mother:
“Have you noticed any abnormality or is there anything that concerns you?”
Listen to any concerns that the mother may have.

Ask the mother
“Has your baby passed meconium?” Babies should pass meconium within the first 24 hours, and you need to ensure the baby has passed meconium before allowing mom and baby home. The baby who does not pass meconium may have an imperforate anus or intestinal obstruction.

Examine the baby
Examine the baby from head to toe. If possible examine the baby in front of the mother so she can express any concerns she may have, and you can in turn explain your findings to her.

Record this information on the Newborn Admission Record and on the Initial Assessment recording form or on the record you use in your hospital. If you are examining a well baby record the information in the maternity record.

MEASURE AND RECORD the head circumference on the head circumference chart in the Limpopo Newborn Admission Record.

- Is the head circumference normal? A term babies head circumference is between 32 and 38 cm. If the baby is preterm use the Fetal-infant-growth chart (p74) to determine whether the head circumference is > 97th centile or < 3rd centile.
- If the head circumference is > 97th centile the baby has macrocephaly and may have hydrocephalus.
- If the head circumference is less than the 3rd centile the baby has microcephaly. The cause of the microcephaly will need to be determined.
For swelling of the scalp
- The baby may have a subaponeurotic haemorrhage or cephalhaematoma. These usually subside normally, but may predispose to jaundice as the blood resorbs & the haem is broken down to bilirubin.
- NB: A baby with a subaponeurotic haemorrhage may bleed severely and become shocked and anaemic.

At the face
- Does the face appear unusual? Is it asymmetrical?
- Are the ears in the normal position? Are the eyes normal & correctly spaced?
- Are there epicanthic folds?
- Does the infant have a normal red reflex; does he or she follow a light or object?
- Are there sub-conjunctival bleeds?
- Is there pus in the eyes? If so is it severe with oedema of the eyelids?
- Are the mouth & lip normal? Place your little finger in the mouth & check that the palate is intact.
- Is the nose patent. Check that the infant breathes comfortably through the nose with the mouth closed.

At the abdomen and back
- Are there any abnormalities?
- Is there a myelomeningocele or gastroschisis?
- Has the baby passed meconium and is the anus patent?

At the limbs
- Observe the infants limbs while lying on the back.
- Does the infant move all the limbs without pain?
- Is there swelling of the joints or legs?
- Are the movements symmetrical? Test for the Moro Reflex & see if the baby’s movements are symmetrical.

At the hands & feet.
- Are there any abnormalities of the position or digits?

At the skin
- See if the skin is intact.
- Are there any pustules. Is the skin red?
- Is the umbilicus draining pus
- Is the skin around the umbilicus red?

Record your findings on the recording form

<table>
<thead>
<tr>
<th>ASSESS FOR BIRTH INJURIES, MALFORMATIONS, LOCAL INFECTIONS</th>
<th>CLASSIFY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head circumference _______ &lt; 3rd centile Y N &gt; 97th centile Y N Normal Y N</td>
<td></td>
</tr>
<tr>
<td>Swelling of scalp Y N Unusual appearance Y N</td>
<td></td>
</tr>
<tr>
<td>Eyes: Pus draining Y N Red/swollen eyelid or Subconjunctival haemorrhage Y N</td>
<td></td>
</tr>
<tr>
<td>Cleft lip / Cleft palate Y N Neural tube defect Y N</td>
<td></td>
</tr>
<tr>
<td>Imperforate anus Y N Gastroschisis / omphalocele Y N</td>
<td></td>
</tr>
<tr>
<td>Pustules / rash Y N Umbilicus red / pus Y N</td>
<td></td>
</tr>
<tr>
<td>Abnormal position Y N Asymmetric movements Y N Cries if limb touched Y N</td>
<td></td>
</tr>
<tr>
<td>Club foot Y N Extra digit Y N Swollen limb or joint Y N</td>
<td></td>
</tr>
<tr>
<td>Other__________________________________________________________</td>
<td>Classify for all problems</td>
</tr>
</tbody>
</table>

MODULE 1: ASSESS & CLASSIFY
CLASSIFY THE CHILD FOR BIRTH INJURIES, ABNORMALITIES OR LOCAL INFECTIONS

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Open tissue on the head, or back</td>
<td>NEURAL TUBE DEFECT / SPINA BIFIDA</td>
</tr>
<tr>
<td>• Omphalocele</td>
<td></td>
</tr>
<tr>
<td>• Gastrochisis</td>
<td></td>
</tr>
<tr>
<td>• Imperforate anus, not passed meconium in 24 hours</td>
<td>MAJOR GASTROINTESTINAL ABNORMALITY</td>
</tr>
<tr>
<td>• Head circumference above the 97th centile</td>
<td></td>
</tr>
<tr>
<td>• Head circumference &lt; 3rd centile</td>
<td>HYDROCEPHALUS</td>
</tr>
<tr>
<td>• Club foot</td>
<td></td>
</tr>
<tr>
<td>• Cleft lip and / or palate</td>
<td>CLEFT LIP AND / OR PALATE</td>
</tr>
<tr>
<td>• Swollen head – bump on one or both sides</td>
<td></td>
</tr>
<tr>
<td>• Abnormal position of legs</td>
<td></td>
</tr>
<tr>
<td>• Poor limb movement</td>
<td></td>
</tr>
<tr>
<td>• Unusual appearance</td>
<td></td>
</tr>
<tr>
<td>• Other abnormalities</td>
<td></td>
</tr>
<tr>
<td>• Pus draining from the eye</td>
<td>BIRTH INJURY</td>
</tr>
<tr>
<td>• Redness around the umbilicus</td>
<td></td>
</tr>
<tr>
<td>• Skin pustules</td>
<td>BIRTH ABNORMALITY</td>
</tr>
<tr>
<td></td>
<td>LOCAL BACTERIAL INFECTION</td>
</tr>
</tbody>
</table>

There are many other abnormalities and minor skin disorders. Consult standard newborn care textbooks for these, or refer patient for further assessment.
1.4 ASSESS AND CLASSIFY FOR RISK FACTORS

Assess the baby for any risk factors. A risk factors mean that the baby will need certain observations or specific prophylactic treatment.

To evaluate for risk factors take a complete history of the pregnancy and the delivery. Record the information in the Initial Assessment Form and the Newborn Admission record or your hospital record. If the baby is in postnatal ward use the maternity record.

**ASK OR CHECK THE ANTENATAL CARD AND MATERNAL RECORD**

<table>
<thead>
<tr>
<th>Pregnancy</th>
<th>Labour and birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mother diabetic</td>
<td>• Intrauterine infection or fever</td>
</tr>
<tr>
<td>• Mother has or had TB in last 6 month</td>
<td>• Membranes ruptured for &gt; 18 hours</td>
</tr>
<tr>
<td>• Mother tested RPR positive or unknown</td>
<td>• Difficult labour</td>
</tr>
<tr>
<td>• Mother tested HIV positive or unknown</td>
<td>• Apgar score &lt; 7</td>
</tr>
<tr>
<td>• Mother's blood group O or Rhesus Neg</td>
<td>• Complications after birth</td>
</tr>
<tr>
<td></td>
<td>• Birth weight &lt; 2.5kg or &gt; 4 kg</td>
</tr>
</tbody>
</table>

If you answer yes to any of the above then classify the risk factors and indicate them on the chart. Ensure that you respond to them.

### 1.4.1 RISK OF HYPOGLYCAEMIA

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mother has diabetes or</td>
<td>RISK OF HYPOGLYCAEMIA</td>
<td>• Feed immediately, or IV fluids</td>
</tr>
<tr>
<td>• Baby's birth weight &gt; 4 kg</td>
<td></td>
<td>• Hourly glucose for 6 – 12 hours</td>
</tr>
<tr>
<td>• Low birth weight babies or</td>
<td></td>
<td>• Treat hypoglycaemia (p.21)</td>
</tr>
<tr>
<td>• Severe disease</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **A big baby, or a baby whose mother has diabetes**, grows well because he/she gets a lot of glucose from the mother through the placenta. The fetus produces extra insulin to deal with this extra glucose. At birth the glucose supply from the mother stops and the high levels of insulin in the baby's blood can cause hypoglycaemia. This is particularly important in the first 6 hours after birth.

- **Low birth weight babies** are at risk of hypoglycaemia because they do not have adequate energy stores.

- The risk of hypoglycaemia is likely to be aggravated when there is hypothermia, hypoxia or when the baby is severely ill, because in these circumstances more glucose is required. These conditions are also common in low birth weight babies.

- Large babies (birth weight greater than 4 kg), infants whose mothers have diabetes, low birth weight and sick babies are those whose blood glucose levels must be checked frequently.

- A baby with a risk of hypoglycaemia needs to have the blood glucose checked, be fed immediately or given IV glucose (Neonatalyte). The specific management of infants of diabetic mothers is discussed later.
1.4.2 **RISK OF JAUNDICE**

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mother’s blood group O or</td>
<td>• Measure bilirubin at 6 hours</td>
<td></td>
</tr>
<tr>
<td>• Mother Rhesus Neg or</td>
<td>• Commence phototherapy if bilirubin &gt; 80 umol/l (p. 39-41)</td>
<td></td>
</tr>
<tr>
<td>• Birth injuries</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mothers who are blood group O may have a baby who has ABO incompatibility. The baby would usually be blood group A or B if there is an incompatibility. If the mother’s Rhesus factor (Rh) is negative, the baby is at risk of haemolytic disease of the newborn due to Rh incompatibility. If the mother’s group is Rhesus negative, she needs to be given anti-D gammaglobulin after birth.

Babies with extravascular blood such as cephalohaematoma, subaponeurotic haemorrhage, cerebral haemorrhage or any other bruising are predisposed to jaundice.

The management of these at risk groups is discussed later.

If jaundice is suspected commence phototherapy as soon as possible. Check the bilirubin levels 6 hourly if there is a potential blood group incompatibility.

1.4.3 **RISK OF BACTERIAL INFECTION**

A baby born to a mother with an intrauterine infection or fever any time from the onset of labour to three days after birth, or rupture of membranes for more than 18 hours before birth, is often normal at birth but can develop a problem later.

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Membranes rupture &gt; 18 hrs or</td>
<td>• Follow maternal chorioamnionitis protocol (p. 36)</td>
<td></td>
</tr>
<tr>
<td>• Maternal fever or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Offensive smell / liquor at birth</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.4.4 **RISK OF NEONATAL ENCEPHALOPATHY**

Asphyxia in the newborn baby means “failure to start and to continue breathing spontaneously”. There are two main causes:

- Immaturity of the respiratory centre – in preterm infants.
- Hypoxia which usually occurs during labour, or as the result of abruptio placentae. This often leads to encephalopathy in the newborn, especially the term infant. Fetal hypoxia is recognised in labour as fetal distress.
- It is therefore very important to anticipate asphyxia in mothers who are in preterm labour or when there is fetal distress, and be ready to resuscitate the baby.

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Apgar score &lt; 7 at 5 minutes</td>
<td>• Observe for 12 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Evaluate and manage for possible encephalopathy (p. 37-38)</td>
<td></td>
</tr>
</tbody>
</table>
1.4.5  **RISK OF CONGENITAL SYPHILIS**

Babies at risk of getting syphilis are those whose mothers have the disease. Therefore all pregnant women must be tested for syphilis at the booking visit, and the results must be available quickly and the woman treated if she is positive. **Record** the mother’s results on the Limpopo Newborn Admission Record, and on the Initial Assessment Chart. Manage the baby and mother according to the protocol (p. 46)

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mother tested RPR positive or • Mother’s RPR not known or • Mother partially treated</td>
<td>RISK OF CONGENITAL SYPHILIS</td>
<td>• Evaluate and manage according to congenital syphilis protocol (p. 45-46)</td>
</tr>
</tbody>
</table>

1.4.6  **RISK OF HIV TRANSMISSION**

Babies born to HIV positive mothers are at risk of transmission before, during and after delivery, the latter through breast feeding. **Document** the mothers HIV status, the treatment the mother is getting, i.e. dual therapy or HAART, and any treatment the infant has had. If the mother has not been tested, or has not had a repeat test if initially negative, ensure urgent testing of the mother so that post exposure prophylaxis can be provided for the baby. Ensure mother has a CD4 count.

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mother tested HIV positive or • Unknown maternal HIV status or • Unknown feeding choice</td>
<td>RISK OF HIV TRANSMISSION</td>
<td>• Manage according to PMTCT protocol (p. 48)</td>
</tr>
</tbody>
</table>

1.4.7  **RISK OF TUBERCULOSIS**

Mothers with *Mycobacterium tuberculosis* infection should be identified during pregnancy. If the mother has TB she should be treated according to protocol. A baby born to a mother with TB needs to be managed according to protocol on page 47. Treatment for the infant depends on the activity of TB in the mother and the time that she has been ill.

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Mother started TB treatment within the past 6 months or • Mother coughing for &gt; 3 months</td>
<td>RISK OF TUBERCULOSIS</td>
<td>• Manage according to TB protocol (p. 47)</td>
</tr>
</tbody>
</table>

**Record** the perinatal risk factors on the Initial Assessment Form and Newborn Admission Record

**ASSESS**

<table>
<thead>
<tr>
<th>ASSESS RISK FACTORS AND SPECIAL TREATMENT NEEDS</th>
<th>CLASSIFY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother has diabetes Y N Baby &gt; 4 kg Y N</td>
<td>Classify for all risk factors</td>
</tr>
<tr>
<td>Mother’s blood group: Rh Neg Y N Gp O Y N Unknown Y N</td>
<td></td>
</tr>
<tr>
<td>Rupture of membranes &gt; 18 hours Y N Maternal fever Y N Offensive liquor Y N</td>
<td></td>
</tr>
<tr>
<td>Apgar &lt; 7 at 5 minutes Y N</td>
<td></td>
</tr>
<tr>
<td>Mother’s RPR/VDRL: ☐ Positive ☐ Negative ☐ Unknown</td>
<td></td>
</tr>
<tr>
<td>Mother HIV status: ☐ Positive ☐ Negative ☐ Unknown</td>
<td></td>
</tr>
<tr>
<td>Mother has TB, or has been on TB treatment within the last 6 months Y N</td>
<td></td>
</tr>
</tbody>
</table>

**Now see Exercise Module 6.1 – and do exercise 1D**
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2.2 SPECIFIC CONDITIONS ....................................................................................................................... 56
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INTRODUCTION

Once a baby is born and has been assessed, classified and treated for emergency care, priority signs, local infections, risk factors and special needs, the baby will be either with his mother in the postnatal ward or in the neonatal ward, depending on his condition.

All babies, whether sick or not, will require warmth, feeding and a clean, safe environment. Some may require additional care to maintain normal body temperature, normal oxygen saturation, normal blood glucose, special volumes of feeds and fluids, or transport to other facilities if they are small or sick.

There are also some specific conditions that are unique to the newborn period, such as neonatal apnoea and respiratory distress; prematurity and low birth weight; encephalopathy; neonatal jaundice; congenital abnormalities; neonatal syphilis, tuberculosis and HIV. It is vital that each of these specific conditions is recognized and managed accordingly.

This module describes the principles of care in these key areas of management for sick and small newborns and for the specific conditions described above. The Newborn Care Chart booklet provides much of the information that will be required in this module, and should be used as a reference throughout.

OBJECTIVES

At the end of the module you will be able to

- Prevent, recognise and treat hypothermia and maintain normal body temperatures in newborn infants using different warming methods, including Kangaroo Mother Care, infant warmers, open and closed incubators and radiant heaters
- Assess which babies require oxygen and provide oxygen therapy using the most appropriate method for the baby’s condition, including headbox oxygen, nasal prongs, nasal canula and CPAP.
- Maintain normal blood glucose. Prevent and, if necessary, treat hypoglycaemia
- Understand and calculate feed and fluid requirements for sick and small babies
- Practice infection prevention and control for newborns in healthcare facilities
- Recognise which babies should be referred and carry out a safe and successful transfer to another facility with clear communication
- Recognise and appropriately manage specific conditions of the newborn period, including apnoea, prematurity and low birth weight, serious acute infections, local infections, neonatal encephalopathy, neonatal jaundice, congenital abnormalities, maternal tuberculosis and HIV affected mothers and babies.
2.1 PRINCIPLES OF TREATMENT, MONITORING AND CARE

MAINTAIN BODY TEMPERATURE
A newborn baby is unable to adequately maintain his / her temperature. This is especially so when the baby is low birth weight. The reasons for this are:

- There are inadequate energy stores, both glycogen and fat.
- The immature liver is unable to produce enough glucose from glycogen, even when there are good stores. The glucose is the fuel used to produce energy (heat) in the body.
- Low birth weight babies are especially at risk as the problems above are more severe, and they also have a relatively large body surface area so that they lose heat very easily.

MAINTAIN NORMAL BLOOD GLUCOSE LEVELS
Glucose is the energy source of the body. It is especially important for brain cells, so that hypoglycaemia can result in brain damage. Glucose is also needed for:

- Maintaining body temperature
- Growth

Sources: Food (milk)
- IV fluids if the baby is unable to take feeds

NB If the baby is cold, he / she needs more glucose.
- If the baby is hypoglycaemic, he / she can become hypothermic.

OXYGEN THERAPY
Oxygen is essential for normal metabolism to take place, and in particular for the production of energy. The energy produced is used for keeping the baby warm, for growth, for movement, and the repair of damaged tissue.

Many newborn babies need to be given extra oxygen.
Insufficient oxygen (hypoxia) is one of the main reasons for the high morbidity and mortality in newborn babies.

Too much oxygen also damages the retina of the eyes in preterm babies.
It is therefore very important to monitor carefully the oxygen administration and oxygen saturations when using oxygen in newborns.

FLUIDS AND FEEDS
Feeds are the means by which the babies get their sugar (energy source) intake. The newborn baby has immature kidneys and therefore cannot easily control the amount of fluid which is excreted. In addition, there is fluid loss through the skin (insensible fluid loss), which needs to be replaced. This is especially present in preterm infants nursed under radiant heaters, as in open incubators. This fluid must be replaced. It is essential that the baby has the correct amount of fluid in the body as it is used for transporting food and waste products.
PREVENTION AND TREATMENT OF INFECTIONS

Newborn babies, especially preterm babies, have an immature immune system which makes them susceptible to infection. They must therefore be protected from getting infections, and if they do get infected, the infection must be treated urgently and adequately. Most infections in babies who are in hospital are acquired from the hands of health workers or procedures, especially IV lines. The important means of preventing infections are:

- Breast feeding
- Skin-to-skin or Kangaroo Mother Care
- Strict hand washing for all who handle or work with the baby
- Strict aseptic technique when doing procedures

These 5 issues are the basic principles of newborn care. Whenever you have to deal with a newborn baby, remember that the baby needs to be kept warm, needs the correct amount of food and fluid, may need extra oxygen, must have a normal blood sugar level, and must be prevented from getting an infection, or have an infection properly treated.

Two other issues are also important in the management of newborn babies. These are:

OBSERVATIONS

Observations are done in order to detect changes in the condition of the patient. If there are changes, then there may need to be a change in the management of the patient. Observations are a critically important part of patient care, both from a management and medico-legal point of view.

For newborn care, a special observation chart is needed. The standard hospital chart is not suitable. A specimen observation chart can be found in the appendix.

Having done the observations, it is necessary to decide whether there has been a change in the condition of the baby, and if so, whether there is a need to change the treatment which the baby is getting.

TRANSFER AND REFERRAL

It is essential to know which babies need to be transferred to another hospital which has better facilities for providing care for them. It is also essential to know what needs to be done for the baby before transferring him / her. Communication, both verbal and written, is a key issue in the transfer of babies.
2.1.1 MAINTAIN BODY TEMPERATURE

LEARNING OBJECTIVES

At the end of this section you will be able to:
• Define normal body temperature & hypothermia
• Understand how infants lose heat and how to prevent this from happening
• Know how to recognize and treat HYPOTHERMIA
• Know the different methods of rewarming, and keeping babies warm, and which method is best in different circumstances

The normal axillary temperature of a newborn baby is 36.5°C – 37.0°C.

The normal abdominal skin temperature is 36.0°C – 36.5°C

In practice, the normal skin temperature for a newborn baby is 36.0°C – 37.0°C

A baby who is sick or small needs additional thermal protection and warmth to maintain normal body temperature. These babies become hypothermic very quickly.

DEFINITION OF HYPOTHERMIA

Hypothermia (low body temperature) is defined as an axillary or abdominal skin temperature below 36°C.

The temperature of babies must be read with a low reading thermometer, or else you are not able to adequately determine how low the baby’s temperature is, or to assess an improvement.

The severity of the hypothermia is classified as follows:

<table>
<thead>
<tr>
<th>Temp &lt; 32°C</th>
<th>SEVERE HYPOTHERMIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sign of severe disease</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temp 32 – 35.9°C</th>
<th>HYPOTHERMIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>May have signs of severe disease</td>
<td></td>
</tr>
</tbody>
</table>

RISKS FACTORS FOR HYPOTHERMIA

BABIES AT RISK OF HYPOTHERMIA
• Wet Babies
• Low birth weight babies
• Babies requiring resuscitation
• Sick babies, especially with infection
• Babies in a cold room
• Babies who are not fed
• Hypoglycaemic babies
• Babies undergoing medical procedures

WET INFANTS

Infants are wet after delivery, after a bath and when lying in a wet nappy. Wet infants lose heat by evaporation. When the water on the skin evaporates, it takes heat from the body and therefore cools the body.

⚠️ Infant lose heat by evaporation especially after delivery or during and after bathing.
LOW BIRTH WEIGHT

They lose more heat than term babies
- Low Birth Weight infants have a large surface area in relation to their body weight. Therefore, preterm and underweight for gestational age infants tend to lose heat rapidly.
- Preterm, underweight for gestational age and wasted infants have very little white fat under their skin (subcutaneous fat) to insulate their body against heat loss. Most white fat is stored under the skin during the last weeks of pregnancy. Therefore, preterm infants are born before they are able to build up stores of white fat. Underweight for gestational age and wasted infants also have little white fat as it has been used up before delivery.

They produce less heat than term babies
- Newborn babies use brown fat to produce heat quickly. In preterm or underweight for gestational age infants the stores of brown fat are either not yet laid down, or have been used up, so that the ability to produce heat after birth is reduced.
- These babies also have reduced glycogen stores. Glycogen is the source of glucose. If there is insufficient glycogen, there will be insufficient glucose produced.

BABIES REQUIRING RESUSCITATION

During resuscitation babies may be exposed to cold environment if the baby is resuscitated in a cold bed with no overhead heater. These babies lose heat by radiation (to surrounding colder objects), by conduction to a cold surface, and convection (to the environment by draughts). The environmental temperature in the labour ward and theatre is often kept quite cool for the sake of the patients and staff. This is cold for a newborn baby.

SICK BABIES ESPECIALLY WITH INFECTION

Infection overwhelms the temperature control of our bodies especially small babies and utilizes the energy they need to produce to keep warm.

BABIES IN A COLD ROOM

These babies lose heat through convection. Convection is the loss of heat from the infant’s skin to the surrounding air. Infants lose a lot of heat by convection when exposed to cold air or draughts.

BABIES WHO ARE NOT FED

Glucose is the main source of energy for newborns. If they are not fed, these babies use up all their energy stores and become hypoglycaemic, and therefore do not have enough energy to keep warm. Hypoglycaemia is a common cause of death in cold infants.

---

Hypoglycaemia can cause hypothermia
Hypothermia can cause hypoglycaemia
PREVENT HYPOTHERMIA

Principles of preventing hypothermia
Prevention of hypothermia means:
• Keeping the baby in the skin-to-skin care with the mother OR
• If this is not possible, the baby should be warmly clothed OR
• If the baby is small or sick, he/she should be nursed in a warm incubator
• Keep the room temperature at 25 - 26ºC.
• Avoid unnecessary exposure of the baby during procedures.
• All wet babies must be dried immediately and wrapped in a warm dry towel
• Wet napkins must be changed
• Bathing of sick and small babies is unnecessary and should be avoided. If the baby needs to be cleaned, he/she can be cleaned in the incubator. Daily cleaning does not require more than “top and tail”.

Take action to prevent hypothermia

<table>
<thead>
<tr>
<th>Dry the baby well at birth</th>
<th>Maintain a warm environment in newborn unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>When the baby is warm</strong></td>
<td>• Keep the room at 25 - 26ºC (Check 4 x / day with a wall thermometer)</td>
</tr>
<tr>
<td>• Keep the baby covered or clothed as much as possible unless nursed in skin-to-skin care</td>
<td>• Keep the room free of draughts</td>
</tr>
<tr>
<td>• Babies nursed in Kangaroo Mother Care only need a nappy, cap, and booties</td>
<td>• Do not place the baby on or near cold objects (examination table, wall, window) even if the baby is in an incubator</td>
</tr>
<tr>
<td>• Delay bathing until after the first 24 hours (if needed at all)</td>
<td>• Ensure warmth during procedures</td>
</tr>
<tr>
<td>• Provide skin-to-skin care if possible</td>
<td>• Have curtains drawn in the nursery</td>
</tr>
<tr>
<td>• Clothe the baby, including booties and cap, unless the baby is in KMC</td>
<td></td>
</tr>
<tr>
<td>• Uncover only parts that need observation and treatment</td>
<td></td>
</tr>
<tr>
<td>• Change the nappy when it is wet</td>
<td></td>
</tr>
<tr>
<td>• Nurse in an incubator if the baby needs special care or observation (p. 15)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feed the baby early</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Encourage early breastfeeding</td>
<td></td>
</tr>
<tr>
<td>• Feed baby and check blood glucose if appropriate</td>
<td></td>
</tr>
</tbody>
</table>

Maintain a warm environment in newborn unit

<table>
<thead>
<tr>
<th>Observe body temperature</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hourly if &lt; 1.2 kg and serious infection</td>
<td></td>
</tr>
<tr>
<td>• 3 hourly in babies 1.2 - 1.5 kg</td>
<td></td>
</tr>
<tr>
<td>• 6 hourly in babies &gt; 1.5 kg and stable</td>
<td></td>
</tr>
</tbody>
</table>

Encourage skin-to-skin care

<table>
<thead>
<tr>
<th>Encourage skin-to-skin care</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Placing mother and baby skin-to-skin can be used to re-warm babies with hypothermia</td>
<td></td>
</tr>
<tr>
<td>• In addition to re-warming, skin-to-skin care improves feeding, reduces infections, and encourages bonding</td>
<td></td>
</tr>
<tr>
<td>• It is only used for stable babies, unless no other option is available</td>
<td></td>
</tr>
<tr>
<td>• Small babies should be cared for in Kangaroo Mother Care (p.14)</td>
<td></td>
</tr>
</tbody>
</table>

TREAT HYPOTHERMIA

Principles of treating hypothermia

• Quickly warm up the baby by either placing him in the KMC position or in a pre-warmed incubator set at 38ºC.
• Decrease the incubator temperature as the baby warms up.
• Take the baby’s temperature every 30 minutes until it is normal. The temperature must increase by at least 0.5ºC every hour
• Give oxygen even if the baby is centrally pink, as cold babies are often hypoxic.
• Ensure an adequate energy intake, either by feeding the baby (milk) or with intravenous Neonatalyte (contains 10% dextrose) if the baby cannot be fed.
• If the baby’s temperature does not come up quickly enough, increase the incubator temperature and continue to take and record the baby’s temperature ½ hourly.
Take action to treat hypothermia

<table>
<thead>
<tr>
<th>Temp 32 – 35.9 °C</th>
<th>MODERATE HYPOTHERMIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>May have signs of severe disease</td>
<td>• Rewarm the baby using skin to skin contact</td>
</tr>
<tr>
<td></td>
<td>• If there is evidence of severe disease, then treat for severe hypothermia</td>
</tr>
<tr>
<td></td>
<td>• Measure the blood glucose &amp; feed</td>
</tr>
<tr>
<td></td>
<td>• Measure the temperature every hour. The temperature should increase by 0.5 °C every hour</td>
</tr>
<tr>
<td></td>
<td>• If baby is stable, introduce KMC (p.14)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temp &lt; 32°C</th>
<th>SEVERE HYPOTHERMIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sign of severe disease</td>
<td>• Radiant warmer or incubator at 38°C</td>
</tr>
<tr>
<td></td>
<td>• If using a servo-controlled incubator, set skin temperature at 36.5°C and ensure skin probe is fixed securely (p.16)</td>
</tr>
<tr>
<td></td>
<td>• Measure temperature after 30 minutes and then hourly until normal.</td>
</tr>
<tr>
<td></td>
<td>• The temperature should increase by more than 0.5°C every hour</td>
</tr>
<tr>
<td></td>
<td>• Treat for sepsis</td>
</tr>
<tr>
<td></td>
<td>• Give IV fluids and monitor blood glucose, keep nil by mouth until re-warmed</td>
</tr>
<tr>
<td></td>
<td>• Give oxygen by nasal prongs until the baby’s temperature is normal</td>
</tr>
<tr>
<td></td>
<td>• Continually reassess for emergency signs. The baby is at risk for cardio-respiratory failure</td>
</tr>
<tr>
<td></td>
<td>• Once the baby is warmed &amp; stable, consider KMC (p.14)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Baby sick, or &lt; 1 kg</th>
<th>METHODS OF WARMING THE BABY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Radiant warmer or incubator at 38°C</td>
</tr>
<tr>
<td></td>
<td>• If no incubator is available or transferring baby, then KMC is an acceptable alternative (p.14)</td>
</tr>
</tbody>
</table>

**METHODS OF WARMING THE BABY**

<table>
<thead>
<tr>
<th>Severe hypothermia (&lt; 32°C)</th>
<th>• Incubator at 38°C or radiant warmer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Set the skin temperature of a servo-controlled incubator at 36.5°C</td>
</tr>
<tr>
<td></td>
<td>• Ensure that the skin probe is securely on the skin of the baby (see Newborn Care Chart booklet p. 16)</td>
</tr>
<tr>
<td>Hypothermia (&lt; 36.0°C)</td>
<td>• Always try skin-to-skin care first if baby is stable (KMC)</td>
</tr>
<tr>
<td>Birth Weight &lt; 1.5 kg</td>
<td>• If KMC is unsuccessful at re-warming the baby, then manage according to birth weight</td>
</tr>
<tr>
<td>Birth Weight 1.5 - 1.8 kg on admission</td>
<td>• Open or closed servo-controlled incubator</td>
</tr>
<tr>
<td>Birth Weight &gt; 1.5 kg and sick</td>
<td>• Closed manual or servo-controlled incubator, or KMC</td>
</tr>
<tr>
<td></td>
<td>• Open or closed incubator / radiant warmer</td>
</tr>
</tbody>
</table>

**Important note about incubators**

- All incubators need electricity, and will not function when there is an electric power failure.
- They therefore need a reliable source of electricity, and the hospital must have a functioning back-up generator.
- It is also essential to check the incubator temperature regularly. This is part of the essential observations done for newborn babies.
- A major disadvantage of incubators is that the mother and baby are separated. Every effort must be made to get babies out of incubators and into skin-to-skin contact (Kangaroo Mother Care) with their mothers as soon as possible.
Guide to the methods for warming a baby or keeping a baby warm

<table>
<thead>
<tr>
<th>Method</th>
<th>Guideline for choosing the most appropriate method</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| Warm room                   | • Appropriate for the care of babies recovering from illness & small babies who do not require frequent diagnostic & treatment procedures  
                            | • The room temperature should be kept at 30ºC                                                                               | • Only heaters needed, no other specialised equipment required                  | • Baby is usually nursed in a cot, dressed and covered with blankets which makes it difficult to observe the baby  
                            |                                                                            |                                                                             | • Baby can become hypothermic                                                                 |
|                            | • The room temperature should be kept at 30ºC                                                                               |                                                                             | • If a warm room is exceptionally uncomfortable for adults, it may be better to do Kangaroo Mother Care with the baby, unless the mother is not available |
| Skin–to–skin (Kangaroo Mother Care) | • Appropriate for all stable babies weighing > 1.5 kg  
                            | • Particularly recommended for continuous care of babies weighing 1.5 to 1.8kg while they are still in hospital  
                            | • Appropriate for re-warming a baby with moderate hypothermia (32 – 35.9 ºC) | • The mother can closely monitor the baby  
                            |                                                                            |                                                                             | • Not appropriate for babies with life threatening problems (e.g. sepsis & severe difficulty in breathing)  
                            |                                                                            |                                                                             | • Mother may not always be available                                                                 |
| Closed incubator (Manual)   | • Appropriate for continuous care of babies weighing >1.5 kg.  
                            | • Appropriate for babies who have life threatening conditions (e.g. sepsis, severe breathing difficulty)  
                            | • Appropriate for incubator care for all sick infants                     | • Maintains a constant temperature  
                            |                                                                            |                                                                             | • The baby can become hyperthermic or hypothermic if the temperature is not regulated  
                            |                                                                            |                                                                             | • The standard incubator requires manual setting of the temperature & regular monitoring, including the observation of the baby’s temperature |
| Radiant warmer              | • Appropriate for sick babies & babies weighing >1.5 kg  
                            | • Use to keep the baby warm during initial assessment, treatment, & procedures, & to re-warm a cold baby  
                            | • Allows for observation of the baby  
                            | • Many procedures can be performed while baby is under a radiant warmer   | • Allows for observation of the baby  
                            |                                                                            |                                                                             | • The baby can become hyperthermic or hypothermic if the temperature is not monitored  
                            |                                                                            |                                                                             | • The baby can become dehydrated  
                            |                                                                            |                                                                             | • Not appropriate for long term care unless it is a servo-controlled open incubator |
| Servo controlled incubators | • They are suitable for the care of all infants, but particularly those that are sicker, such as:  
                            | • Babies weighing <1.5 kg.  
                            | • Babies who have life threatening conditions (e.g. sepsis, severe breathing difficulty) | • These incubators automatically control the temperature of the air in the incubator to keep the babies skin temperature normal  
                            |                                                                            |                                                                             | • If the skin probe is not attached to the baby, the incubator will not be able to control the temperature of the baby.  
                            |                                                                            |                                                                             | • If the skin probe becomes loose the incubator will continue to warm up & the baby will become hyperthermic |
| Open servo incubator        | • Appropriate for sick & small babies, especially in an ICU                                                                 | • Suitable for babies who need resuscitation or procedures to be done  
                            | • Ideal for nursing very sick babies                                       | • Need a heat shield to cover the baby to prevent heat loss by radiation   |
HOW TO APPLY WARMING METHODS

Skin-to-skin (Kangaroo Mother Care)
Kangaroo Mother Care is the care of preterm infants in skin-to-skin contact with the mother.
- KMC is only used to rewarm stable babies with mild or moderate hypothermia
- It is especially useful in stable, preterm and/or low birth weight babies who need additional warmth to maintain body temperature.
- It is not for life threatening conditions, unless no other option is available at the time

Advantages of KMC
- Best way to keep a baby warm
- Improves breast feeding and baby grows better
- Baby is physiologically more stable
- The mother is more involved in care of her baby
- Better bonding between the mother and baby
- Better neurological outcomes

INTERMITTENT KMC
Intermittent KMC is the practice of scheduling periods of skin-to-skin care in between another warming method, such as open or closed incubator care.
- Babies who are low birth weight can be nursed skin–to-skin intermittently, as often as possible, until the mother and baby are ready for continuous KMC
- Mothers are sometimes afraid or feel uncomfortable about practising KMC. It is at this stage, while the baby is still in the neonatal ward that she can be supported to start with intermittent KMC so that she will become comfortable with it when she has to practise continuous KMC later
- The mother practises KMC when she comes to visit or feed the baby
- If the mother is ill, the father or other relatives can practise intermittent KMC
- Intermittent KMC can be practised if the baby is on a drip and oxygen, even CPAP, as long as staff takes care in placing the baby in the KMC position and continuing to observe the baby

CONTINUOUS KMC
The baby is ready for continuous KMC when
- Baby’s temperature is stable
- Baby is tolerating feeds
- Blood glucose is normal
- Baby no longer needs oxygen & IV fluids
- Baby usually weighs more than 1.5kg, but if the baby weighs less than this and is stable, continuous KMC can be initiated earlier (this weight is a guide, not a rule)

NB - Babies in continuous KMC should have 6 hourly observations done.

- Continuous KMC must be done all the time except when the mother goes to the bathroom.
- The mother must maintain good hand hygiene
- The mother must be able to stand and walk without holding her baby. Therefore the baby must be well secured (mbeleko, tari) so she can walk around the hospital and outside with her baby in KMC
- The time the mother and her baby spend in the KMC ward is preparation for going home. The mother must therefore be able to do domestic tasks comfortably with the baby in the KMC position.
- The KMC unit needs to have facilities for the mothers to make tea, prepare light meals, and even do laundry, so that she can do these things with the baby in the KMC position.
- There must be facilities to keep the mothers occupied while they are in the ward; eg radio, television, handwork, and skills training
- It is important to get other family members (father, grandmother, etc) involved in KMC as early as possible if they are available, so they can provide better support for the mother when she is home
### Guide to practising Kangaroo Mother Care*

#### What is KMC?
- KMC is a method of caring for small babies that has been shown to maintain warmth, improve feeding, reduce infections, and encourage bonding.
- KMC can reduce mortality by up to half in babies weighing less than 2000g.
- KMC has three main components including thermal care through continuous skin-to-skin contact usually with the mother, nutrition through exclusive breastfeeding, and support from health staff through early recognition and response to complications.
- If continuous KMC cannot be practiced due to space or other constraints, intermittent KMC is also beneficial.
- All stable small babies and their mothers will benefit from KMC.

#### KMC Monitoring
- 6 hourly heart rate, respiratory rate, temperature, activity, colour, intake and output.
- Daily weight.
- Daily KMC score (see Newborn Care Chart booklet p. 72).

#### KMC Nutrition
- Babies who are unable to suckle should be fed expressed breast milk via nasogastric tube or cup. Babies may be kept in the KMC position while tube feeding. Allow them to try suckling during the tube feed.
- Babies will show that they are ready to suckle as their rooting and suckling reflexes develop.
- Once the baby is able to suckle, allow him / her to breast feed on demand, and feed at least every three hours.
- When the baby no longer needs tube feeds but cannot yet suckle, cup feeding is the method of choice.
- Cup feeding is the feeding method when an HIV positive mother has chosen replacement feeding for her baby.

#### KMC Position
- Dress the baby in a nappy and cap.
- Place the baby in an upright position against the mother’s bare chest, between her breasts and inside her blouse.
- Cover both the mother and baby with a blanket or jacket if the room is cold.
- You may use a special garment; or tuck the mother’s blouse under the baby or into her waistband. (“mbeleko” “tari”)
- The baby must be secured well enough so that the mother can walk around without needing to hold her baby. Her hands must be free.
- Explain and demonstrate until the mother is confident to use the kangaroo position.

#### KMC Ward
- The KMC ward should be warm and inviting.
- The mother must keep her baby in the KMC position at all times (except while she baths, etc).
- Good hygiene is important, including hand washing after using the toilet and before feeding.
- Mothers can walk around the ward and outside with their babies in the KMC position if the weather conditions are favourable.
- Occupy the mothers and encourage appropriate developmental stimulation.
- Health staff should be available to respond early and quickly to complications.

*Most published evidence on KMC comes from health facilities and has been found to be an effective and safe method of caring for low birth weight newborn infants. For more details refer to “Kangaroo Mother Care: a practical guide”. (WHO, 2003).*

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**Discharging babies from Kangaroo Mother Care**
- Most babies are suitable for discharge when they weigh about 1.8 kg, are stable and able to feed. This weight is a guideline, not a rule.
- The KMC Score Sheet (p. 72 in Newborn Care Chart booklet) is also a useful addition which will give a guide as to the readiness of the mother and baby for discharge. It takes into account the condition of both the baby and mother and the home circumstances.
- It is very important that the mother practises KMC at home. She needs to have understood the reasons for the importance of it, while she is still in hospital before going home. The support of her mother or mother in law is also very important. Try to encourage these significant family members to visit and learn about KMC while the mother and baby are still in hospital.
Manual closed incubator
- Place the baby in a warm (37°C) clean incubator
- Determine the recommended incubator temperature for the baby using the table below
- Set the incubator to this temperature
- Measure the incubator & baby’s temperature after 30 minutes & adjust the incubator temperature if the baby’s temperature is not normal (36.0 - 37.0°C)
- Observe the incubator & baby’s temperature 3 hourly as part of routine observations.
- Alter the incubator temperature whenever the baby’s temperature is outside the normal range.

<table>
<thead>
<tr>
<th>Birth Weight</th>
<th>Days After Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1000g</td>
<td>35.5</td>
</tr>
<tr>
<td>1500g</td>
<td>35.0</td>
</tr>
<tr>
<td>2000g</td>
<td>34.0</td>
</tr>
<tr>
<td>2500g</td>
<td>33.5</td>
</tr>
<tr>
<td>3000g</td>
<td>33.0</td>
</tr>
</tbody>
</table>

Servo controlled closed incubator
- Switch the control to Manual (AIR) & preheat to 37.0°C
- Place the baby in the incubator & attach the temperature probe to the baby’s skin on the left side of the abdomen
- Make sure the cable from the baby’s skin is correctly plugged into the incubator
- Switch the incubator control from manual (AIR) to servo controlled (SKIN).
- Set the required skin temperature to 36.5°C on the control panel
- The actual skin temperature will be displayed on the panel
- After 30 minutes check that the baby’s skin temperature is the same as the required temperature. If not then the skin probe is not correctly applied or the incubator is malfunctioning
- Check the infant’s & incubator temperature every 1 – 3 hours

Radiant warmer
- Warms the baby by radiant heat and is mainly used in the resuscitation area
- Keep radiant heater switched on in the resuscitation area, ready for use at all times

Servo controlled open incubator
- Uses radiant heat to warm the baby
- Set as for servo control closed incubator. The temperature probe is taped to the baby’s skin on the left side of the abdomen and set to 36.5°C
- The baby must be undressed and exposed, except for a nappy
- A heat shield will prevent heat loss through radiation & convection
- An open incubator is useful for managing sick and small babies in ICU or high care. It is not needed for Intermediate Care, as babies will be better in a closed incubator

NB - If the skin probe comes loose the incubator will continue to warm up & the baby will become hyperthermic.
2.1.2 OXYGEN THERAPY

LEARNING OBJECTIVES

At the end of this section you will be able to:
• Know which babies require oxygen
• Understand how to administer oxygen
• Understand the advantages & disadvantages of each method
• Monitor oxygen administration to newborns

OXYGEN IS REQUIRED IN THE FOLLOWING SCENARIOS
• During resuscitation
• In respiratory or circulatory failure
• In cases of severe hypothermia
• In a baby with respiratory distress:
  o RR > 80
  o severe chest in drawing or grunting
  o blood oxygen saturation less than 88%
  o central cyanosis (blue tongue and lips)
• Any condition, especially severe illness, where oxygen saturation is less than 88%

During resuscitation 100% oxygen is usually used as the babies either have respiratory or circulatory failure and they initially need more oxygen. However, if oxygen is not available, ventilation with a bag and mask using room air is satisfactory for most babies.

Babies with severe hypothermia will also benefit from oxygen because there is decreased tissue perfusion and oxygen is not released from the red blood cells, so that it is not available to the tissues. When giving extra oxygen, some oxygen will be in the blood itself (not in the red blood cells). This will be available to the tissues.

Severe respiratory distress. An increased respiratory rate, grunting and chest in-drawing are indications that the baby is trying to get more oxygen. This is usually due to something wrong with the lungs. Giving extra oxygen makes it easier for the baby to get the oxygen he / she needs. You will find that when you administer oxygen to these babies, their respiratory distress often improves.

Babies who have an oxygen saturation in the blood that is less than normal (< 88% in preterm and < 94% in term babies) require oxygen to be given. The oxygen saturation is measured with a pulse oximeter, and it is always essential to monitor the baby’s oxygen requirements.

HOW MUCH OXYGEN?

Babies need to be given the correct amount of oxygen, as too little oxygen may result in hypoxic damage and too much oxygen can also cause damage. In preterm babies too much oxygen can result in damage to the retina (retinopathy of prematurity).

In order to deliver the correct amount of oxygen it is necessary to:
• know how much oxygen is in the air the baby is breathing
• monitor and record the amount (percentage, or concentration) of oxygen being given
• monitor and record the oxygen saturation of the baby’s blood
CONCENTRATION OF OXYGEN

The percentage of oxygen in room air is 21%, and the percentage of pure oxygen is 100%. The percentage of oxygen given must be only enough for the baby’s needs. This is done by mixing the oxygen with air. This mixing can be done with:

- An air / oxygen blender that mixes pure oxygen with medical air to give the required percentage of oxygen.
- A venturi that mixes pure oxygen with room air – the venturi is a simple apparatus that uses a jet of oxygen to suck in a fixed amount of room air. Each venturi has a specific oxygen flow rate to give the correct percentage of oxygen.
- The percentage of oxygen given must be adjusted to keep the baby’s oxygen saturation at:
  
<table>
<thead>
<tr>
<th>Preterm baby</th>
<th>Term baby</th>
</tr>
</thead>
<tbody>
<tr>
<td>88 – 93%</td>
<td>94 – 96%</td>
</tr>
</tbody>
</table>

METHOD OF ADMINISTRATION OF OXYGEN

It is almost impossible to give 100% oxygen to a baby except by mechanical ventilation. All other methods will result in some mixing of oxygen with air. The table below describes how much oxygen is delivered by the following routes:

<table>
<thead>
<tr>
<th>Flow rate of oxygen</th>
<th>Head Box</th>
<th>Face Mask</th>
<th>Nasal Canula</th>
<th>Nasal Prong</th>
<th>CPAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow rate of oxygen</td>
<td>5 litres</td>
<td>3 litres</td>
<td>1 – 2 litres</td>
<td>1 – 2 litres</td>
<td>5 – 10 litres with CPAP machine</td>
</tr>
<tr>
<td>% of Oxygen delivered to baby when 100% is given</td>
<td>30 – 60% dependent on how tightly the box fits</td>
<td>~30%</td>
<td>~30%</td>
<td>~30%</td>
<td>Up to 80%</td>
</tr>
</tbody>
</table>

The table on the following page will help you to know which method of administration of oxygen will be appropriate for the baby which you are treating.
<table>
<thead>
<tr>
<th>Method</th>
<th>Indication</th>
<th>Method</th>
<th>Flow and concentration</th>
<th>Observations</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal prongs</td>
<td>Mild respiratory distress, or coping on HBO\textsubscript{2}</td>
<td>Place the prongs just below the baby’s nostrils. Use 1mm prongs for small babies and 2mm prongs for term babies. Secure the prongs with tape.</td>
<td>1 L per minute</td>
<td>Monitor the oxygen saturation 3 hourly</td>
<td>Ensures constant concentration</td>
<td>Not for babies with moderate or severe breathing difficulty</td>
</tr>
<tr>
<td></td>
<td>No nasogastric tube in situ - baby may have an orogastric tube</td>
<td></td>
<td></td>
<td></td>
<td>Baby can be fed orally (cup or breast)</td>
<td>Prongs can easily get displaced</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ideal for babies with mild respiratory distress</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Baby can be fed orally (cup or breast)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ideal for babies with mild respiratory distress</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Baby can be fed orally (cup or breast)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Uses little oxygen</td>
<td></td>
</tr>
<tr>
<td>Nasal cannula</td>
<td>Mild respiratory distress, or coping on HBO\textsubscript{2}</td>
<td>Insert a FG5 or FG8 nasogastric tube 2 – 3 cm into the nostril. Secure with tape.</td>
<td>0.5 L per minute</td>
<td>Monitor the oxygen saturation 3 hourly</td>
<td>Ensures constant concentration</td>
<td>Not for babies with a nasogastric tube in situ as this may obstruct both nostrils</td>
</tr>
<tr>
<td></td>
<td>No nasogastric tube in situ - baby may have an orogastric tube</td>
<td></td>
<td></td>
<td></td>
<td>Baby can be fed orally (cup or breast)</td>
<td>If tube feeding is needed use an orogastric tube</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ideal for babies with mild respiratory distress</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Uses little oxygen</td>
<td></td>
</tr>
<tr>
<td>Headbox (HBO\textsubscript{2})</td>
<td>For babies with respiratory distress needing oxygen</td>
<td>Always ensure that the head stays within the head box. 4 - 12 L / min of oxygen is required. Apply a face mask if you need to move the baby.</td>
<td>5 L / min if an oxygen / air blender is used. Must use air / oxygen blender or venturi. Oxygen concentration 25% - 80%</td>
<td>Observe and record the oxygen saturation and colour hourly. Observe and record oxygen concentration. ALWAYS MONITOR OXYGEN SATURATION</td>
<td>High concentrations can be achieved. Does not obstruct the nasal passages. Humidification of oxygen not necessary</td>
<td>Baby cannot be moved. Must feed by nasogastric tube. High flow needed to reach required concentration. Danger of oxygen poisoning (retinopathy, broncho-pulmonary dysplasia), especially in a preterm baby, if too much oxygen is given</td>
</tr>
<tr>
<td></td>
<td>To stabilise babies to assess whether they will require CPAP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>For babies not maintaining oxygen saturation on nasal prong or cannula</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous Positive Airway Pressure (CPAP)</td>
<td>For preterm babies with severe respiratory distress, e.g. hyaline membrane disease, wet lung syndrome, pneumonia, atelectasis, pulmonary oedema Apnoea of prematurity</td>
<td>Apply special nasal prongs to the baby. Connect the CPAP machine. Start with a pressure of 5cm of water. When weaning the baby, first turn down the oxygen percentage and then the cm pressure of water.</td>
<td>Oxygen and air mixed through a blender.</td>
<td>Observe and record the oxygen saturation continuously. ALWAYS MONITOR THE OXYGEN SATURATION</td>
<td>Delivers oxygen and provides a positive airway pressure to prevent collapse of airways. Decreases the work of breathing. Optimises surfactant production. Reduces the incidence of apnoea</td>
<td>Babies must be breathing spontaneously. Cannot be fed initially. Later small feeds via orogastric tube. Danger is gastric distension and vomiting. Risk of air leak syndromes. Reduction in cardiac output. Trauma to the nostrils &amp; skin. Stomach distension. Inadvertent disconnection</td>
</tr>
</tbody>
</table>
MONITORING THE OXYGEN REQUIREMENTS

Monitor the oxygen saturation of all babies receiving oxygen, using a pulse oximeter. Babies receiving head box oxygen should have their oxygen saturation monitored every hour, and those on nasal prongs every 3 hours.

- If a baby needs to have oxygen administered, keep the baby's blood oxygen saturation between 88 - 93% in a preterm infant and 94 – 96% in a term infant. Adjust the oxygen percentage being given to keep the baby's oxygen saturation in this range.
- If the oxygen saturation is higher than the upper limit of the range (preterm 93%, term 96%) and the baby is breathing comfortably, you should decrease the percentage of oxygen being given.

This is done by either:

- Changing the method of delivery e.g. from head box to nasal prongs
- Reducing the concentration of oxygen. If the baby is receiving oxygen in a headbox, change the verturi being used to administer the oxygen, or dial down the percentage on the oxygen – air blender.
- Monitor the oxygen saturation continuously, and the clinical signs, for 30 minutes after making a change.

⚠️ If a baby is receiving oxygen in a head box, and needs to have the oxygen reduced, reduce the percentage oxygen not the flow.

INITIATING OXYGEN THERAPY

When initiating oxygen in newborns in the nursery, it is usually most convenient and quick to commence with head box oxygen with 5 litres of 40% oxygen, although one may also commence with nasal canula oxygen. Do what is fastest for your unit and monitor the oxygen saturation continuously for the first 30 minutes (see guidelines below and algorithm in the Newborn Care Chart booklet p.18)

To commence oxygen administration:

- Place a headbox on the baby with 5 litres of 40% oxygen and observe the baby’s response
- If the baby improves but still has some distress and the oxygen saturation is 88 – 93% for a preterm infant or 94 – 96% for a term infant, continue
- If the baby is very comfortable and the oxygen saturation is > 93% in a preterm infant or > 94% in a term infant, change to a nasal canula or prongs
- If the baby still has respiratory distress and the oxygen saturation is < 88% in a preterm infant or < 94% in a term infant, then the baby may need CPAP or mechanical ventilation.
FLOW CHART GUIDELINES FOR OXYGEN ADMINISTRATION
(see Newborn Care Chart booklet p. 18)

**NB** Entry is at any point

**Head Box Oxygen With venturi system**
- > 60% O₂ flow at 10 litres
  - Provide CPAP O₂ flow at 6 - 8 litres
    - > 40% O₂
      - Signs of respiratory distress
        - Assess for intubation and referral for IPPV
    - < 40% O₂ and Saturations > 88%
      - NO Signs of respiratory distress
      - Provide nasal prong oxygen
  - < 40% O₂ flow at 10 litres oxygen
    - Wean by changing venturis to 30%

**Guidelines for oxygen administration**
- Start head box oxygen for all babies with RESPIRATORY DISTRESS
- Monitor the oxygen saturation with a PULSE OXIMETER continuously for 30 minutes after commencement on oxygen
- A preterm baby’s oxygen saturation should be between 88% and 93%
- A term baby’s oxygen saturation should be between 94 and 96%
- If the baby is pink and comfortable (less grunting / chest indrawing) and saturation > 88%, in < 60% oxygen on head box, change to nasal prongs.
- If the baby is distressed or blue or the oxygen saturation is < 88% on > 60% oxygen, use CPAP if available, or transfer
- If the baby remains distressed or blue, or the oxygen saturation remains < 88% on optimum CPAP (as defined by experienced staff) then intubation and ventilation is needed

**CARE OF BABIES RECEIVING OXYGEN**
- Do not stop oxygen administration to a baby for procedures, routine care or feeding
- Ensure the baby does not receive too little or too much oxygen:
  - Too little oxygen may cause organ damage and eventual death
  - Too much oxygen may damage the baby’s lungs and retinas.
- Do not give oxygen if it is not indicated
- Always give oxygen using a blender or venturi, unless you are using nasal prongs or cannula
- Humidification of oxygen is not necessary


**METHODS OF ADMINISTRATION**

**Head box oxygen (HBO\textsubscript{2})**

- Ensure that the baby’s head stays within the head box, even when he moves.
- Always use a venturi or oxygen - air blender.
- Ensure that the flow of oxygen is the flow indicated on the venturi or 3 – 5 litres / minute if using an oxygen - air blender.
- Babies receiving head box oxygen can only be fed by nasogastric tube.
- Humidification of oxygen is not necessary.
- **Do not take the baby out of oxygen for procedures or feeding.**

**Nasal prongs**

- Use 1 mm prongs for a small baby and 2 mm prongs for a term baby.
- Place the prongs just within the baby’s nostrils.
- Secure the prongs in place with elastic or adhesive tape.
- Adjust the flow of oxygen to achieve the desired concentration.
- Replace the prongs if they are soiled. The soiled prongs can be cleaned, disinfected and reused.

**Nasal canula / nasal catheter**

- Use a FG8 catheter or a FG6 for smaller babies.
- Determine the distance the tube should be passed by measuring the distance from the nostril to the inner margin of the eyebrow.
- Gently insert the catheter into the nostril. If a gastric tube is in place, insert a separate orogastric tube for the feeds.
- **Ensure that the catheter is correctly positioned:** The catheter should not be visible in the back of the infant’s mouth – if it is, pull it out slowly until it is no longer visible.
- Adjust the flow of oxygen (from 0.5 – 2 litres per minute) to achieve the desired concentration.
- Give oxygen using a face mask while cleaning and disinfecting the prongs.

**Constant Positive Airways Pressure (CPAP)**

CPAP increases positive airways pressure in spontaneously breathing infants throughout the respiratory cycle.

CPAP works by:
- increasing lung capacity by preventing collapse of alveoli, thus decreasing the work of breathing.
- stimulating breathing thereby decreasing apnoea.
- improving lung compliance and airways resistance.
- decreasing oedema of the alveoli.
Usage of CPAP
CPAP is used on preterm infants with respiratory distress, atelectasis, recurrent apnoea or pulmonary oedema. If you have CPAP available this can be commenced on all preterm babies with respiratory distress who require oxygen.

Apparatus required for CPAP
Although earlier CPAP used a water bath to regulate the positive pressure (bubble oxygenator) there are several electronic machines available that provide much easier control of the procedure. All provide a variable mixture of oxygen and air. The CPAP apparatus will **not work** on oxygen alone. If a central bank of medical air is not available, it can be supplied by cylinders with a regulator, or a compressor which can be used in the ward. Most of the machines use heated humidification but this not essential when intubation is not used.

- Start as early as possible using a pressure of 5cm of water.
- Ensure good nasal application of the prongs and regulate the oxygen according to the baby's oxygen saturations.
- Aim for an oxygen saturation of 88 - 93% in a preterm baby or 94 - 96% in a term baby. This is often achieved with a low percentage of oxygen.
- When weaning the baby off CPAP, turn down the oxygen percentage first and then reduce the pressure.
- All changes must be evaluated and recorded according to the blood oxygen saturation. If the oxygen saturation falls, simply increase the oxygen and/or pressure.

Notes
- CPAP will not be sufficient in very severe respiratory distress or where the baby is not breathing
- The pressure can be increased to 8 – 10 cm if indicated
- Apart from excoriation of nose and inadvertent disconnection, there are few risks.
- Oral or tube feeding is not advised during CPAP

Now see Exercise Module 6.2 – and do exercise 2B
2.1.3 MAINTAIN NORMAL GLUCOSE

LEARNING OBJECTIVES

At the end of this section you will be able to:
• Define normal blood glucose levels and hypoglycaemia
• Understand the dangers of hypoglycaemia
• Identify infants at increased risk for hypoglycaemia
• Understand the prevention of hypoglycaemia
• Manage hypoglycaemia

DEFINITION OF HYPOGLYCAEMIA

• The normal blood glucose level in a newborn baby is 2.5 – 6 mmol / l
• Hypoglycaemia is therefore a blood glucose level below 2.5 mmol / l
• Severe hypoglycaemia is a blood glucose level of < 1.4 mmol / l

DANGERS OF HYPOGLYCAEMIA

Glucose is the source of energy for all tissues, and for producing heat. It is especially important for maintaining the normal function of the brain cells. Therefore the dangers of hypothermia are:
• Brain damage
• Hypothermia

Prolonged glucose deficiency will result in the child not growing well

PREVENTION OF HYPOGLYCAEMIA

• Put the baby to the breast immediately after birth
• Keep the baby warm
• If milk feeds are contraindicated start intravenous fluids (Neonatalyte) immediately
• Check and record regularly the blood glucose level of infants at risk of hypoglycaemia (see table below)

BABIES AT RISK FOR HYPOGLYCEAMIA

Babies are at risk of hypoglycaemia when:
• They have inadequate stores of glucose and glycogen (LBW, wasted babies)
• They are using up their stores of glucose and glycogen either to fight infection or maintain a normal temperature (respiratory distress, infection, hypothermia)
• They have not been fed (starved babies)
• They have transient high levels of insulin (infants of diabetic mothers)

Which babies are at risk for hypoglycaemia?
• Starved infants
• Babies with hypothermia
• Infants of a diabetic mother
• Infants with a birth weight > 4kg
• Low birth weight (preterm & underweight)
• Wasted infants
• Infants with respiratory distress
• Infants with an infection
• Infants who have had birth asphyxia
Check the blood glucose level of the following babies

- Small (birth weight less than 2kg) and sick babies
  - every 3 hours for the first 24 hours, and then until the blood glucose level has been normal for 24 hours
- Babies of diabetic mothers, and babies weighing 4kg or more at birth
  - hourly for the first 6 hours
- Babies who are hypothermic
  - every 3 hours until temperature normalises, and then until the blood glucose level has been normal for 24 hours

CLINICAL SIGNS OF HYPOGLYCAEMIA

Hypoglycaemia is an emergency sign, as it can result in both acute and long term consequences. A baby who is hypoglycaemic:

- May appear asymptomatic or
- May develop a number of priority signs. These include irregular jerky movements, convulsions, apnoea, and lethargy. These are all signs of the brain not getting enough glucose. If this situation persists there can be damage to cells in the brain with resultant learning difficulties or cerebral palsy, or
- May develop hypothermia, as the body no longer has energy to produce heat.

A baby who is hypoglycaemic may have NO clinical signs

TREAT HYPOGLYCAEMIA

(See Newborn Care Chart booklet p. 21)

**HYPOGLYCAEMIA**

If the blood glucose is 1.4 - 2.5 mmol / l
- Breastfeed or feed expressed breast milk. Only if breastfeeding is not possible (mother very sick or HIV-positive and has chosen not to breastfeed) then give 10ml / kg appropriate replacement milk feed
- Repeat the blood glucose in 15 minutes
- If the blood sugar remains low, treat for severe hypoglycaemia
- If the blood glucose is normal, give normal milk feeds and check the blood glucose 3 hourly

**SEVERE HYPOGLYCAEMIA**

If the blood glucose is < 1.4 mmol / l
- Give a bolus of 10% glucose infusion (Neonatalyte) at 5 ml / kg. Then continue with the 10% glucose infusion at the recommended rate for age & weight (chart booklet p. 22-23)
- Repeat the blood glucose in 15 minutes
- If still low, give IM glucagon: dose: 0.2mg / kg / dose to increase glucose rapidly
  OR
- If still low, give 5mg hydrocortisone IV
AND discuss with a paediatrician

Manage the baby both according to the severity of the hypoglycaemia and decide which the most rapid way to administer glucose is.

- If the baby has severe hypoglycaemia and does not have an IV line up, give an oral or nasogastric feed while you attempt to insert a drip.
- An infusion of 50% glucose is contraindicated as it may lead to rebound hypoglycaemia, and also tends to damage the baby's veins.
- Administer a 10% glucose infusion as a bolus (should be Neonatalyte / Neolyte).
- If the child has not responded after 15 minutes repeat the bolus and if there is still no response then administer hydrocortisone or glucagon.
Management of baby with persistently low blood glucose
If a baby has a persistently low blood glucose levels, check whether the baby:
• Is warm enough and in a thermoneutral environment
• Is getting adequate feeds, and / or IV fluids as appropriate
• Has an infection

Manage the baby both according to the severity of the hypoglycaemia and decide the most rapid way to administer glucose.
• If the baby has severe hypoglycaemia and does not have an IV line up, give an oral or nasogastric feed while you attempt to insert a drip.

Most babies with a persistently low blood glucose
• Are not warm enough
  o Check the method of warming the baby and that it is being applied correctly.
  o Is the baby on KMC getting continuous KMC?
  o Is the incubator at the correct temperature?
  o Is the baby adequately covered in the incubator?
  o Is the baby or the incubator too close to a cold window?
• Are not getting adequate feeds
  o Check the feeds – amount and type
• Have an underlying infection.
  o Screen for infection

BABY OF A DIABETIC MOTHER AND A LARGE FOR GESTATIONAL AGE BABY
Admit babies of mothers with diabetes OR babies weighing > 4 kg to the nursery for hourly glucose observation for the first 6 hours after birth
• Feed the baby immediately, or start IV neonataLyte if the baby cannot be fed
• Check the blood glucose hourly
• If hypoglycaemia occurs, manage according to the hypoglycaemia protocol (see Newborn Care Chart booklet p.21)
• Discharge the baby back to the mother after 6 hours if the glucose has been normal and the baby is well

Hypoglycaemia is a medical emergency and must be treated immediately
2.1.4 FEEDING AND FLUIDS FOR SICK AND SMALL BABIES

LEARNING OBJECTIVES

At the end of this section you will be able to:

- Know how to feed small and sick neonates
- Know how to determine the volume of fluids and feeds to be given to newborns

FEEDING SICK & SMALL BABIES

For babies < 1.5 kg or sick babies

- Commence on IV fluids and keep nil by mouth for the first day
- Determine the amount of IV fluid and feed for each baby using Table 2 and Table 3 in the Newborn Care Chart booklet p. 22-23) as a guide
- Gradually introduce expressed breast milk (EBM) from day 2 by nasogastric tube
- Give feeds every 3 hours
- Increase the feeds daily if there is no vomiting, apnoea or abdominal distension
- Progress to a cup / spoon feeding as soon as the baby does not need head box oxygen or CPAP.
- Breastfeed the baby instead of giving EBM as soon as the baby can suckle
- Very low birth weight babies may require 75ml / kg on day one
- Extremely low birth weight babies(< 1 kg) may require 100ml / kg on day 1 and 2, and may need to start oral feeds with ½ ml 2 hourly (see Chart booklet p. 30)

For babies > 1.5 kg and those who can take oral feeds but cannot suckle

- Feed 3 hourly according to suggested volumes in Table 4 in the Chart booklet p. 24.

FEEDING METHOD

Cup feed

- Babies who cannot breastfeed for medical or other reasons
- Babies who can swallow but cannot yet suckle

Nasogastric / orogastric feeds

- Babies who cannot swallow, often severely neurologically damaged, as in severe HIE
- Babies who have respiratory distress and are in headbox oxygen
- Babies on nasal prongs or canula oxygen or CPAP, who need gastric feeds, should have an orogastric tube

FEEDING VOLUME

Suggested fluids for small or sick babies

<table>
<thead>
<tr>
<th></th>
<th>Total Fluids</th>
<th>Suggested IVI</th>
<th>Suggested Oral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>60 ml / kg</td>
<td>60 ml / kg</td>
<td>Nil</td>
</tr>
<tr>
<td>Day 2</td>
<td>75 ml / kg</td>
<td>50ml / kg</td>
<td>25ml / kg</td>
</tr>
<tr>
<td>Day 3</td>
<td>100ml / kg</td>
<td>50ml / kg</td>
<td>50ml / kg</td>
</tr>
<tr>
<td>Day 4</td>
<td>125ml / kg</td>
<td>25ml / kg</td>
<td>100ml / kg</td>
</tr>
<tr>
<td>Day 5</td>
<td>150ml / kg</td>
<td>Nil</td>
<td>150ml / kg</td>
</tr>
<tr>
<td>Day 6+</td>
<td>180ml / kg</td>
<td>Nil</td>
<td>180ml / kg</td>
</tr>
</tbody>
</table>

- To calculate the volume of feeds and fluids, use birth weight until the baby has regained birth weight, and then the weight on the day
- Use a 60 drop / ml intravenous infusion administration set (ml / hour ~ drops / min)
- Always use a buretrol, with an infusion controller or dial-a-flow when administering IV fluids to neonates
• To calculate the drip rate: \[ \frac{wt \ (kg) \times \text{volume} \ / \ kg}{24} = \text{ml} \ / \ \text{hour} \]

• Neonatolyte / Neolyte (contains 10% dextrose) is IV fluid of choice, but 10% dextrose can also be used if Neonatolyte is not available

• To calculate 3 hourly feeds: \[ \frac{wt \times \text{volume} \ / \ kg}{8} = \text{ml} \ / \ \text{feed} \]

• The feeds and fluids must be recalculated and prescribed **EVERY DAY**

**Recommended feeds**
- Expressed breast milk (EBM)
- If there is no EBM or the mother is HIV-positive and has decided not to breastfeed:
  - If the weight is < 1.5 kg – appropriate pre-term replacement feed
  - If the weight is > 1.5 kg – normal newborn replacement feed

**MONITORING OF BABIES ON IV FLUIDS**
- Inspect the drip site every hour - look for redness and swelling around the insertion site. If swelling or redness is present stop the drip and resite it.
- Check the volume of fluid given and compare it with the prescribed volume
- Assess hydration daily
- Use an infusion controller or dial-a-flow to avoid fluid overload
- **Measure and record** the total fluid intake daily

**Start breast feeding as soon as possible**
2.1.5  INFECTION PREVENTION AND CONTROL

LEARNING OBJECTIVES

At the end of this section you will be able to:
- What causes infection in a newborn infant
- How babies become infected
- What to do to prevent most of these infections

CAUSES OF INFECTION

Newborn infants are at risk of infection:
- Because they have an immature immune system, especially preterm infants
- When the mother has an infection which can cross the placenta
- When the mother has gone into preterm labour
- When there has been chorioamnionitis
- When there has been prolonged rupture of the membranes before or during labour
- When they are handled by people who have not cleaned their hands properly
- When they have had invasive procedures done
- From contaminated equipment and linen

Infections are not caused by:
- Visitors
- Admitting babies from home to the nursery

Many serious infections in newborn babies are acquired in hospital

PREVENTION OF INFECTION

- Good antenatal care should detect intrauterine infections such as syphilis and HIV. Appropriate management can prevent or reduce the risk of infection of the baby.
- A mother who has gone into unexpected preterm labour. This is often associated with chorioamnionitis, which can affect the baby. The use of prophylactic antibiotics in these babies can prevent them from becoming ill. A CRP test should be done at 48 hours of age and if it is normal, antibiotics can be stopped.
- When the mother has had prolonged rupture of the membranes, prophylactic antibiotics should be given and then discontinued if the CRP is normal at 48 hours.
- The routine use of chloramphenicol eye ointment at birth and cleaning the cord with alcohol 4 times per day are essential
- Careful aseptic technique must be used with all procedures
- Contaminated equipment and linen must be removed and cleaned. This is particularly important at the areas where the newborns are resuscitated.
- Newborns should not be admitted to the paediatric ward as this places them at a serious risk of getting an infection.

Washing hands, or using alcohol hand lotion, before and after handling a baby is the most important way of preventing infection in newborn babies.
Hand washing

- Wet hands thoroughly, apply chlorhexidine containing soap or solution and wash for 15 seconds, rinse under running water, air dry or use a clean disposable towel
- Always wash your hands on entering the nursery and before and after touching a baby, or after handling soiled linen or instruments
- Instruct mothers and visitors to wash their hands before and after touching their babies while in the neonatal unit
- An alcohol based hand lotion may be used instead of hand washing before and after handling babies
- Each incubator or cot must have a bottle of alcohol containing hand lotion
- Each cubicle needs a basin with running water and chlorhexidine containing solution or soap

ADMISSION POLICIES TO THE NEWBORN NURSERY

- Good antenatal care should detect intrauterine infections such as syphilis and HIV. Appropriate management can prevent or reduce the risk of infection of the baby.
- Outborn infants, or older neonates, should be admitted to the newborn care area. They are not “dirty” and do not introduce infection.
- Isolation is not needed
- Neonates must not be admitted to a paediatric ward.
- If a baby has gastroenteritis, or a vesicular rash like herpes or chicken pox, he / she should be isolated and not admitted to the nursery.

NURSING CARE

- **Newborn babies should be breast fed.** Exclusive breast feeding is best.
- Nurse the baby in Kangaroo Mother Care whenever possible
- Staff should be patient allocated and not task allocated
- Each baby must have his / her own incubator or cot, thermometer, stethoscope, swabs, medicines, and alcohol hand lotion.
- Avoid having too many people handling the baby. Staff should be patient and not task allocated.
- Everything possible must be done to reduce overcrowding in the newborn care areas.
- Newborn care facilities must be adequately staffed.
- Avoid using communal areas for procedures (eg bathing). These can all be done in the baby’s own cot or incubator
- Use disposable gloves when handling mucous membranes and body fluids. Use a new pair of gloves for each baby.
- **Wash hands or use alcohol hand lotion before and after handling each baby**

ROUTINE PREVENTIVE CARE

- Know the mother’s RPR result. If positive treat according to the protocol (see Newborn Care Chart booklet p. 45-46)
- Know the mother’s HIV status. If positive treat according to the protocol (see Newborn Care Chart booklet p. 48)
- Instil chloramphenicol eye ointment into the eyes at birth
- Clean the umbilical cord 4 times per day with alcohol
- Prophylactic antibiotics for babies where the mother has had more than 18 hours rupture of the membranes. A CRP should be done at 48 hours and the antibiotics stopped if it is normal.
• Prophylactic antibiotics if the baby has been born as the result of unexplained preterm labour. A CRP should be done at 48 hours and the antibiotics stopped if it is normal.

CLEANING EQUIPMENT
• Wipe stethoscopes with alcohol swabs or D-germ (0.5% Chlorhexadine and 70% alcohol) between use
• Wash head boxes with soap and water between use
• Clean incubators with 0.5% Chlorhexadine between use and allow to dry before using
• Remove and destroy sharps containers when 2/3 full
• Clean spills of blood with 0.5% Chlorhexadine
• Clean containers used to express breast milk with soap and water, then soak in Milton or autoclave.
• Clean oxygen tubing, and respirator circuits:
  o with soap and water
  o soak in Hibiscrub (4% Chlorhexidine gluconate) for 30 minutes
  o rinse with clean water
  o soak in 5ml Cydex (10% isopropyl alcohol) mixed with a bucket of water for another 30 minutes
  o using gloves, remove the tubing, rinse with tap water, drain the water, hang on an IV stand and then blow dry with oxygen

ISOLATION, ADMISSION AND VISITING
• Isolation of infected babies is usually not needed if a policy of frequent hand washing is practiced. However babies with gastroenteritis should be nursed in a private room
• Outborn babies should be admitted in the nursery; they do not spread infection to the babies born in the hospital
• Do not admit neonates to a paediatric ward
• A free visiting policy is safe, even for children. It does not introduce infection to the nursery. However, anyone who handles or touches the baby must wash his / her hands.
• Protective clothing has no place in preventing infection in newborns
• Allow as much contact as possible between the mother and her baby. The baby will then be colonised with the mother’s micro-organisms which are much less likely to cause a serious infection. KMC is ideal.

STAFF
• Staff working with newborn babies must be permanently allocated and should not be rotated
• Staff with gastroenteritis or upper respiratory tract infections should not work with newborns until they have recovered
• All staff should have their immunisations up to date. It is recommended that they should all have regular (annual) influenza vaccinations.
• Clothing:
  o Short sleeved clothing must be used when working with the babies
  o There is no place for protective clothing (gowns, caps, masks)
• Hand washing or use alcohol hand lotion before and after handling a baby
### Guidelines: Infection Prevention and Control

- **Routine prophylaxis**
  - Eye care
  - Cord care
  - Mother’s RPR
  - Mother’s HIV status
  - Antibiotics if prolonged rupture of membranes or unexplained preterm labour
- **Hand washing**
- **Kangaroo Mother Care**
- **Breast feeding (or expressed breast milk)**
- **Cleaning linen and equipment** NB! resuscitation area
- **Minimal handling**
- **Staff to be patient and not task allocated**
- **Stop staff rotation**

**NOT needed:**
- Isolation (except in a very few circumstances, as above)
- Admission to a paediatric ward is dangerous
- Protective clothing for staff, mothers and visitors
2.1.6 TRANSFER AND REFERRAL

LEARNING OBJECTIVES

At the end of this section you will be able to:

- Know which babies should be referred
- Know what must be done before the baby is transferred
- Understand the responsibilities of the health worker who is transferring the baby
- Understand the special care needed by a baby with probable congenital cyanotic heart disease (“blue baby”)

The key to successful and safe referral and transfer of newborn babies is **communication** between the referring health worker, the doctor / sister at the referral hospital and the transport team.

Babies who need to be transferred to hospital

**From a clinic / health centre**

- Birth weight less than 2000g
- Respiratory distress
- Low Apgar score – especially a 5 minute score of less than 7/10
- Convulsions
- Apnoea
- Hypoglycaemia
- Clinical jaundice
- Congenital abnormality which needs a doctor’s assessment
- Any baby which needs more than a few hours’ observation
- Any baby with risk factors which you cannot manage at a clinic

**Babies must be transferred to hospital if:**

- They have needed emergency care
- They have priority signs
- They have risk factors which cannot be managed at a clinic
- They need more than a few hours’ observation

**From a District (level 1) hospital to a Regional (level 2) or Tertiary hospital**

- Birth weight less than 1500g who is not stable
- Respiratory distress when the baby needs more than 40% oxygen
- Uncontrolled convulsions
- Recurrent apnoea which is not responding to treatment
- Hypoglycaemia needing drug treatment

**To a Tertiary hospital**

- Babies needing mechanical ventilation
- Babies who are not responding to treatment
- Babies needing an exchange transfusion
- Babies with congenital abnormalities which need specialist care, if this is not available at a level 2 hospital
WHAT MUST BE DONE BEFORE TRANSFER

Clinical care
- The baby must be identified with the mother and have the correct identification bands in place.
- All the observations must continue to be done and recorded. The last observations must be done immediately before the baby leaves the ward. This includes a blood sugar level.
- There must be a secure airway.
- There must be a secure and reliable IV line.
- There must be a nasogastric or orogastric tube in place, if this is needed.
- The ambulance must have:
  - A warm incubator
  - Oxygen
  - Resuscitation equipment for a newborn baby
  - A pulse oximeter
  - A copy of the patient’s notes, observation chart, and referral letter must go with the patient.

Provide all necessary emergency care before transfer:
- observations, airway, oxygen, IV line, warmth

Administrative care
- Make appropriate arrangements with the clinician at the referral hospital.
- Inform the clinician of any significant changes in the patient’s condition before transfer.
- Immediately before the baby leaves:
  - Ensure that all the appropriate observations have been done and recorded.
  - Write a note on the condition of the baby.
  - Tear out the first page of the admission record, and write the letter at the back. This must accompany the baby to hospital.
  - Ensure that there is enough medication for the time of transport.
  - The baby’s mother must accompany the baby. If this is not possible e.g. the mother is too ill, then her details or those of the next responsible family member with contact phone numbers and address must accompany the baby’s notes.

The documentation accompanying the baby must include:
- History
- Clinical findings
- Observations
- Management plan
- Medications
- Contact details of the mother or other responsible relative

The “Blue baby” with probable congenital heart disease
- Make sure that the baby is stable – resuscitate if necessary.
- Treat shock.
- Give oxygen.
- Keep nil by mouth.
- Give Prostaglandin E2, ¼ tablet half hourly. Crush the tablet, mix with 2 - 5ml of water and give it through a nasogastric tube.

Communicate: it can’t make things worse!
2.2 SPECIFIC CONDITIONS

2.2.1 APNOEA AND RESPIRATORY DISTRESS

LEARNING OBJECTIVES

In this section you will learn:
• What apnoea is
• What respiratory distress is
• What causes them
• What observations to do
• How to treat them
• How to recognize the different causes

APNOEA

Apnoea is when the baby stops breathing for long enough to cause bradycardia and / or cyanosis. This is usually about 20 – 30 seconds.

It is usually because the respiratory centre is not working properly. There are 2 main reasons for this:
• Immaturity, which will occur if the baby has been born preterm. Preterm babies often respond to stress, such as infection or respiratory distress, by becoming apnoeic.
• Some form of brain damage or injury, such as oedema or haemorrhage. This is often because of brain stem damage. This is what happens in severe hypoxic ischaemic encephalopathy

IMPORTANT CONDITIONS IN WHICH APNOEA MAY OCCUR ARE:
• Preterm babies
• Hypoxia
• Hypoglycaemia
• Hypothermia
• Hyperthermia
• Respiratory distress
• Infection
• Intraventricular haemorrhage
• Convulsions
• Maternal sedation, notably pethidine, morphine and valium.

Management of apnoea: Immediate action
• Stimulate the baby to breathe by rubbing his / her back for 10 seconds. If the baby does not begin to breathe immediately, resuscitate the baby using a bag and mask (review details in Resuscitation module).
• When using a bag and mask for resuscitation of a baby who has had an episode of apnoea, do not give more oxygen than the baby was receiving when the episode occurred. In other words, do not give, for example 100% oxygen when the baby had only been getting 40% oxygen. In this case use 40% oxygen in the resuscitation. If the baby had not been getting oxygen, resuscitate using room air, or at most 25% oxygen.
• Teach the mother how to immediately stimulate the baby to breathe, should it reoccur
Management of apnoea: Unexpected episode
- Blood glucose level
- Check the baby’s temperature
- Consider an infection, and investigate and treat for this
- Has the baby had a convulsion?
- If the episode has occurred within about 6 hours after delivery, check whether the mother has had sedation / analgesia in labour
- Take **immediate action** to manage the patient

Management of apnoea: Preterm baby
1. Check the baby’s blood sugar level
2. Give Theophyline 5mg / kg loading dose followed by 2mg / kg every 12 hours.
   - This should be done routinely to all infants under 35 weeks of gestation or < 1.5 kg.
   - When the baby’s weight is 1.6 kg, stop the theophyline.
3. Observe the baby for apnoea. This is best done using an apnoea monitor, a pulse oximeter or a cardio – respiratory monitor.
4. Once the episodes of apnoea are no longer occurring, KMC can be started.
5. If there are frequent apnoeic episodes, treat the baby for sepsis (See serious acute infection, Chart book, p. 36)
6. Re-assess the baby’s feeding and fluid management (See fluid management section, Chart book, p. 22)
7. Prevent hypothermia and hyperthermia
8. Nurse-infants slightly head up, lying on the abdomen (the prone position).
9. If the baby is not receiving oxygen, giving headbox oxygen at a concentration not higher than 25% may prevent repeated apnoea.

Management of apnoea: Term baby
1. Check the baby’s blood sugar level
2. Monitor the baby for 24 hours using an apnoea monitor, or place the baby in skin to skin contact with the mother.
3. If 2nd episode of apnoea occurs investigate and treat for sepsis.
4. Prevent hypothermia, and hyperthermia
5. If the baby is feeding well, and has no further episodes of apnoea, and has no other reason for hospitalization, then prepare to discharge the baby after 24 hours.

Take action to prevent apnoea

<table>
<thead>
<tr>
<th>Preterm baby</th>
<th>Term baby</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Give oral theophyline 5mg / kg loading dose followed by 2mg / kg 12 hourly</td>
<td>- Apnoea is unusual in term babies. Observe, investigate and refer if necessary</td>
</tr>
<tr>
<td>- Observe the baby for apnoea</td>
<td>- Monitor for 24 hours using an apnoea monitor, or skin-to-skin care</td>
</tr>
<tr>
<td>- Once stabilised, KMC can be started</td>
<td>- Investigate and treat for sepsis if there is a 2nd episode of apnoea</td>
</tr>
<tr>
<td>- If there are intermittent apnoeic episodes, treat for sepsis.</td>
<td><strong>If the baby is free from apnoea for 24 hours, and the baby is feeding well, and has no other reason for hospitalisation, then prepare to discharge the baby.</strong></td>
</tr>
</tbody>
</table>

*If there is persistent apnoea, assess for CPAP and discuss for transfer.*
RESPIRATORY DISTRESS

Clinical features of respiratory distress
A baby with Severe Respiratory Distress has:
- A rapid respiratory rate (RR): > 80 / min
- Severe Chest indrawing or
- Grunting
These signs show that the baby is trying to get more oxygen.
If these fail, then the baby will also develop:
- Cyanosis

A baby has Mild Respiratory Distress when the RR is 60 – 80 /min and there are no other signs of distress. A child with Mild Respiratory Distress may develop severe respiratory distress.

Causes of respiratory distress
The main causes are:
- Hyaline membrane disease
- Wet lung syndrome (transient tachypnoea of the newborn)
- Pneumonia
- Meconium aspiration

Other causes to remember are:
- Pneumothorax. This usually occurs in a baby who has been ventilated during resuscitation, or is being mechanically ventilated. It is especially important to remember this when a baby’s condition deteriorates unexpectedly, and does not respond well to treatment.
- Metabolic acidosis. This commonly occurs after birth when the baby has been hypoxic during labour.
- Hypothermia
- Anaemia
- Polycythaemia
- Heart failure

How to determine the cause of the respiratory distress
- Is the baby preterm? The respiratory distress is likely to be due to hyaline membrane disease.
- Is there a history of prolonged rupture of membranes? The baby is likely to have pneumonia.
- Was there meconium stained liquor? The respiratory distress could be due to metabolic acidosis or meconium aspiration.
- Is the anterior – posterior diameter of the chest large or small?
  - In hyaline membrane disease the diameter is small
  - In meconium aspiration the diameter is large
- Is the distress severe?
  - A small chest with significant indrawing is almost certainly indicates hyaline membrane disease. The sternum of a preterm infant is very soft and is easily pulled inwards when the baby breathes.
X-ray chest

- If you suspect that the baby may have hyaline membrane disease, then wait until the baby is 4 – 6 hours old before taking the X-ray.
- Decide on the size of the lung fields. If there are 7 or less ribs visible posteriorly, the lung fields are small. If there are more than 7 ribs visible posteriorly the lung fields are normal or large.
- Small lung volumes
  - Granular appearance to the periphery: probably hyaline membrane disease
  - Peripheries clear: probably atelectasis
- Large lung fields
  - Patchy “infiltrates” throughout the lung fields: probably pneumonia or meconium aspiration
  - Peripheries clear: Probably wet lung syndrome (transient tachypnoea of the newborn)
- Look for free air, or bowel, in the pleural cavities. This would be a pneumothorax, or a diaphragmatic hernia.
- Is the heart large? This could be due to congenital heart disease?

An approach to chest X-ray findings

- Chest X-ray
  - > 7 ribs posterior
    - YES: Large lung volumes
      - Patchy or lobar infiltrates: Pneumonia or Meconium aspiration
      - Clear peripheries: Wet lung (TTN)
    - NO: Small lung volumes
      - Granularity to peripheries: Hyaline membrane disease
      - Clear peripheries: Atelectasis
Management of respiratory distress

Remember to follow the 6 key principles of newborn care

1. Maintain body temperature: This will usually need to be in an incubator so you can monitor the baby.
2. Oxygen therapy: Start immediately with head box oxygen with an oxygen flow of at least 5L/min and a venturi or oxygen / air blender with 40% oxygen. Monitor the blood oxygen saturation and adjust the percentage of oxygen being given to keep the saturation at 88 – 93% in a preterm baby or 94 – 96% in a term baby.
3. Maintain normal blood glucose: Check 3 hourly and provide.
4. Feeds and fluids: Keep babies with severe respiratory distress and those on CPAP nil per os for 24 hours. Thereafter feeds can be started slowly.
5. Infection prevention and control: Most babies with respiratory distress will receive antibiotics, because it is difficult to completely exclude infection. However, most causes of respiratory distress are not caused by an infection. You can do a CRP at 48 hours and if normal discontinue antibiotics.
6. Transfer and referral: In discussion with your referring hospital transfer babies that are not coping on the maximal oxygen or support you are able to provide.

Minimum handling

Do not interfere with the baby unless it is absolutely necessary. These babies drop their blood oxygen saturations very easily when they are handled, and it is not always easy to get them reoxygenated.

Haemoglobin level

An Hb should be done on admission. If there is a change in the condition of the baby it should be repeated.

Observations

Record the following important observations every hour and note any deterioration.

Take action if there is a change.

1. Respiratory Rate
2. Presence and absence of chest indrawing and grunting
3. Presence and absence of cyanosis
4. Percentage of inspired oxygen.
5. Heart rate

Specific treatment is required for respiratory distress due to different causes. These are outlined in the following sections. Please also refer to p. 29 in the Newborn Care Chart booklet.
HYALINE MEMBRANE DISEASE

At term the fetal alveoli are mature and ready to be inflated with air after delivery. These mature alveoli secrete surfactant that prevents them collapsing completely at the end of expiration. This allows the infant to breathe air in and out with very little physical effort.

Preterm infants with immature lungs do not have adequate amounts of surfactant at birth. Their alveoli collapse with expiration and the infant is unable to expand them during inspiration. Collapsed alveoli, due to the lack of surfactant, result in respiratory distress. This condition is known as Hyaline Membrane Disease (HMD).

Clinical features of hyaline membrane disease
- Preterm: Gestational age usually < 36 weeks
- Develops respiratory distress at or soon after delivery. If it is not treated, the respiratory distress gets worse for about 72 hours before starting to improve.
- The chest is small and there is usually indrawing of the sternum.
- Chest X-ray: small lung volumes, fine granular opacities extend to the periphery of the lung fields

Management of hyaline membrane disease

Preventive treatment
- If possible, prevent or delay the onset of preterm labour
- Whenever possible, delay the preterm labour until the mother has had 48 hours of steroids. This does not entirely prevent hyaline membrane disease, but reduces the severity of it.

Specific treatment
- Give oxygen and supportive treatment.
- If there is severe respiratory distress, CPAP may be required. If CPAP is readily available, this should be started early.
- Give artificial surfactant in first 12 hours under supervision of a paediatrician.
- Give Benzyl Penicillin 50,000 u / kg / dose IV 12 hourly and Gentamicin 5mg / kg IV daily for 48 hours, then do a CRP and. Stop the antibiotics if the CRP is normal.
WET LUNG / TTN (Transient Tachypnoea of Newborn)

Before delivery, the fetal lungs are not collapsed, but the alveoli and bronchi are filled with lung fluid. At vaginal delivery, most of this fluid is squeezed out of the lungs as the chest is compressed in the birth canal. After birth the remaining fluid is absorbed into the capillaries and lymphatics of the lung within a few minutes.

In some infants this rapid removal of fetal lung fluid takes place slower than usual resulting in the wet lung syndrome which presents as respiratory distress. The Wet Lung Syndrome (Transient Tachypnoea of the Newborn, TTN) is a common cause of mild respiratory distress. It is also important because during the first day of life it can easily be confused with Hyaline Membrane Disease.

It is more likely to occur when the baby has been born by caesarean section, probably because the "squeezing" effect of labour has not occurred. Respiratory distress due to wet lung syndrome usually lasts only about 24 hours.

This condition can be confused with the respiratory distress of acidosis, which occurs when there has been evidence of fetal distress (fetal hypoxia) during labour.

Suspect wet lung syndrome / TTN when

- The baby has been born by caesarean section, especially if the mother has not been in labour (elective caesarean section) and the membranes have not been ruptured before delivery.
- Fetal hypoxia or severe asphyxia
- Maternal sedation
- Polyhydramnios.

Clinical features of wet lung syndrome / TTN

- Often born preterm, but can also occur in term babies
- Often born by caesarean section
- The baby develops respiratory distress soon after delivery.
- There is mild to moderate respiratory distress which resolves in less than 72 hours, often within 24 hours.
- The baby has an over-inflated chest
- Chest X-ray: Hyperinflated lungs, with a parahilar streakiness and clear peripheral lung fields

Management of wet lung syndrome / TTN

- Give oxygen according to the blood oxygen saturation.
- Give Benzyl Penicillin 50,000 u / kg / dose IV 12 hourly and Gentamicin 5mg / kg IV daily for 48 hours and then do a CRP. If this is normal, the antibiotics can be stopped.
- Nasogastric tube feeds can usually be commenced 3 hourly depending on the severity of the respiratory distress.
PNEUMONIA
An infant may be born with pneumonia as a complication of chorioamnionitis or a congenital infection, such as syphilis. Infants, especially if they are preterm, may also develop pneumonia in the days or weeks after birth due to:
- The spread of bacteria by the hands of staff or parents (nosocomial infection).
- Invasive procedures such as intravenous lines, especially if strict aseptic precautions were not used

Clinical features of pneumonia
- It can occur in a baby of any gestational age
- There may be a history of chorioamnionitis. However, this is not always present.
- If there is a congenital infection, the respiratory distress starts soon after birth. If the infection is acquired later the respiratory distress will only start later. This emphasises the importance of careful observation of newborn babies. Chest X-ray: The lung fields are relatively large. There are often areas of collapse and consolidation.

Management of pneumonia
- Give oxygen according to the blood oxygen saturation.
- Ensure that the baby’s temperature is kept normal
- Check the blood glucose level 3 hourly for at least the first 24 hours, and manage according to the level
- Ensure that the baby is receiving the correct type and amount of feed and fluids.
- Give Benzyl Penicillin 50,000 u / kg / dose IV 12 hourly and Gentamicin 5mg / kg IV daily. Check the CRP at 48 hours. If this is normal (low), then the respiratory distress was not due to pneumonia, and the antibiotics can be stopped. If it is not low, then continue the antibiotics for 7 – 10 days
- if there is a specific cause for the pneumonia, such as syphilis, then the specific treatment must be given.
- If the baby is not responding to treatment, consult a paediatrician.
MECONIUM ASPIRATION
If the fetus is hypoxic in utero (when there is fetal distress) it may pass meconium and make gasping movements which suck the meconium stained liquor into the larynx and upper trachea. If the airways are not well suctioned after the head is delivered, the meconium can be inhaled into the smaller airways and alveoli with the onset of breathing.

Meconium can damage the lungs by:
- Causing chemical pneumonia, because meconium contains pancreatic digestive enzymes
- Blocking or partially blocking the airways. This is because of the thick mucous which it contains. The result of this is that the lungs become overinflated. Some parts are collapsed and others very over expanded.

Clinical features of meconium aspiration
- A term or post-term baby
- There is a history of meconium stained liquor.
- Meconium may be suctioned from the mouth and upper airways at birth
- The infant is usually meconium stained.
- Severe respiratory distress is present and chest appears hyper inflated (over expanded)
- Chest X-ray: Hyperinflated lungs, with areas of collapse (atelectasis)

Prevention
When there is meconium stained liquor, the baby’s airways, especially the pharynx, must be suctioned at the delivery of the head ie. before the baby has had a chance to breathe. This is to prevent meconium in the baby’s pharynx from being aspirated into the lungs.

Management of meconium aspiration
- Give oxygen according to the blood oxygen saturation
- If the respiratory distress is severe, the baby should be in a hospital where the baby can be ventilated if necessary
- Keep the baby nil per mouth for at least the first day, and introduce feeds slowly according to the condition of the baby. The baby will need an IV line.
- Handle the baby as little as possible
- Give Benzyl Penicillin 50,000 u / kg / dose IV 12 hourly and Gentamicin 5mg / kg IV daily for 48 hours and then check the CRP. If the CRP is normal (low), then the antibiotics could be stopped.

Differentiating Meconium aspiration from other conditions
Meconium aspiration and acidosis following intrapartum hypoxia are frequently confused. When a baby has passed meconium before birth, it is the result of hypoxia.
- In meconium aspiration, meconium has been inhaled into the lungs. This usually results in severe respiratory distress. The baby has a large chest with a large antero-posterior diameter. The abdomen often looks hollowed out (scaphoid). The baby is often very ill and needs a lot of oxygen. He does not tolerate handling, and easily becomes cyanosed. The respiratory distress may take up to 3 weeks to recover.
- In acidosis, it is the then hypoxia that makes the baby breathe fast in an attempt to correct the acidosis caused by hypoxia. These babies are often meconium stained, and breathe rapidly. The respiratory distress usually clears within about 24 hours.

Meconium aspiration is a very serious problem and everything possible must be done to prevent it. These babies are very sick and there is a very high mortality rate. They can take several weeks to recover. The lungs can take many months to recover completely.
CARDIAC PROBLEM

Clinical features of a cardiac problem
Newborn babies with congenital heart disease will present most commonly with cyanosis (often with little or no respiratory distress) or a murmur. Less commonly congenital heart disease may present as circulatory failure. Some common congenital heart diseases such as ventricular septal defect (VSD) do not cause signs or symptoms until after the neonatal period.

The commonest problem in preterm babies is a persistent patent ductus arteriosus (PDA). The clinical features will be a murmur, bounding pulses and sometimes respiratory distress. Babies with respiratory distress should be treated for heart failure with fluid restriction (80 – 120ml/kg/24hours), and furosemide IV or oral 1mg/kg/24 hours. The haemoglobin level should be checked and transfused to 13g/dl if necessary. Consider giving Ibuprofen oral 10mg/kg/dose daily for 3 days.

Management of a cardiac problem
Babies with cyanosis thought to be due to Congenital Heart Disease (possible heart abnormality) should be treated with Prostoglandin and according to the basic principles of newborn care (see Newborn Care Charts p. 27). These babies need urgent referral to a paediatric centre.

Transfer Of Blue Baby: Congenital Heart Disease
- Resuscitate and stabilise
- Give Prostaglandin E2, ¼ tablet half hourly. Crush the tablet, mix with 2 - 5 ml of water and give it through a nasogastric tube.
- Intubate if at all possible
- Treat shock before transfer
- Keep the baby nil per mouth

Some newborns with circulatory failure may have severe congenital heart disease without cyanosis. Consider this especially if the heart is large on the CXR. Prostaglandin treatment may be helpful, but should only be given on advice of the centre with which urgent transfer has been arranged.

Term babies who have murmurs but no other signs do not need treatment but need to be referred for assessment by a paediatrician.

Now see Exercise Module 6.2 – and do exercises 2G and 2H
2.2.2 PRETERM AND LOW BIRTH WEIGHT

Low birth weight is defined as a birth weight of less than 2500g. In South Africa, about 10 – 15% of all babies that are born have a low birth weight. Low birth weight can be the result of preterm birth, or under weight for gestational age (intrauterine growth restriction), or a combination of both of these.

LEARNING OBJECTIVES

In this section you will:
- Understand the causes and classification of low birth weight
- Know the relevance of gestational age.
- Provide comprehensive care, and treatment to low birth weight babies

CLASSIFICATION OF LOW BIRTH WEIGHT BABIES

An extremely low birth weight baby weighs less than 1000g at birth. Most of these babies will be preterm and have the problems of immaturity.

A very low birth weight baby weighs between 1000 and 1499g at birth. Most of these babies are also preterm.

A low birth weight baby has a birth weight between 1500 and 2499g. These babies may be preterm or underweight for gestational age. For the purpose of management it is convenient to divide this group into those with a birth weight of less than 2000g and those with a birth weight of 2000g – 2499g. Most babies weighing less than 2000g will need to be admitted even if it is only for a few days for assessment. However all babies weighing < 2500g are considered low birth weight and may have features of prematurity if they are appropriately grown for gestational age.

<table>
<thead>
<tr>
<th>Extremely Low Birth Weight</th>
<th>Weight &lt; 1000g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low Birth Weight</td>
<td>Weight 1000 – 1499g</td>
</tr>
<tr>
<td>Low Birth Weight</td>
<td>Weight 1500 – 2499g</td>
</tr>
</tbody>
</table>

Babies who are low birth weight may be appropriately grown for gestational age (preterm), or underweight for gestational age (growth restricted), or a combination of preterm and underweight for gestational age. It is essential to know the gestational age of the baby as well as the weight, as this will help you to anticipate what problems the baby may develop. However the principles of care of these babies – i.e. maintaining normal body temperature, oxygen, maintaining normal glucose, feeds and fluids are initially dependent on their weight classification.
CAUSES OF LOW BIRTH WEIGHT

Preterm delivery
In many cases the reason for preterm labour is unknown
- Chorioamnionitis often precipitates preterm labour. The mother may not show clinical evidence of disease.
- If the cause is uncertain, it is useful from a patient management perspective to assume that there has been chorioamnionitis, and treat the patient accordingly.

Underweight for gestational age (Intrauterine growth restriction)
The causes of intrauterine growth restriction are multiple:
- Maternal diseases e.g. hypertension, poor nutrition, chronic intrauterine infections
- Substance abuse e.g. smoking and alcohol
- Multiple pregnancy
- Congenital abnormalities
- Often unexplained. In many of these patients the placenta may show evidence of ischaemic changes.

When there is intrauterine growth restriction, it can present in 2 different ways.
1. The baby may not have been growing well form early in the pregnancy. In this case the weight and head circumference will be on about the same centile when they are plotted on the growth chart.
2. The problem may have only arisen late in the pregnancy, with reduced weight gain, or even weight loss in the fetus. These babies will have relatively large heads compared to their weights when these are plotted on the growth charts. When the fetus has lost weight, the baby is at high risk of hypoxia during labour and birth asphyxia.

CLINICAL PROBLEMS ASSOCIATED WITH LOW BIRTH WEIGHT

<table>
<thead>
<tr>
<th>PRE –TERM</th>
<th>UNDERWEIGHT FOR GESTATIONAL AGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothermia</td>
<td>Hypothermia</td>
</tr>
<tr>
<td>Hypoglycaemia</td>
<td>Hypoglycaemia</td>
</tr>
<tr>
<td>Hyaline membrane disease</td>
<td>Asphyxia</td>
</tr>
<tr>
<td>Recurrent apnoea</td>
<td>Organ damage due to lack of oxygen.</td>
</tr>
<tr>
<td>Poor feeding</td>
<td>Meconium aspiration</td>
</tr>
<tr>
<td>Jaundice</td>
<td></td>
</tr>
<tr>
<td>Infection</td>
<td></td>
</tr>
<tr>
<td>Apnoea</td>
<td></td>
</tr>
<tr>
<td>Periventricular haemorrhage</td>
<td></td>
</tr>
<tr>
<td>Patent Ductus Arteriosus</td>
<td></td>
</tr>
</tbody>
</table>

If a fetus has been growing normally, the weight at 28 weeks gestation will be about 1000g
If a fetus has been growing normally, the weight at 34 weeks gestation will be about 2000g

Most babies who weigh 2000g at birth can go to their mothers, because at 34 weeks, a baby can usually:
- Breathe spontaneously without developing apnoea
- Suck
TREAT, OBSERVE AND CARE: LOW BIRTH WEIGHT BABY
The chart, on p. 30 of your Newborn Care Charts, describes the comprehensive
treatment, observation and care of low birth weight babies. Keep this page open while you
read this section.

ADMISSION CRITERIA
Extremely low birth weight and Very low birth weight babies must receive high care as
they will initially need hourly observations.

All babies classified as Low birth weight with a birth weight in the 1.5 – 2.0 kg range
need to be admitted first in the neonatal unit for assessment and care. No baby should go
straight to KMC until his / her condition has been assessed, feeds are started, and
intermittent KMC is successful in the newborn care unit.

Babies classified as Low birth weight with a birth weight in the 2.0 – 2.5 kg range can be
kept with their mothers unless there is a reason for them to have special care. They
should be kept in Kangaroo Mother (Skin-to-skin) Care, and discharged when the baby is
feeding well and has not lost too much weight.

WARMTH
Preterm and small newborns usually cannot maintain their own temperature sufficiently
well and are at risk of hypothermia. The requirements and options to keep the preterm
babies warm is summarised on p. 30 of the Newborn Care Charts and is covered in detail
in Module 2.1 Principles of newborn care in section 2.1.1.

DETERMINE GESTATIONAL AGE
It is essential to know the gestational age of all low birth weight babies as their
management may be influenced by both weight and age. The gestational age is
established by:
1. Dates: The mother needs to know the dates of her last menses
2. Early ultrasound – before 22 weeks
3. Scoring the physical and neurological appearance of the baby after delivery. The
   Ballard score is one of the scoring charts that help us assess this.

BALLARD SCORING METHOD
The Ballard score can be found in the Newborn Admission Record and in the Newborn
Care Charts, p. 33. The Ballard scoring method uses both neurological and external
features to determine the gestational age. Each feature is given a score and these
scores are added up to a final score. The final score can be converted to an estimated
gestational age by consulting the table. You will learn how to do the Ballard score in the
practical exercises.

FLUIDS AND FEEDS
- Babies under 1.5kg and sick babies are kept nil by mouth for at least the first 24 hrs
- Once the baby’s condition has stabilised feeds can be started. In a sick baby these
  feeds are usually given by a naso- or orogastric tube.
- Once a baby is no longer receiving head box oxygen, he can cup feed.
- Once he can suckle he is able to breast feed.
Further details on feeding the small and sick newborn were covered under Module 2.1
Principles of newborn care in section 2.1.4.
**OBSERVATIONS**

- Check and record the blood glucose level of all low birth weight babies of any classification 3 hourly for the first 24 hours.
- Check the blood oxygen saturation of all babies receiving oxygen, continuously until optimal and then 3 hourly if receiving nasal prongs or cannula oxygen and hourly if receiving head box oxygen.
- Observe and record the heart rate, respiratory rate, temperature, colour and activity of babies according to their classification.
- Extreme low birth weight: hourly.
- Very low birth weight: 3 hourly
- Low birth weight: 3 hourly for first 24 hours, thereafter 6 hourly if stable.

Record the observations on the Limpopo Newborn Observation Chart. Chart the heart rate, respiration, colour, temperature, percentage oxygen being administered and blood oxygen saturation, feeds and fluids ordered, and the intake and output, bilirubin level and blood glucose levels. There is place on the chart for hourly monitoring, but the observations only need to be done and recorded on the chart according to the monitoring protocol. The baby’s temperature may also be recorded on the usual temperature chart, in order to see the trend in the temperature over a week.

<table>
<thead>
<tr>
<th>LBW: 1.5 – 2.5 kg</th>
<th>VLBW 1.0 – 1.5 kg</th>
<th>ELBW: &lt;1 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 hourly respiratory rate, heart rate, temperature, colour and activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake / output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 hourly blood glucose level for the first 24 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 - 3 hourly blood oxygen saturation for all babies receiving oxygen.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 hourly respiratory rate, heart rate, temperature, colour, and activity</td>
<td></td>
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</tr>
<tr>
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<td>3 hourly blood glucose level for the first 24 hours</td>
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</tr>
<tr>
<td>1 - 3 hourly blood oxygen saturation for all babies receiving oxygen.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hourly respiratory rate, heart rate, temperature, colour, and activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake / output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 hourly blood glucose level for the first 24 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hourly blood oxygen saturation.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**APNOEA PREVENTION**

- Babies with a birth weight of <1.5 kg or a gestational age <35 weeks are prone to apnoea should be commenced on oral theophylline and monitored for apnoea. This is to prevent apnoea of prematurity.
- Continue the theophylline until the baby is 1.8 kg or has been apnoea free for at least 7 days.
- Do not discharge a baby until he / she has been apnoea free for more than 7 days.

**OXYGEN THERAPY**

Babies with respiratory rate > 80, severe chest indrawing OR grunting OR blood oxygen saturation less than 88%.

**ANTIBIOTICS**

Give antibiotics to the following groups of babies:

- Babies from a potentially infected environment e.g. born to mothers with prolonged rupture of membranes
- Babies with obvious signs of infection
- Babies <37 weeks gestation where there is no obvious reason for the preterm labour
- Give IV Penicillin 100 000u/kg/dose twice daily & Gentamycin 5 mg/day given daily
- When there is a potential infection only, and when antibiotics are given prophylactically, do a CRP after 48 hours and stop the antibiotics if the CRP is normal, and the baby is clinically normal
- When there is an infection, treat for 5 days and then stop if the baby isS well
VITAMINS AND IRON

- 0.6 ml of multivitamin drops daily from 5 days if feeding is well established (multivitamin preparation must include 400 IU Vitamin D daily) Vitamin D 800 IU daily for babies < 1.5 kg
- 0.6 ml ferrous lactate (ferrodrops) daily from 14 days if the baby is feeding

RECORD MEASUREMENTS

- It is important to measure the baby accurately and plot this on the “Weight, feeding and treatment summary” chart in the newborn record.
- Weigh and plot the weight daily
- Determine the weight gain weekly. See Newborn Care Charts p. 52 and 53
- Measure and chart the head circumference weekly.
- Once you have established the baby’s gestational age you can plot the baby’s weight and head circumference on the “Fetal-infant Growth Chart for Preterm Infants (Newborn Care Chart book, p74). This chart will assist you to determine if the baby is appropriate for gestational age (between the 3rd and 97th centile lines) or underweight for gestational age (< 3rd centile line). Always compare the centiles for weight and head circumference. The chart will also assist you to monitor the growth parameters of the baby, including the head circumference.
- Measure the haemoglobin weekly.
- Record the result on the “Weight, feeding and treatment chart” in the Newborn Admission Record.

Record the following daily information on the “Weight, feeding and treatment summary” chart. This record is a summary of aspects of the baby’s care.

All of the following information must be recorded:

1. Date
2. Oxygen administration
3. CPAP or IPPV
4. Antibiotics
5. Phototherapy
6. Scores HIE or KMC
7. Weight
8. Feeds
9. IVI fluid
10. ml / kg

An example of a completed chart is shown on the next page. The chart is for baby Nomsa.

Baby Nomsa was born on 2/9/2007. Her birth weight was 1350g, head circumference 27cm. She developed respiratory distress and needed oxygen for 4 days. She was given antibiotics for the first 5 days. She became jaundiced on day 3 and needed phototherapy for 4 days. She started in kangaroo Mother Care when she weighed 1550g.
# Weight, Feeding and Treatment Summary Chart

| Date | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|------|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Oxygen | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CPAP/IPPV | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Antibiotics | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Phototherapy | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Hb | 6.4 | 6.5 | 6.6 | 6.7 | 6.8 | 6.9 | 7.0 | 7.1 | 7.2 | 7.3 | 7.4 | 7.5 | 7.6 | 7.7 | 7.8 | 7.9 | 8.0 | 8.1 | 8.2 | 8.3 | 8.4 | 8.5 | 8.6 | 8.7 | 8.8 | 8.9 | 9.0 |
| 4500g / 2500g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4250g / 2250g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4000g / 2000g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3750g / 1750g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3500g / 1500g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3125g / 1250g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3000g / 1000g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2750g / 750g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2500g / 500g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**Days:**

- Feeds:
  - Premature infant formula
  - Low-dose breast milk
  - High-dose breast milk
  - Standard breast milk
  - Codeine
  - Metoclopramide
  - Naloxone

- ivdpm
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0

- ml/kg
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
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  - 0
  - 0
  - 0
  - 0
  - 0
  - 0
DISCHARGE

- Discharge when baby is between 1.8 – 2kg, and according to the KMC score. All newborns should be in KMC before discharge.
- **Baby to continue with multivitamin & iron for 6 months. Note this on the Road to Health Card**

FOLLOW UP

- Ensure that your hospital has a High Risk Follow up clinic, to follow up babies until they are 9 months old.
- Babies with a birth weight of less than 1.5 kg and bigger babies with a complicated course to be followed at a high risk clinic
- After discharge from KMC follow up the baby in 3- 5 days mainly for a weight check and to assess whether the mother is coping well, and the baby feeding well, at home.
- If the baby is gaining well, follow up every 2 weeks until the baby is 3 2.5 kilograms, thereafter baby can be followed up at the clinic
- **Babies with a birth weight of < 1.5 kg, or who have had a complicated course, need a neurodevelopmental evaluation at 4 & 9 months**

📖 Now see Exercise Module 6.2 – and do exercises 2I and 2J

WEIGHT GAIN IN LOW BIRTH WEIGHT BABIES

**Weigh babies** every day. Use an infant scale that can measure 10g weight intervals or less. A scale which measures in 50g intervals is **not suitable** for use with preterm infants or in a KMC unit.

Plot the daily weight of the baby on the “Weight, feeding and treatment chart” and calculate the weight gain or loss for the day and every week.

All babies normally lose weight in the first week after birth. This is due to:
- an excess amount of fluid in the body at birth
- coping with the increased metabolic demands of extrauterine life.

It is considered normal for a newborn baby to loose 10 % of his / her body weight in the first 7 – 10 days of life. This means that a baby who weighs 1000g at birth can be expected to lose about 100 g in the first 7 – 10 days. This baby could then weigh as little as 900g on day 10.

Low birth weight babies usually regain their birth weight by 14 days. This means that after two weeks a low birth weight baby might only weigh the same as he did at birth.

<table>
<thead>
<tr>
<th>Minimum expected weight gain is 10g / kg / day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight 1 kg: <strong>Expected weight gain is at least</strong> 10g / day, or 70 – 100g / week</td>
</tr>
<tr>
<td>Birth weight 2 kg: <strong>Expected weight gain is at least</strong> 20g / day, or 150g / week</td>
</tr>
<tr>
<td>Birth weight 3 kg: <strong>Expected weight gain is at least</strong> 30g / day, or 200g / week</td>
</tr>
</tbody>
</table>

72  MODULE 2: TREAT, OBSERVE AND CARE
CLASSIFY WEIGHT GAIN IN LOW BIRTH WEIGHT BABIES
Turn to page 52 in the Newborn Care Chart book to assess feeding and classify weight gain in low birth weight babies.

You will ASSESS AND CLASSIFY the weight gain every week and decide if the baby has:

**Inadequate weight gain**
- The baby has lost more than 10% of birth weight or
- The baby is gaining weight at less than 10g / kg / day

**Adequate weight gain**
- The baby has lost less than 10% of birth weight or
- The baby is gaining weight at least 10g / kg / day

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 10% weight loss in first week</td>
<td>INADEQUATE WEIGHT GAIN</td>
<td>• Determine the cause of inadequate weight gain</td>
</tr>
<tr>
<td>Weight gain insufficient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate weight gain or Less than 10% weight loss in first week</td>
<td>ADEQUATE WEIGHT GAIN</td>
<td>• Continue feeding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• When able to suckle start breastfeeding</td>
</tr>
</tbody>
</table>

**Now see Exercise Module 6.2 – and do exercise 2K**

**DETERMINE CAUSE OF INADEQUATE WEIGHT GAIN**
If the baby has inadequate weight gain, determine and classify the cause. A baby with inadequate weight gain usually has
- Insufficient feeds or
- Incorrect feeding method or
- Incorrect thermo neutral environment or
- Illness

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baby seems unwell, lethargic, less than normal movement</td>
<td>SERIOUS ILLNESS</td>
<td>• Investigate and treat for sepsis or specific infections</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check for PDA, other rare causes</td>
</tr>
<tr>
<td>Inadequate feed volume for age and weight</td>
<td>INSUFFICIENT FEEDS</td>
<td>• Correct feed volume</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increase feeds by 20ml/kg/day until 180ml/kg/day of feeds (p.22-23)</td>
</tr>
<tr>
<td>Baby &lt; 1.8kg is not getting continuous KMC</td>
<td>INADEQUATE TEMPERATURE CONTROL</td>
<td>• Correct the environmental temperature (p.14-16)</td>
</tr>
<tr>
<td>Baby &lt; 1.5 kg is not adequately heated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preterm baby &lt; 1.5kg is suckling from breast</td>
<td>INCORRECT FEEDING METHOD</td>
<td>• Correct feeding (p.22-23)</td>
</tr>
<tr>
<td>Baby &lt; 1.5 kg is cup fed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No problems identified</td>
<td>NO OBVIOUS CAUSE FOUND</td>
<td>• Consider rarer causes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Consult a paediatrician at the referring hospital for advice</td>
</tr>
</tbody>
</table>
You will want to ask the following questions:

1. **Is the baby ill?**
   - Assess the baby for priority signs using the charts 1.2 on p. 6-7 of the Newborn Care Chart book and for infections using the charts 2.2.3 and 2.2.4 on p. 35 and 36 respectively of the Chart book.
   - Treat the baby according to what is found
   - Urinary tract infections are very difficult to diagnose in newborn babies, and may only present with poor growth. If there is no other obvious cause, the urine should be checked for pus cells and nitrites.

2. **What feed volume is being given? What volume should be given? (in ml/kg/day)**
   Determine the feed volume being given to the baby in ml / kg / day.
   **Example:** A 20 day old baby weighing 1.6 kilogram is getting 20ml 3 hourly.
   - Daily feeds: 20ml x 8= 160ml / 24 hours
   - Daily feed / kg + 160 / 1.6 = 100ml / kg / day
   - On day 20 a baby should be getting 150 - 180ml / kg / day
   - The total volume needed is therefore 1.6kg x 180 = 288ml / day (24 hours)
   - The feeds should therefore be 288 / 8 = 36ml 3 hourly

   P. 22 of the Newborn Care Chart book shows you that this baby should be getting 180ml / kg of milk per day, or 36ml every 3 hours.

3. **Is the feeding method correct?**
   - How is the baby being fed?  (Breast, cup, or naso / orogastric tube)
   - Is this appropriate for baby’s development or condition?
   - Babies can get tired when they breast feed when they are recovering from an illness or are just “learning” to suckle. When this happens they may not be able to finish a feed and therefore not get enough milk to supply their energy needs. Babies also expend quite a lot of energy while breast feeding.
   - Very small babies who are being cup fed, can only take small sips of milk at a time. This means that the baby may take a long time to finish a feed. Often they fall asleep before they have finished.
   - In both these cases, the extra milk may have to be given either by a cup, in bigger babies, or by nasogastric tube, in smaller babies. Sometimes it is necessary to revert to cup or nasogastric feeds for a few more days until the baby is able to cope with the feeds.

   **Assessing developmental progress for feeding**
   - A fetus starts to **swallow** at about 12 weeks gestation, so that even a very preterm baby can swallow, but can only take very small amounts at a time, so that feeding is slow if given by cup
   - A baby only starts to **suckle** at about 34 weeks gestation. Breast feeding is therefore unlikely to succeed before this.
   - A baby who is sick or recovering may take days to be to cope with the normal feeds for her age.

4. **Is the baby being kept in a suitably warm environment?**
   - Assess the baby’s environmental temperature
   - Is the baby maintaining a normal temperature?
   - Is a small baby in an incubator adequately covered? (woollen cap, booties, plastic wrap)

   Very simply: babies need energy to grow (gain weight) and keep warm. If a baby needs to use a lot of his energy intake to keep warm, he will not be able to grow properly
Babies may not gain weight adequately if they are not kept in the correct environmental temperature. They will be using their energy to keep warm.

- Is the incubator set at the correct temperature? Use table 1 on p. 16 of the Newborn Care Chart book to check this.
- Are there any draughts in the room?
- Is the incubator too close to a cold window?
- Is a baby who is supposed to be getting continuous KMC getting continuous KMC?

5. Is there no obvious reason for the poor weight gain?
When no obvious cause can be found, consult a paediatrician. The baby may have to be transferred for investigation. Remember to check for a urinary tract infection!
2.2.3 SERIOUS ACUTE INFECTIONS OR SEVERE DISEASE

If a baby is classified as serious infection or severe disease, the baby may have a severe infection such as septicaemia, meningitis, necrotising enterocolitis or tetanus, or asphyxia, or hypothermia. Hypothermia can also be present in all of these other conditions. Many of these conditions have very similar presenting signs. You will need to use risk factors and other pointers to decide whether the baby has Sepsis or Neonatal Encephalopathy (Asphyxia as shown in the table below).

<table>
<thead>
<tr>
<th>SEPSIS OR MENINGITIS</th>
<th>NEONATAL ENCEPHALOPATHY / ASPHYXIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Risk of sepsis (PROM etc)</td>
<td>• Prolonged or difficult labour or birth</td>
</tr>
<tr>
<td>• Unstable temperature</td>
<td>• Low Apgar Score</td>
</tr>
<tr>
<td>• Condition worsens rapidly &amp; dramatically</td>
<td>• Failure to breathe spontaneously at birth</td>
</tr>
<tr>
<td>• Condition usually commences after day 3 or 4 of life</td>
<td>• Meconium stained Liquor</td>
</tr>
<tr>
<td>• Vomiting</td>
<td>• Signs start at birth or on day 1</td>
</tr>
<tr>
<td>• Abdominal distension</td>
<td></td>
</tr>
<tr>
<td>• Poor feeding after having fed well</td>
<td></td>
</tr>
<tr>
<td>• Unclean birth</td>
<td></td>
</tr>
</tbody>
</table>

This section will first deal with the severe infections and neonatal encephalopathy / asphyxia is dealt with in section 2.2.5 later in this module.

LEARNING OBJECTIVES

In this section you will learn to:
• Recognise the main causes of severe infection
• Know what other conditions can present with similar signs
• Know how to manage these babies

SEPSIS OR NEONATAL ENCEPHALOPATHY?
• If the baby is suspected to have sepsis, do the following investigations CXR, FBC, CRP, LP, Blood Culture, Gastric aspirate for Gram stain
• Decide on the site of infection and commence treatment. Use the table on p. 35 of the Newborn Charts to assist with diagnosis, investigation and first line treatment
• If the baby has signs of sepsis but the site of infection is not yet clear, treat for Septicaemia
• If convulsions are present, give a loading dose of phenobarbitone 20-40 mg/kg IMI. Consider maintenance phenobarbitone 5mg/kg/day in 2 divided doses orally.
• The baby may also have congenital syphilis, see section 2.2.8 below

SERIOUS INFECTIONS IN NEWBORN
• Septicemia
• Meningitis
• Necrotizing enterocolitis
• Tetanus
SEPTICEMIA
Septicemia is an infection of the blood stream with bacteria which may have colonized the infant before or after birth. It is often a complication of a local infection e.g. pneumonia, umbilical cord sepsis or skin infection.

Clinical features of septicaemia
Early diagnosis of septicemia is difficult because the clinical signs are often non-specific. The common signs are:-
- Lethargy
- Poor feeding or suckling. These first 2 are usually earliest signs of septicemia
- Abdominal distension/vomiting
- Pallor, this is due to either haemolysis or shock
- Jaundice
- Purpura because of reduced platelets
- Recurrent apnoea
- Hypothermia, fever is very unusual
- Oedema or sclerema

Investigations
- FBC
- CRP
- Blood culture
- CXR
- LP

Management of septicaemia
- Nurse in an incubator in High Care
- Observations; These need to be done hourly, especially respiration, heart rate, apnoea, temperature of the baby and incubator, and blood glucose (3 hourly).
- Give oxygen according to the baby’s blood oxygen saturation
- Nil per mouth and IV fluids (Neonatalyte) initially as these babies often have an ileus
- Keep the baby warm
- Antibiotics: Ampicillin 50 mg / kg / dose IV, or Cefotaxime 50 mg / kg / dose IV 12 hourly and Gentamicin 5 mg / kg / dose IV daily for 7 – 10 days.
- Change the antibiotic depending on the blood culture or other results
MENINGITIS

Meningitis is the inflammation of the meninges of the brain of the newborn.

Clinical features of meningitis

The diagnosis is difficult in newborn because the following features are usually NOT present: Neck stiffness, full fontanelle, vomiting, photophobia

The newborn is usually generally ill and may have signs of septicemia together with the following features:

- Irritable and high pitch cry
- Abnormal movements and convulsions
- They tend to stare and keep their fists clenched
- They may have recurrent apnoea and cyanotic spells

If meningitis is suspected, a lumber puncture must be done to confirm the diagnosis.

Management of septicaemia

1. Observations. In particular watch for:
   - Convulsions
   - Apnoea
   - Blood sugar
   - Temperature of the baby and incubator
2. Treat any convulsions
3. Treat the infection
   - Cefotaxime 50 mg / kg / dose IV 12 hourly or Ceftriaxone 80 mg / kg / dose IV daily
   - Ampicillin 100 mg / kg / dose 12 hourly for 2 weeks.
   - If there is a Gram negative organism, treat for 21 days.
NECROTIZING ENTEROCOLITIS
Necrotizing enterocolitis (NEC) is necrosis (death) of part or all of the small and large intestine. It is usually seen in 2 groups of newborn infants:-

- **Term infants** who have had severe intrapartum hypoxia which has caused ischaemic and damage to the gut.
- **Preterm infants** who have been infected in the nursery. This form of necrotizing enterocolitis may occur in epidemics. It is often associated with overcrowding of patients in the nursery and poor hand hygiene.

Clinical features of necrotising enterocolitis
Both ischaemia and infection damage the bowel wall, and the infant presents with:
- Signs of septicaemia and often shock.
- Abdominal distension and ileus. The abdomen is tender when palpated.
- Vomiting, which is often bile stained.
- Blood in the stool. This may be obvious or only be detected when the stool is tested for occult blood.
- All infants with one or more clinical signs of necrotizing enterocolitis should have an X-ray taken of the abdomen. The finding of air in the bowel wall will confirm the diagnosis of necrotizing enterocolitis.

These are extremely ill infants who must be referred to a level 2/3 hospital
The mortality rate is high in NEC, especially if the diagnosis is made late

Management of necrotising enterocolitis
Before transferring them, the following management is needed:
1. Nasogastric tube MUST be passed to relieve the bowel distension.
2. Keep nil per mouth and start an intravenous infusion (neonatalyte at the appropriate rate for age and weight)
3. Give general supportive care.
   - Observations
   - Oxygen, if needed to keep the baby’s blood oxygen saturation normal
   - The baby may need extra glucose to maintain the blood glucose levels
   - Maintain the baby’s temperature
4. Antibiotics: Start
   - Cefotaxime 50 mg / kg / dose IV 12 hourly or Ceftriaxone 80 mg / kg / dose IV daily and Ampicillin 100 mg / kg / dose 12 hourly for 14 days if gram positive and 21 days if gram negative.
TETANUS
Tetanus in the newborn infant (tetanus neonatorum) is caused by the bacterium, *Clostridium tetani*, which infects dead tissues such as the umbilical cord. *Clostridium tetani* usually occurs in soil and faeces, which is sometimes placed on the cord or other wounds as a traditional practice. It produces a powerful toxin that affects the nervous system. A newborn baby is infected when contaminated material is put on the umbilicus.

Clinical features of tetanus
There may be a history of soil or powder having been placed on the cord as a traditional practice.

The baby presents with:
- Inability to suckle and stiffness
- There is a typical appearance of the mouth during a spasm
- Increased muscle tone, especially of the jaw muscles and abdomen.
- The baby's back may arch backwards (oposthotonus) during a spasm.
- The generalised muscle spasms or “convulsions” are often precipitated by stimulation such as handling or loud noises.
- Respiratory failure and death in untreated infants, due to spasm of the respiratory muscles.

Management of tetanus neonatorum
Prevention
1. Good cord care.
2. Immunizing all pregnant women with tetanus toxoid, if tetanus is common in the region.

The emergency treatment of tetanus consists of:
1. Keeping the airway clear and giving oxygen.
2. Not stimulating the infant.
3. Stop the spasms with diazepam (Valium) 0.25-1 mg/kg 4 - 8 hourly intravenously or rectally, repeatedly until the spasms stop. *You may have to mask ventilate the infant, as the valium may stop the baby from breathing.*
4. In frequent spasms, give Phenobarbitone 5-10 mg / kg / dose IV regularly according to the baby’s needs
5. Benzyl penicillin 100 000 u / kg IV 12 hourly for 10 days
6. Tetanus immunoglobulin IM 500 units.
7. Notification is essential.
8. Transfer the infant urgently to the nearest level 3 hospital. The infant will need to be ventilated.

**Babies with neonatal tetanus must be managed in a level 3 hospital as they will need to be ventilated.**

**Provide emergency treatment as above and transfer urgently**

Now see Exercise Module 6.2 – and do exercise 2L
2.2.4 LOCAL INFECTION

Refer to p. 36 of the Newborn Care Chart book when reading this section on local infections, including maternal chorioamnionitis, conjunctivitis, skin infections and omphalitis.

LEARNING OBJECTIVES

In this section you will learn to:

- Know what are the common local and less serious infections
- Know how to treat them
- Recognise when they have become serious

MATERNAL CHORIOAMNIONITIS

Maternal chorioamnionitis may cause both local and generalised infections in a newborn baby. Chorioamnionitis is a common acute inflammation of the chorion, amnion and placenta. Chorioamnionitis may occur with intact membranes, although it is most common after prolonged rupture of the membranes.

Chorioamnionitis is the commonest cause of preterm labour and, therefore, should be suspected in all preterm infants born after the spontaneous onset of labour or pre labour rupture of the membranes.

Unexplained fetal tachycardia may be the first indication that the mother has chorioamnionitis

Diagnosis of maternal chorioamnionitis after delivery

- Chorioamnionitis is often not diagnosed before delivery as the mother is usually asymptomatic. The mother usually only develops symptoms (fever, abdominal tenderness and possibly an offensive vaginal discharge) if the infection is severe.
- If the infection has spread to the amniotic fluid, the baby may smell offensive at birth
- Most of these colonized infants will be clinically well but some will develop signs of infection at or soon after delivery.
- Severe chorioamnionitis may also cause placental oedema and result in fetal hypoxia

Suspect maternal chorioamnionitis when:

- There has been prolonged rupture of the membranes of > 18 hours
- The baby has offensive smell at birth
- There is an unexplained preterm delivery  Unexplained LBW

Management of an infant whose mother has had chorioamnionitis

Usually the infant appears well and does not need to be treated. However antibiotics should be given:

1. Prophylactically if there has been:
   - Prolonged rupture of the membranes
   - Unexpected preterm labour, especially when the baby weighs less than 1500g
   - Evidence that the amniotic fluid is infected

2. If the infant is clinically ill with signs of pneumonia or septicaemia.
   - Antibiotics: Benzyl Penicillin 50,000 U / kg / dose 12 hourly for 5 days, and
   - Gentamicin 5 mg / kg / dose daily  for 5 days.

When the antibiotics are given prophylactically, a CRP should be done after 48 hours,and if it is normal, the antibiotics can be stopped.
CONJUNCTIVITIS
Organisms which commonly cause conjunctivitis are:
• Gonococcus
• Staphylococcus
• Chlamydia
• Sometimes gram negative organisms cause conjunctivitis in newborns

The organisms which usually cause severe conjunctivitis are:
• Gonococcus
• Staphylococcus

Gonococcal conjunctivitis is the most serious as it can damage the cornea and cause blindness, one of the common causes of blindness in infants.

Clinical features of conjunctivitis
• Discharge from the eyes
• The discharge may be purulent, or mucousy (especially with Chlamydia)
• Conjunctivae are red

In severe conjunctivitis:
• There is usually a lot of pus discharging from the eyes. This is usually yellow in colour
• The eyelids are oedematous and it may not be possible to separate them because of the swelling
• Pus may spurt from the eye and runs down the cheeks when the eyelids are opened.

Management of conjunctivitis
If the conjunctivitis is not severe:
1. Clean the eyes with clean water
2. Put chloramphenicol eye ointment into the eyes 3 or 4 times per day

Conjunctivitis is a medical emergency as it can lead to blindness if not properly and quickly treated.

Severe conjunctivitis is a medical emergency as it can lead to blindness if not properly and quickly treated.

Severe conjunctivitis
1. The pus MUST be washed out of the eyes with saline or warm water, immediately.
2. If possible, take a pus swab before starting treatment. Do not delay starting treatment if a pus swab cannot be taken
3. Continue to irrigate the eyes with 0.9% saline solution or warm clean water (tap water is suitable) every 1 - 2 hours until the discharge is minimal.
4. Put chloramphenicol or tetracycline eye ointment into the eyes 1 – 2 hourly initially, and reduce the frequency as the eyes get better. Remember to treat both eyes.
5. Penicillin drops can be used to instill in the eye. Add 1ml of Inj: Benzyl Penicillin to 50 ml sterile water or normal saline. This mixture MUST NOT be kept more than 24 hrs.
6. Give a single dose of Ceftriaxone 50 mg / kg / dose IM PLUS Erythromycin syrup 12.5 mg tds for 14 days.

Severe conjunctivitis, especially if it is caused by the gonococcus, can damage the cornea resulting in blindness.
SKIN INFECTIONS
Most of the skin infections are not serious. However, if the infant becomes unwell and shows any signs of septicaemia, then antibiotics should be given urgently.

Clinical features of skin infections
- Blisters filled with pus, usually yellow
- When the blisters rupture, they leave an area of red dry skin.
  - They are usually caused by *Staphylococcus aureus*,

Management of skin infections
If possible, a pus swab can be sent. Do not delay treatment if a pus swab cannot be taken immediately. The management depends on the severity of the skin infection:

Mild skin infection: A few lesions in a well baby
- Wash the baby twice per day with an antiseptic soap

Moderate skin infection: A lot of pustules in a well baby
- Wash the baby as above
- Give flucloxacillin 62.5 mg tid orally for 5 days

Severe: Extensive lesions becoming confluent, or with skin oedema, or if the baby is sick
- Admit the baby
- Give cloxacillin 50 mg / kg / dose bd IV for 5 days
OMPHALITIS (INFECTION OF THE UMBILICUS AND BASE OF THE CORD)

Applying alcohol (spirits) to the umbilicus and base of the cord is essential care and will prevent almost all infections of the umbilicus

Clinical features of omphalitis
- An offensive (smelly) discharge at the base of the cord.
- Failure of the base of the cord to become dehydrated (ie. cord remains wet and soft)
- There may be a pussy discharge at the base of the cord
- Erythema (redness) of the skin around the base of the cord (a flare).
- If the infection is severe and spreading, the skin around the umbilicus will become oedematous.

Mild infection
- There may be a little pus at the base of the cord
- There is no oedema of the skin around the base of the cord
- The infant is generally well when the infection is localized to the cord only.

When the infection is severe or is spreading there will be:
- Redness and oedema of the skin around the base of the cord (cellulitis)
- Abdominal distension, often with decreased bowel sounds, and vomiting (peritonitis).
- The infant is generally unwell with the features of septicaemia.

When the infection is severe or spreading, the baby needs urgent treatment

Management of omphalitis
With good preventative cord care, infection of the umbilical cord should not occur. Prevention consists of:
1. A routine application of alcohol (surgical spirits) to the base of the cord every 6 hours until it is dehydrated.
2. Antibiotic powder is not used.
3. Never cover the cord with the nappy or a cloth, as this keeps it moist.

If the infection is localized to the umbilicus, and the baby is well with no signs of cellulitis, peritonitis, septicaemia or tetanus, then treatment consists simply of:
- Clean the cord frequently (3 hourly initially) with surgical spirits. The base of the cord should be carefully cleaned with a swab and copious amounts of spirits
- Antibiotics are not needed.

Special attention must be paid to the folds around the base of the cord which often remain moist. Within 24 hours the infection should have resolved.

Keep a careful watch for signs that infection is spreading beyond the umbilicus

If there are signs of extension of the infection, such as:
- Cellulitis of the abdominal wall around the base of the cord (redness and oedema of the skin),
- Peritonitis, or
- Septicaemia
Then antibiotics must be added to the cord cleaning, including:
- Benzyl Penicillin 50,000 u / kg / dose 12 hourly and
- Gentamicin 5 mg / kg / dose daily for 10 days.

Now see Exercise Module 6.2 – and do exercise 2M
2.2.5 NEONATAL ENCEPHALOPATHY

LEARNING OBJECTIVES

In this section you will learn:

- What asphyxia is
- What encephalopathy is
- How to recognize neonatal encephalopathy
- How to treat the baby with neonatal encephalopathy

ASPHYXIA

Asphyxia in the newborn is defined as:

- Failure to initiate (start) and maintain (continue) spontaneous respiration within 1 minute of birth

This is almost always the result of a problem with the respiratory centre in the brain. If it is due to hypoxia which has occurred during labour, the result will be that the baby may develop encephalopathy (Hypoxic Ischaemic Encephalopathy).

NEONATAL ENCEPHALOPATHY / HIE

Neonatal encephalopathy is the condition that results from cerebral hypoxia (not enough oxygen to the baby’s brain) during labour causing ischaemic damage to brain cells, and often follows asphyxia at birth. It is often called Hypoxic Ischaemic Encephalopathy (HIE).

Clinical features of neonatal encephalopathy

Suspect neonatal encephalopathy when:

- There has been a prolonged or difficult labour or birth
- There was a low Apgar score
- The baby failed to breathe spontaneously at birth (asphyxia)
- There was meconium stained liquor
- The signs were present from at birth or started on day 1

Classify the severity of encephalopathy according to the following table.

<table>
<thead>
<tr>
<th>CLASSIFY</th>
<th>FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>MILD ENCEPHALOPATHY</td>
<td>• Jittery, hyper-alert</td>
</tr>
<tr>
<td></td>
<td>• Increased muscle tone</td>
</tr>
<tr>
<td></td>
<td>• Poor feeding</td>
</tr>
<tr>
<td></td>
<td>• Normal or fast breathing</td>
</tr>
<tr>
<td>MODERATE ENCEPHALOPATHY</td>
<td>As above, plus</td>
</tr>
<tr>
<td></td>
<td>• Lethargy</td>
</tr>
<tr>
<td></td>
<td>• Feeding difficulty</td>
</tr>
<tr>
<td></td>
<td>• Occasional apnoea / convulsions</td>
</tr>
<tr>
<td>SEVERE ENCEPHALOPATHY</td>
<td>• Floppy / unconscious</td>
</tr>
<tr>
<td></td>
<td>• Unable to feed</td>
</tr>
<tr>
<td></td>
<td>• Convulsions are common</td>
</tr>
<tr>
<td></td>
<td>• Severe apnoea is common</td>
</tr>
</tbody>
</table>

If a baby less than 3 days old:

- cannot suck and
- has a history of prolonged labour or Apgar score < 7

Then treat for neonatal encephalopathy
Management of neonatal encephalopathy
Based on the severity of the encephalopathy manage the baby according to the chart on p. 37 of the Newborn Care Chart. If the baby has other problems for example Meconium Aspiration manage these will need to be managed appropriately in addition.

Management of mild encephalopathy
• If the baby is not receiving oxygen, allow breastfeeding
• If the baby is receiving oxygen or cannot be breastfed, give expressed breastmilk via a nasogastric tube
• Provide ongoing care (see below)

Management of moderate and severe encephalopathy
Observations
• 3 hourly RR, HR, Temperature, colour and activity
• Daily HIE score (p. 38)
Temperature
• Do not overheat the baby
• Cool the baby with a fan or ice pack to the head, to keep the axillary temperature around 34°C
Fluids
• Establish an IV line and give only IV fluids for the first 12 - 24 hours – do not feed orally
• Restrict the fluid intake to 60 ml / kg body weight for the first 3 days
• Monitor the urine output: If the baby passes urine < 6 times per day or produces no urine, do not increase the fluid volume on the next day
• When the amount of urine begins to increase, increase the volume of fluid intake gradually, regardless of the baby’s age – i.e. progress from 60 ml/kg to 80 ml/kg to 100 ml/kg to 120 ml/kg
• If the baby is unable to suck, give the feeds by nasogastric tube
• When the baby is able to suck, start breastfeeding
Convulsions
• Give phenobarbitone 20 mg/kg slowly IV or IM
• If the convulsions continue, give another dose of phenobarbitone 10 mg/kg IV slowly over 5 minutes, or IM
• If they continue, load with phenytoin
• If the convulsions are controlled, try to stop the phenobarbitone
• If the baby is able to suck, allow breastfeeding. If the baby cannot breastfeed, feed via a gastric tube.

Encourage the mother to hold and cuddle her baby

Ongoing care for babies with encephalopathy
• If the baby’s condition does not improve after 3 days: reassess for signs of serious infection or severe Disease (p. 7, 35)
• If the baby’s condition does not improve after 1 week: if no sepsis, and no other hospital management is needed, discharge. the baby can be discharged on phenobarbitone if necessary. The mother will need advice on feeding.
• Discuss the baby’s prognosis with the mother and / or family
• Follow up in 1 week. The baby must come sooner if he / she is not feeding well, or has convulsions, or is sick.
HYPOXIC ISCHAEMIC ENCEPHALOPATHY (HIE) SCORING SYSTEM

- The HIE scoring system is a simple clinical tool which helps to predict the infant's long term outcome.
- This chart is easy to use. It consists of a clinical assessment of 9 signs, which need to be assessed daily, and a score recorded.
- Infants with a maximum score of 10 or less, will almost certainly be neurologically normal. Those with a maximum score of 15 or more, and who are not sucking by day 7, will probably not be neurologically normal.

<table>
<thead>
<tr>
<th>Sign</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
<th>Day 7</th>
<th>Day 8</th>
<th>Day 9</th>
<th>Day 10</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tone</td>
<td>Normal</td>
<td>hyper</td>
<td>hypo</td>
<td>flaccid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Conscious level</td>
<td>Normal</td>
<td>hyperalert, stare</td>
<td>lethargic</td>
<td>comatose</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fits</td>
<td>none</td>
<td>infrequent &lt; 3 / day</td>
<td>frequent &gt; 3 / day</td>
<td></td>
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<tr>
<td>Posture</td>
<td>Normal</td>
<td>Fisting, cycling</td>
<td>strong distal flexion</td>
<td>decerebrate</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Moro</td>
<td>Normal</td>
<td>partial</td>
<td>absent</td>
<td></td>
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<td></td>
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<tr>
<td>Grasp</td>
<td>normal</td>
<td>poor</td>
<td>absent</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suck</td>
<td>Normal</td>
<td>poor</td>
<td>absent</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Respiration</td>
<td>Normal</td>
<td>Hyperventilation</td>
<td>brief apnoea</td>
<td>IPPV (apnoea)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fontanelle</td>
<td>Normal</td>
<td>full - not tense</td>
<td>tense</td>
<td></td>
<td></td>
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</tbody>
</table>

The score usually increases for the first few days after birth and then returns to normal by 1 week in mildly affected babies. A high score is generally associated with a high mortality, while a score which remains high beyond 1 week is associated with a high risk of abnormal neurological development.

Now see Exercise Module 6.2 – and do exercise 2N
2.2.6 NEONATAL JAUNDICE
Jaundice is the yellow colour of the skin and sclerae caused by deposits of bilirubin.

LEARNING OBJECTIVES

In this section you will learn:
- How bilirubin is formed from haemoglobin
- What physiological jaundice is
- Which babies are at risk of severe jaundice
- Know when and how to start phototherapy
- Know when to refer or start an exchange transfusion

FORMATION OF BILIRUBIN
In contrast to the adult red blood cell lifespan of 120 days, the lifespan of the neonatal erythrocyte is only 60 to 90 days with preterm infants having an even shorter life span of 35 to 50 days. Older and damaged red blood cells are continuously removed from the circulation and metabolised. Bilirubin is a metabolite product of this process, and is produced as follows in two forms, unconjugated and conjugated bilirubin:
- Haemoglobin, the red pigment in the red blood cells, is broken down to unconjugated bilirubin in the reticuloendothelial system.
- Unconjugated bilirubin is carried by albumin in the bloodstream to the liver where it is joined to glucuronic acid. This process is called conjugation.
- The bilirubin then becomes conjugated bilirubin.
- Conjugated bilirubin is then excreted into the small bowel through the bile ducts. In the bowel, the conjugated bilirubin is unconjugated again and some of it can be reabsorbed.
- In the newborn baby most of the bilirubin in the body is unconjugated.

CAUSES OF JAUNDICE
Jaundice is caused by excessive bilirubin in the bloodstream which is then deposited in the skin and the sclerae (the white) of the eyes. As bilirubin is being formed from the breakdown of red blood cells, certain conditions can result in too much bilirubin being formed. These are:
- Excessive haemolysis – breakdown of too many red cells, resulting in excessive unconjugated bilirubin produced (and some conjugated bilirubin too). This typically occurs in the first 24 hours and is often due to blood group or Rhesus incompatibility or a birth injury with haemorrhage.
- Deficient conjugation – a problem occurs in the conjugation of bilirubin to albumin resulting in excessive unconjugated bilirubin only. This usually appears by 3-5 days and can be caused by diseases of the liver.
- Biliary obstruction – a problem occurs in the excretion of conjugated bilirubin into the bowel, resulting in excessive conjugated bilirubin. This is a cause of prolonged jaundice of more than 14 days.

The diagram below provides a visual overview of the formation of bilirubin from red blood cells and haemoglobin (Hb) and the sites of problems in the breakdown pathways that cause excessive bilirubin production and jaundice.
Formation of bilirubin and causes of jaundice

**RISK TO THE BABY FROM EXCESSIVE BILIRUBIN**
- Unconjugated bilirubin is fat soluble and toxic to the brain (fatty tissue) in high concentrations.
- Conjugated bilirubin is water soluble and is not toxic to the brain.
**NEONATAL JAUNDICE**

When the concentration of bilirubin in the blood rises, it becomes visible in the skin causing jaundice. In the initial assessment and classification of the newborn, jaundice in the first 24 hours should be classified as **severe disease**, while jaundice starting after the first 24 hours needs to be investigated and managed appropriately.

In a newborn the degree of jaundice is determined by measuring the Total Serum Bilirubin (TSB) and plotting this on a graph. The TSB cannot be estimated accurately by assessing the degree of jaundice in the skin. Clinical jaundice in the first 24 hours is always abnormal. Jaundice lasting longer than 14 days needs investigation.

Physiological jaundice is common. It usually starts on Day 3 (ie. after the first 24 hours), seldom lasts beyond Day 10. Treatment is not usually needed as the bilirubin level is seldom is above 275 umol /l.

Jaundice can become dangerous when the concentration of unconjugated bilirubin in the blood becomes very high. Unconjugated bilirubin may then enter the brain of the newborn infant and cause **bilirubin encephalopathy** (kernicterus).

---

### In a newborn with jaundice, always determine the degree of jaundice by measuring the TSB and plotting this on a graph.

The result of the TSB needs to be available within 1 hour from the laboratory. A “Bilicheck” can be used to screen for jaundice, but if > 200 umol /l, take blood for TSB.

---

### Babies at risk for severe jaundice

Babies at risk of severe jaundice should be either recognized before birth or in the first 24 hours by evaluating maternal and perinatal conditions. The table below outlines the risks, investigations and management of severe and common jaundice (also see p. 39 in Newborn Care Charts).

<table>
<thead>
<tr>
<th>RISK FOR JAUNDICE</th>
<th>INVESTIGATIONS</th>
<th>TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Uncommon but potentially severe</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Jaundice on day 1</td>
<td>• Do a total serum bilirubin (TSB) level</td>
<td>• Start phototherapy immediately</td>
</tr>
<tr>
<td></td>
<td>• Check the mother’s blood groups (ABO and Rhesus)</td>
<td>• Check TSB 6 hourly</td>
</tr>
<tr>
<td></td>
<td>• Do a Coombs test, if possible</td>
<td></td>
</tr>
<tr>
<td>• Mother’s blood group O or Rhesus negative</td>
<td>• Check the TSB at 6 hours of age</td>
<td>• If TSB &gt; 80 umol / l, start phototherapy</td>
</tr>
<tr>
<td></td>
<td>• Do a Coombs test, if the TSB is rising &gt; 8.5 μmol / l / hour</td>
<td>• If Coomb’s test positive, give IV gamma-globulin 500 mg over 1 hour</td>
</tr>
<tr>
<td>• Prolonged jaundice (&gt; 14 days)</td>
<td>• Do conjugated and unconjugated bilirubin levels</td>
<td>• Consult paediatrician for further management</td>
</tr>
</tbody>
</table>

**Common**

| | | |
| • Jaundice after day 1 | • Do TSB if the baby looks yellow | • Start phototherapy if TSB above the line on the chart |
| • Preterm baby | • Daily TSB until day 5, or TSB is going down | • Start phototherapy if TSB above line on the graph (p.41) |
| | | • Stop phototherapy if the TSB is below the phototherapy line on the graph (p.41) by at least 50 μmol / l |

---

In a newborn with jaundice, always determine the degree of jaundice by measuring the TSB and plotting this on a graph. The result of the TSB needs to be available within 1 hour from the laboratory. A “Bilicheck” can be used to screen for jaundice, but if > 200 umol /l, take blood for TSB.
Investigations for neonatal jaundice
- Do a TSB on all babies who look jaundiced.
- Do a TSB at 6 hours of age if the mother is Blood group O or Rhesus negative.
- In all babies who have jaundice on day 1 it is necessary to know the mother’s blood groups (ABO and Rhesus) and to do a Coombs test.
- Do a direct Combs test on babies with jaundice if the mother is Blood group O or Rhesus negative.

Management of jaundice
- Start **phototherapy** while waiting for the TSB result, if the baby looks more than mildly jaundiced.
- If the TSB for the infant's age is above the phototherapy line (see graph below), treatment should be started. Phototherapy is started earlier in preterm or sick infants.
- Phototherapy should not be given to healthy, term infants who are jaundiced with a TSB below the phototherapy line.
- All infants born to women who are blood group O and/or Rhesus –ve should have their TSB measured at 6 hours after birth. If the TSB is above 80 µmol/l, phototherapy should be started.
- When the TSB is high, check the level for exchange transfusion on the second graph. This varies depending on the baby’s weight, age and illness.
- Repeat the TSB every 12 – 24 hours, depending on the severity of the jaundice.
- Ensure that the baby is getting an adequate fluid intake.
- Encourage breastfeeding, as it enhances the excretion of bilirubin.
- Continue phototherapy until the TSB is 50 µmol/l under the phototherapy line on the graph. Then stop the phototherapy and repeat the TSB the next day. If the TSB rises above the line again after stopping phototherapy, treatment has to be restarted.
- Visible jaundice rapidly disappears under phototherapy even if TSB remains high.
- Occasionally the TSB can continue to rise even if the baby is receiving phototherapy. The TSB must therefore be monitored in all babies receiving phototherapy.

Indications for an exchange transfusion
Exchange transfusion is indicated:
- If the TSB is greater than the level on the graph (see below) for weight and age, and TSB has not come down by more than 17 umol/l in 4 hours of intensive phototherapy.
- If the TSB rises more than 17 umol/l/hour while under treatment in a situation where there is an ABO or Rhesus incompatibility.
- At a lower bilirubin level if the baby:
  - is preterm
  - has been hypoxic
  - has had hypothermia
  - has been hypoglycaemic
  - has an infection, especially a severe infection

Referral criteria
- Suspect haemolytic disease with a rapidly rising TSB and refer.
- Refer the baby if the levels are approaching exchange transfusion levels. (review attached graph)

An exchange transfusion probably needs to be done at a level 2 or 3 hospital.
**PHOTOTHERAPY**

GUIDELINES FOR ALL WEIGHTS AND GESTATIONS

If gestation is accurate use gestation rather than weight.

(This rule applies to Exchange Transfusion as well)

In the presence of IVH, sepsis, haemolysis, acidosis, or asphyxia, use one line (weight/gestation) lower on the graph or if <1000g a level of 20 micro mol lower.

Graph as constructed by Dr Alan Horn, Division of Neonatal Medicine, UCT, Cape Town.

Levels for infants of 35 or more weeks based on AAP guidelines 2004 and levels for preterm infants based on guidelines by Maisels and Watchko 2003.

---

**EXCHANGE TRANSFUSION**

GUIDELINES FOR ALL WEIGHTS AND GESTATIONS

In the presence of hypoalbuminaemia, sepsis, haemolysis, acidosis, or asphyxia, use one line (weight/gestation) lower on the graph or if <1000g a level of 20 micro mol lower.

Graph as constructed by Dr Alan Horn, Division of Neonatal Medicine, UCT, Cape Town.

Note:

1. These levels refer to infants who are already receiving intensive phototherapy and level is not falling by 17 micro mol/L in 4 hrs.

2. Immediate Exchange is recommended if signs of bilirubin encephalopathy or TSB >85 micro mol/L above threshold.

3. Also exchange if TSB continues to rise >17 mc mol/L/hour.

Levels for infants of 35 or more weeks based on AAP guidelines 2004 and levels for preterm infants based on guidelines by Maisels and Watchko 2003.
Notes on phototherapy

- The distance between the mattress and phototherapy light should be about 40cm.
- The equipment must be serviced regularly and light bulbs changed every 1000 hours (complain to the company if this is not happening).
- The baby should be naked.
- Cover the baby’s eyes when under phototherapy (remove the covering for feeding)
- Turn the baby over every hour.
- Do not cover the incubator or cot with blankets or sheets.
- A perspex (clear plastic) sheet must be placed below the tubes to reduce heat and filter ultraviolet light. The sheet also protects the infant if a tube breaks or loosens.

Risks of phototherapy

- The infant may become too hot or cold. It is essential to monitor skin temperature very carefully during phototherapy.
- The infant may pass loose greenish stools, due to the large amount of bilirubin excreted into the gut. The infant may also sweat more than usual. This may lead to excessive weight loss due to dehydration.
- If formula fed, infants should receive an extra 25 ml / kg / day as milk feeds. There is no need to give extra clear feeds. All infants under phototherapy should have their weights monitored daily.
- The eye pads prevent the mother and infant seeing each other. This may interfere with bonding. Conjunctivitis may also be hidden by the eye pads. The eye pads should be removed every time the infant is fed. Replace the eye pads after the feed.
- The TSB must be measured at least daily in all infants receiving phototherapy.
- It is not possible to assess the severity of jaundice by looking at the skin colour.
- Changes in skin colour may occur.
  - after a few days the infant may become tanned.
  - erythema may result from excessive heat if a perspex sheet is not placed below the tubes.
  - most skin rashes are aggravated by phototherapy
  - phototherapy given to an infant with conjugated hyperbilirubinaemia gives a grey / green colour to the skin known as bronzing.
- Phototherapy separates the infant from the mother. This separation results in maternal anxiety and may delay the establishment of breast feeding.

Signs of bilirubin encephalopathy

- The infant is very jaundiced.
- The total serum bilirubin (TSB) is high.
- At first the infant:
  - is lethargic
  - is hypotonic
  - has a weak cry
  - has a poor Moro reflex
  - feeds poorly and may vomit
- Later the infant:
  - becomes irritable
  - has a high pitched cry
  - becomes jittery
  - develops opisthotonus
  - may have convulsions

These signs are the result of damage to the basal nuclei in the brain. Prevention and management of jaundice is aimed at preventing bilirubin encephalopathy.

Now see Exercise Module 6.2 – and do exercise 20
2.2.7 CONGENITAL ABNORMALITIES

This section only deals with a few of the more common congenital abnormalities which you may see. There are thousands of less common congenital abnormalities not covered here. If you are not sure whether or not a baby is abnormal, or what to do with the baby, consult a paediatrician.

LEARNING OBJECTIVES

In this section you will learn:
- To recognise some major congenital abnormalities
- To provide emergency care
- What plans must be implemented to manage the baby
- The principles of counselling parents about the condition of the baby

CONGENITAL ABNORMALITIES

Look to see if the baby has any major abnormalities and minor abnormalities. Common major abnormalities include the conditions we have dealt with such as neural tube defect, cleft lip or palate, club foot, microcephaly, omphalocele.

Minor abnormalities include extra digits, abnormal size, shape or position of the eyes, ears, nose, chin and digits.

If a baby has one major abnormality and two minor abnormalities or 3 minor abnormalities the baby is classified as having a major congenital abnormality and needs to have blood taken for genetic analysis and referred to a paediatrician for assessment.

A baby with only one or two abnormalities (dysmorphisms) is classified as having a minor abnormality. Consult a paediatrician, genetic nurse or textbook for management.

The management of the most common major and minor congenital abnormalities are discussed in turn in this section.

NEURAL TUBE DEFECTS

What is a neural tube defect?
- A neural tube defect is a lesion in which the spine has not yet closed completely posteriorly. Meninges and spinal nerve tissue may bulge through this gap.
- The gap in the spine is known as spina bifida. This may not be visible.
- A meningocoele is when the meninges have bulged out through the gap, so that there is a lump over the midline of the spine. This may be covered by a membrane.
- A meningomyelocoele is when the meninges and spinal nerve tissue have come out in the sac. This often results in paralysis of the lower limbs and involvement of the bladder and bowel. The outflow of cerebrospinal fluid may be blocked so that the baby may also develop hydrocephalus.
- The lesion may be covered with skin, meninges, or be completely open and draining cerebrospinal fluid.

With neural tube defects, the higher the lesion in the spine, the more likely there is to be significant neurological damage.
Clinical features of neural tube defects

- The swelling over the midline of the back
- Poor motor functioning of the lower limbs. Check for deformities and whether the baby is moving the legs normally?
- Poor bladder function. Urine tends to dribble when the bladder is paralysed, and the bladder may be palpable.
- Poor bowel function. Look at the anus. If there is paralysis the tone of the anal muscles will be poor, and meconium may be leaking out.
- Measure, record, and chart the size of the head on a growth chart. Hydrocephalus is commonly associated with neural tube defects.

Management of neural tube defects

- If the lesion is not covered by skin, cover it with sterile “Opsite” or sterile gauze soaked in saline. The purpose of this is to prevent further damage, and to prevent cerebrospinal fluid drainage.
- If there is no neurological deficit, refer the baby urgently to a neurosurgical service.
- All these babies will need to be referred and it is better to do this sooner rather than later. Consult with a neurosurgeon first.
- Measure and record the head circumference weekly, and refer to the neurosurgical service urgently if it is growing.
- Counsel the parents
  - about the plans and probable outcomes for the baby.
  - about the need for planning the next pregnancies and to take folic acid before and during the pregnancy. The mother will need a letter to take to the clinic to get the folic acid when she is planning her next pregnancy.

HYDROCEPHALUS

- A baby’s head normally grows because the brain is growing. If the head grows too rapidly it is usually because there is excessive fluid in or around the brain.
- Hydrocephalus is one of the causes of macrocephaly (a large head, greater than the 97th centile). All babies with macrocephaly need to be referred for assessment and investigation at a level 3 service.
- If the head circumference is increasing rapidly, this means that there is almost certainly hydrocephalus. These babies need to be referred for neurosurgical drainage. Do not delay the referral.

The head circumference of a newborn baby normally increases at about 1 mm / day (0.7 cm / week)
MICROCEPHALY
- This means that the baby has a small head – the head circumference is less than the 3rd centile
- The head does not grow because the brain does not grow. It is often associated with other abnormalities
- They should be investigated for other abnormalities such as congenital infection
- They should be referred for a paediatric assessment (not urgent)
- They usually have varying degrees of developmental delay and mental impairment
- The parents need to be counselled about the condition and prognosis for the baby

MAJOR GASTROINTESTINAL ABNORMALITY
The following lesions need to be treated urgently
- **Omphalocoele:** This is a defect at the base of umbilicus with protrusion of abdominal contents covered by peritoneum. The baby may have other abnormalities.
- **Gastroschisis:** This is a defect usually to the right of the umbilicus with protrusion of the abdominal contents without peritoneal covering.
- **Imperforate anus** There is no clear anal canal on examination. These babies will not be able to pass meconium normally. However: there may be a recto-vaginal fistula in a girl or a recto-urethral fistula in a boy, so that meconium may be seen on the nappy.
- **Congenital bowel obstructions**
  - If this is proximal in the bowel, the baby presents with bile stained vomiting with little abdominal distension.
  - If the lesion is in the distal bowel, the baby will present with abdominal distension and the bile stained vomiting only starts later.
  - In both cases the baby may pass meconium.

Remember: Always look at the baby's anus as part of the newborn examination

Management of major gastrointestinal abnormality
- Cover the open lesions with sterile saline gauze
- Keep the baby nil by mouth
- Pass a nasogastric tube, and leave it open to drain.
- Give IV fluids (neonatalYTE) at the appropriate rate for weight and age.
- Keep the baby warm
- Refer the baby urgently to a paediatric surgical service.

CLUB FOOT
The commonest form is Talipes equinovarus in which the foot is plantar flexed at the ankle, with the sole turned inwards and the fore foot also bent inwards. The opposite deformity sometimes occurs.
It may be the result of the position of the foot in the uterus, a developmental abnormality in the bone or cartilage, a neuromuscular problem or a spinal problem.

Management of club foot
- Assess the baby for possible neuromuscular problems. If these are present the baby needs to be referred to a paediatrician in a level 3 hospital.
- If the baby is otherwise normal refer as soon as possible for orthopaedic correction, usually serial splinting or plaster of Paris casts.
- Delay in referral and starting treatment of these babies may result in the above measures not working and the babies will then need surgical correction.

CLEFT LIP AND PALATE
There is a gap in the lip and/or palate as the result of incomplete closure of the skin, bones and muscles of the face and mouth. The gap may be on one side, both sides, in the midline, and may involve the whole of the palate, mandible and lip, or only some parts. There may be other associated abnormalities, and sometimes it occurs in families.

Management of cleft lip and palate
- Examine the baby carefully to exclude other abnormalities.
- Assist the mother with feeding as these babies do not always feed easily. Sometimes they can breast feed normally.
- The baby needs to be referred to a cleft lip/palate, or maxillo-facial clinic at a level 3 hospital.
- A plate is often fitted to assist the feeding, and the cleft lip is usually closed at about 3 months of age. The palate is usually repaired at about 9 months of age.

LIMB INJURIES
These are often associated with a difficult or assisted delivery of the baby.
- Shoulder dystocia: There may be a fracture of the clavicle, or humerus, or a brachial plexus injury (Erb’s palsy)
- Breech delivery: There may be a fracture of the femur or humerus

Clinical features of limb injuries
- There is an abnormal position of the arm or leg
- The limb does not move well
- There may be pain on movement of the limb

Management of limb injuries
- Counsel the parents
- Handle the baby gently
- X-ray the affected limb if a fracture is suspected
- Exclude congenital syphilis as a cause of the painful limb
- If there is a fracture, treat appropriately. Consult an orthopaedic surgeon if you are not sure.
- If there is a brachial plexus palsy, show the mother how to move the arm gently and review every 2 weeks. The palsy normally recovers spontaneously, but if the arm is not better in 6 weeks, the baby should be referred to an orthopaedic surgeon.
DOWN SYNDROME

This is a chromosome abnormality with an additional chromosome 21: i.e. trisomy 21

Clinical features of Down syndrome
• The baby’s are usually less than 2.8kg at birth
• The baby’s have a characteristic appearance
• The face is rather flat and the eyes slant downwards. The bridge of the nose is quite wide.
• The ears are small and might be low set
• The occiput (back of the head) is rather flat
• The baby has rather low muscle tone – slightly “floppy”
• The hands and feet are short and wide. The hands typically, but not always have a single palmar crease, and the feet a gap between the 1st and 2nd toes

The babies may also have:
• Congenital heart lesions
• Duodenal atresia

Management of Down syndrome
The diagnosis should ideally be confirmed with chromosome analysis or Quatattive Fluorescent (QF) PCR for Aneuploidy, that detects Trisomy 13, 18, 31. If you are certain of the clinical features and the parents are not going to have more children this can be omitted. Chromosomal analysis and QF PCR for Aneuploidy can be done at level 2 and 3 facilities.
• Counsel the parents
• Arrange for a paediatrician and genetic nurse to see the baby and ensure appropriate follow up.

EXTRA DIGITS

This is a common abnormality. There is usually a sixth digit on the hand or foot. It is attached to the fifth digit usually by a thin pedicle. They are often familial.

Management of extra digits
• If the pedicle is thin (less then 1mm), the digit can be tied off tightly close to the finger (while the baby is breastfeeding or has another form of analgesia).
• If the pedicle is not thin, the baby should be referred to a hand or plastic surgery clinic
2.2.8 CONGENITAL SYPHILIS

Congenital Syphilis is a chronic intra-uterine infection caused by the spirochaete *Treponema pallidum*. If the mother has untreated syphilis during pregnancy, the foetus has a 50% chance of becoming infected.

**Congenital syphilis is a notifiable disease**

**LEARNING OBJECTIVES**

In this section you will learn to:
- Recognise the clinical features of congenital syphilis
- Take preventive action by screening and treating women antenatally
- Appropriately manage the baby with congenital syphilis

**CONGENITAL SYPHILIS**

**Prevention**
- All pregnant women must have a syphilis screening test (VDRL, RPR) done at the booking visit.
- If it is positive (titre > 1:4), the mother must be treated for syphilis with 2.4 million units (1.8g) of Benzathine Penicillin IM weekly for 3 weeks
- At delivery, confirm that the mother has been fully treated
- Check the baby for clinical signs of congenital syphilis

A mother is considered to have been fully treated if she has received 2.4 millions units (1.8 gm) of Benzathine Penicillin IM weekly for 3 weeks, and to have completed her treatment more than 1 month before the baby was delivered.

**Clinical features of congenital syphilis**
The affected babies may present with any of the following signs: include
- low birth weight
- blisters and peeling of the palms of the hands and soles of the feet
- hepatosplenomegaly (presents with abdominal distension)
- pallor
- petechiae
- jaundice
- respiratory distress (due to pneumonia)
- profuse nasal discharge (snuffles) This is not common in the newborn baby
- metaphysitis (seen in X-rays of the long bones, especially around the knees)
- a large pale placenta (> a fifth of the weight of the infant)

Some infants who have congenital syphilis may have no clinical signs. However, if untreated, most of these infants will develop signs in a few months.

**Investigations and diagnosis**
- If the infant has clinical signs of congenital syphilis and the mother’s or baby’s RPR is positive, then diagnosis of congenital syphilis is confirmed.
- If the RPR (or VDRL) is negative in the mother or infant then congenital syphilis is excluded.
It is often difficult to confirm a diagnosis of congenital syphilis if the infant appears clinically well at delivery and the X-ray of the long bones is normal. If the mother is untreated or partially treated or treated during the last months of pregnancy, the blood tests for syphilis will be positive in both the mother and infant at delivery. Even if the infant has not been infected, the maternal antibodies (IgG) cross the placenta and results in a positive RPR test in the infant.

**Management of congenital syphilis**

If the infant has clinical syphilis
- Notify
- Admit the baby to the neonatal ward.
- Benzyl Penicillin (Penicillin G) 50,000 units / kg IV 12 hourly for 10 days, OR
  Procaine Penicillin 50,000 units / kg IM for 10 days.

If the baby is asymptomatic and the mother is positive but fully treated
- No treatment is required for the baby.
- If the baby is asymptomatic and the mother is positive but not fully treated
  - Benzathine Penicillin 50,000 units / kg IM, single dose only

If the baby is asymptomatic and the mother’s RPR result is unknown
- Benzathine Penicillin 50,000 units / kg IM, single dose only

See Chart 2.2.8 on p. 45 of the Newborn Care Charts.

Now see Exercise Module 6.2 – and do exercise 2P
2.2.9 **MATERNAL TUBERCULOSIS**

**LEARNING OBJECTIVES**

- Take appropriate action for the baby whose mother has tuberculosis

**MATERNAL TUBERCULOSIS**

**Management of a baby whose mother has tuberculosis**

If the mother has active pulmonary tuberculosis, there is a high chance that she will infect her baby, especially if she is HIV positive.

If the mother has been on TB treatment for less than 2 months before the baby’s birth, or is diagnosed with TB after the baby’s birth
- The baby should receive treatment with 3 drugs for 6 months.
- Give BCG on completion of the treatment.

If the mother has had more than 2 months TB treatment before the birth of the baby
- The baby should get 6 months treatment with INH 5mg/kg daily.
- Give BCG on completion of the treatment.
- Re-evaluate the baby at the age of 6 weeks. Check the weight gain, and take a chest X-ray.

If the mother has TB and is also HIV positive
- Treat the baby with 3 TB drugs for 6 months
- Give BCG after completion of the treatment.

**Important note on maternal tuberculosis**

If the baby’s mother has active pulmonary TB:
- Do not give BCG at birth. If the BCG has already been given, repeat the BCG 2 weeks after the baby has completed his treatment
- Advise the mother about how to prevent TB infection in her baby.
- Investigate close family members for TB.
2.2.10 HIV AFFECTED MOTHERS AND BABIES

HIV infection among children is increasing, and in South Africa it is now one of the main underlying causes of childhood death. In most cases, children acquire the infection from their mother, before, during, or after delivery through breastfeeding. This is called Mother–to-Child transmission (MTCT) of HIV.

The South African Department of Health National Sero-prevalence Survey conducted in 2008 showed that an estimated 29.3% of pregnant women were HIV positive across South Africa. The high rate of pregnant women with HIV indicates that a very high number of children could be infected as well.

LEARNING OBJECTIVES

In this section you will learn to:

• Understand the importance of knowing the HIV status of the mother
• Describe ART regimen for both mother and baby
• Understand the infant feeding choices for HIV positive mothers
• Discuss the follow up plans of affected babies

PRINCIPLES OF PREVENTING HIV TRANSMISSION TO INFANTS

How do babies get infected with HIV?

• In the uterus: the virus crosses the placenta, so that the baby is already infected when he / she is born.
• During delivery: the baby is usually infected from contact with maternal secretions in the birth canal.
• After birth: the baby becomes infected by drinking breast milk

What must we know in order to reduce the number of babies who get infected?

• The HIV status of the mother: It is only possible to help both the mother and baby if it is known whether or not the mother is infected.
• The CD4 cell count, if the mother is HIV positive: The chance of a mother passing on the infection to her baby is greatly increased if she has a lot of virus in her body (a high viral load). A low CD4 count is an indicator that she has a lot of virus in her tissues. If there is a lot of virus in her tissues, the risk of transmission is much higher in labour, during delivery and through breast milk.

How can we reduce the transmission of virus to the baby?

• Anti-retroviral drugs for the mother: When we know that the mother has a high viral load (low CD4 count), she should be given drugs that will reduce the amount of virus in her tissues, and therefore reduce the risk of transmission to the fetus, during delivery and also through her breast milk. We usually refer to this treatment as HAART. Highly active anti-retroviral treatment (HAART) consists of a combination of three drugs that the mother will take for life. HAART greatly reduces the risk of the mother dying and reduces the risk of the infant becoming infected to well below 5%. Women who have a CD4 count less than 350 need to be urgently commenced on HAART. Other HIV positive women are currently given dual therapy to prevent transmission to the baby. Ensure that you keep up to date with the latest guidelines.
• Anti-retroviral drugs for the baby: When the mother is known to be HIV positive, giving the newborn baby anti-retroviral drugs after delivery can help to reduce the risk of becoming infected during the birth process. Antiretrovirals especially
Nevirapine can also be continued for the duration of breast. Check the latest version of your PMTCT guideline.

- Avoid exposure of the fetus to prolonged rupture of the membranes: If there is prelabour rupture of the membranes, the intrauterine cavity is exposed to the organisms in the vagina, and HIV may also contaminate the amniotic fluid.

- Appropriate feeding method for the baby
  - If the baby does not breast feed, he/she cannot become infected as the result of HIV contaminated breast milk.
  - However, the risk of not breast feeding in a poor rural community is that many babies will die as the result of gastroenteritis, pneumonia and malnutrition.
  - In these circumstances the mortality risk of not breast feeding is higher than that for becoming HIV positive from breast milk.
  - It is possible to pasteurise breast milk at home to make it safe for the baby, but this can be quite a time consuming process.
  - Reducing the viral load in the mother by giving her antiretroviral drugs will reduce the chance of the baby becoming infected through breast feeding

- Exclusive breast feeding: This reduces the transmission of the virus to the fetus through the gut, compared with mixed feeding.

!! All mothers must be offered HIV counselling and testing twice during antenatal care and must have a CD4 Count if positive.!!

**POST EXPOSURE PROPYLAXIS FOR NEWBORN**

Check your latest guideline to determine what post-exposure prophylaxis you need. This may change as guidelines are updated.

If the mother has received less than 4 weeks of AZT, or less than 4 weeks of triple therapy, or only nevirapine

- Administer AZT orally 12 hourly for 4 weeks
- Administer a stat dose of nevirapine to the baby

**Anti-retroviral drug doses for post-exposure prophylaxis in newborns**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Weight</th>
<th>Dose</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVP syrup</td>
<td>&gt; 2 kg</td>
<td>0.6ml (6mg) stat</td>
<td>To be administered as soon as possible after birth</td>
</tr>
<tr>
<td>(10mg / ml)</td>
<td>&lt; 2 kg</td>
<td>0.2ml / kg stat (2mg / kg)</td>
<td></td>
</tr>
<tr>
<td>AZT syrup</td>
<td>&gt; 2 kg</td>
<td>1.2ml bd (12mg bd)</td>
<td>For 1 week, if mother received 28 days of AZT or HAART, otherwise for 4 weeks. Administered with a 2 ml syringe</td>
</tr>
<tr>
<td>(10mg / ml)</td>
<td>&lt; 2 kg</td>
<td>0.2ml / kg bd (2mg / kg bd)</td>
<td></td>
</tr>
</tbody>
</table>
HIV TESTING FOR BABIES

Babies can be tested to see if they have been infected with the HIV virus. The test that is used is an HIV DNA PCR test that test for the presence of the HIV virus in the blood. The HIV rapid test and HIV ELISA test will check for the presence of the HIV antibodies. As the mothers antibodies are found in the baby's blood for up to 18 months, we cannot use these antibody tests to confirm HIV infection in the baby.

The HIV DNA PCR test can detect HIV transmission in the infant 3 – 4 weeks after the transmission has occurred. The HIV DNA PCR test is routinely done at 6 weeks in all HIV exposed infants, as this is a suitable time as it coincides with the 6 week child health visit.

If the newborn is still in the Neonatal Unit at 4 weeks, the HIV DNA PCR test can be routinely done at 4 weeks, and the result obtained before the infant is discharged.

If the newborn is ill and HIV exposed a HIV DNA PCR test should be done at any point.

Interpreting the HIV DNA PCR test result.

A positive result: HIV DNA PCR test is a very sensitive and specific test, so if the result is positive this means that the infant is HIV Positive. However as there as occasionally errors, most often due to specimen labelling and handling, if the infant has a positive PCR test, this should immediately be confirmed with a HIV Viral Load. All infants who are HIV positive should be urgently initiated on HAART.

A negative result: If the HIV DNA PCR result is negative, the infant can be considered to be negative unless he is still breastfeeding, or if the test was performed before 4 weeks of age. If the test was performed before 4 weeks of age or in a breastfed infant, repeat the PCR test 6 weeks after breastfeeding has been discontinued.

If the HIV DNA PCR result was negative but the baby is showing signs of HIV, repeat the test. As mentioned above, the test is reliable but errors are possible.

INFANT FEEDING CHOICES FOR HIV POSITIVE MOTHERS

Feeding options

There are two suitable options for HIV positive mothers:

- Exclusive breastfeeding
- Exclusive replacement feeding

However, in South Africa many, if not all, mothers will not be able to use an exclusive feeding method because of cultural issues.

Exclusive breastfeeding gives the baby the best possible nutrition and protection from infection and disease. If the mother understands that exclusive breastfeeding gives the best chances of good growth and development, she may be more willing to breastfeed exclusively. She may be more motivated to breastfeed to give her infant a good start, in spite of social or personal reasons that make exclusive breastfeeding difficult. In poor, usually rural communities, giving babies replacement milk increases the risk of illnesses, such as gastroenteritis, pneumonia and malnutrition. (IMCI YOUNG INFANT MANUAL 2009)

Breast milk contains small amount of HIV. The chances of transmitting HIV through breastfeeding depends on:-

- The viral load of the mother
• Recent infection
• The duration of breastfeeding
• Conditions of the breast such as cracked nipples or mastitis
• The condition of the baby’s mouth, such as thrush
• Mixed feeding
• Prolonged breastfeeding after 6 months. The longer the breast feeding, the greater the chance of transmitting infection

Evidence suggests that mixed feeding (breast with other food or drinks) leads to higher infection rates with HIV. This may be because the other food or drinks lead to inflammation in the infants intestines and an easy path for the virus to enter the body. Many mothers give mixed feeding from an early age, because it is commonly believed that the breast milk is not sufficient and other foods or drinks are needed, or because the mother is not with the infant in all the time.

Feeding choice
• Counsel the mother about the issues around feeding a baby when she is HIV positive
• Ask the mother about her feeding choice
• Support the mother’s feeding choice, either exclusive breastfeeding or exclusive replacement feeding.
• If the mother is undecided about the method of feeding her baby then make sure that she knows what the issues are and give her time to think about it.
• It is important, if possible, to get grandmothers involved, as they are often the decision makers with regard to infant feeding in the home environment.
• Check the mother’s health. Is she on HAART, when last was her CD4 count checked, does she have TB, does she meet the requirement for HAART for herself. If the mother is on HAART the chance of transmission is less. The baby can also be given Nevirapine until the mother’s viral load has been reduced???

‘SAFEST’ FEEDING CHOICES FOR AN HIV POSITIVE MOTHER

Exclusive breast feeding
If a woman does breastfeed, it is important for her to breastfeed exclusively.
• Exclusive breastfeeding builds up the intestinal mucosa of babies, thus decreasing the risk of mother-to-child transmission of HIV.
• Exclusive breastfeeding reduces the chances of breast problems e.g. mastitis, thus preventing the accumulation of HIV in the breast milk.
• If a women exclusively breast feeds for 6 months, the risk of transmission of the virus to her baby is 5%, or 1 in 20.

Other ways to reduce the chances of passing the virus through breastfeeding are:
• Exclusive breastfeeding for 4 - 6 months followed by a period of safe transition onto replacement milk and complementary feeds
• Expressing and heat treating (pasteurising) all breast milk
• If the mother takes anti-retroviral drugs, she will probably have a reduced viral load and therefore a reduced risk of transmitting the disease through her breast milk.

Exclusive replacement feeding
The mother may have chosen to give exclusive replacement feeding. The advantage of this is that she will not transmit the HI virus to the baby if she gives no breast milk.
However, there are other risks of replacement feeding e.g. increased severity and frequency of diarrhoea and respiratory infections.

**Important information about replacement feeding**

Exclusive replacement feeding will eliminate the possibility of the baby becoming HIV positive through breast feeding.

However, in poor, especially rural communities, the mortality rate for infants of HIV positive mothers who are fed with replacement feeds **is 5 times higher** than in infants who are breast fed normally.

**COTRIMOXAZOLE PROPHYLAXIS**

Pneumocystis jerovecci pneumonia (PJP) is a common cause of mortality in HIV infected infants from 6 weeks to 6 months of age.

Commence all HIV exposed infants on prophylactic cotrimoxazole from the age of 6 weeks. If the HIV DNA PCR is negative at 8 weeks and the infant is not breast fed the cotrimoxazole can be discontinued.

**ANTIRETROVIRAL TREATMENT**

Babies who are HIV positive, confirmed on HIV DNA PCR and Viral Load need to have HAART urgently initiated. Consult the Paediatric HIV treatment guidelines for assistance on how to do this. A newborn known to be HIV infected should not be discharged before HAART is initiated.
MODULE 3:

ASSESS FEEDING AND COUNSEL

SICK & SMALL NEWBORNS

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INTRODUCTION

If the baby is well; there is no need for resuscitation; and no priority signs are evident; then support the mother to commence breast feeding or feeds within an hour of birth.

Feeding in sick and small babies may have to be delayed to attend to their immediate problems. If the mother is HIV positive, give feeding advice and support her choice of feeding. If the mother needs ARV treatment for her own health, ensure she gets treatment as this will also prevent transmission in the baby. The baby may be on prophylaxis.

Assess feeding after the mother has commenced feeding. Sick and small infants may not be able to feed immediately. Assist with feeding and assess feeding when they are ready. Guidelines on how to feed sick and small infants are found in section 2.1.4.

When assessing feeding you will also assess growth. Good growth is an indication of good feeding and likewise poor growth is an indication that feeding may not be going well.

There are three different charts to use to assess feeding. Choose the appropriate chart to use to assess feeding.

- Assess feeding in the breastfed infant
- Assess feeding in the infant on replacement feeding
- Assess feeding and weight gain in the low birth weight baby

Mothers and families of babies in your care will also require support and counselling on the types of feeding and feeding problems. They will also need to know what to look out for should the baby have a problem, and also when to return with the baby for follow-up.

Counselling skills are also needed to support the mother and family if the baby has a problem or abnormality, and particularly if they are dealing with grief over the tragic loss of a baby.

OBJECTIVES

At the end of the module you will be able to

- Assess feeding in babies who are breastfed
- Assess feeding in babies who are receiving replacement feeding
- Assess feeding and weight gain in low birth weight babies
- Understand the principles of counselling and provide helpful counselling support to mothers and families of babies in your care
- Provide helpful guidance to mothers on breastfeeding, positioning and cup-feeding
- Provide helpful guidance to mothers using replacement feeding for their babies
- Counsel and provide clear information when to return the baby immediately to a healthcare facility and for follow up
3.1 ASSESS FEEDING IN THE BREASTFED BABY

Refer to the chart on pg 5 in the Newborn Care Chart booklet to guide the assessment of feeding in the infant who is being breastfed. This will apply to the following infants:

- Babies of mothers who are HIV negative
- Babies of mothers who are HIV positive and have decided to breastfeed their infants.
- Babies of mothers whose HIV status is unknown

The baby may be in the postnatal ward, or may be coming from home. The baby may also be in the neonatal unit and may have stabilised enough to commence breastfeeding.

It is important to assess breastfeeding with each feed, until feeding is going well, and again to assess feeding before the baby is discharged.

ADVANTAGES OF BREASTFEEDING

The best way to feed a baby is to breastfeed exclusively. Exclusive breastfeeding means that the infant takes only breast milk, and no additional food, water or other fluids (prescribed medicines and vitamins are exceptions).

Exclusive breastfeeding gives a newborn’s the best possible nutrition and protection from infection and disease. It is never necessary to give water to a breastfed baby even in hot weather (unless the baby has diarrhoea with some dehydration).

The following diagram is taken from a study that showed the increase in mortality if any other foods or fluids were given to a young infant. It showed that if formula milk was added to the diet in a breastfed infant the baby was 4.5 times more likely to die than an exclusively breastfed infant. Even worse is that an infant fed on formula alone was 16 times more likely to die than an exclusively breastfed infant. This is the reason for strongly advising breastfeeding mothers that the infant should be given breast milk only. Giving infants only other milks increase the risk of illness in the infant.

![Relative Risk of Death Diagram](CG Victoria et al, Brazil, Lancet 8/8/87)
ASSESS BREASTFEEDING – ASK, CHECK, RECORD

If you are assessing the baby for the first time ASK the mother the following questions

How is breastfeeding going? Open questions allow the mother to express her concerns. Let the mother tell you in her own words how feeding is going. You may have to ask her if there is any difficulty feeding. Any difficulty mentioned by the mother is important. The mother may need counselling or specific help with a difficulty. She may report that her infant feeds too frequently or not frequently enough. She may say that she does not have enough milk, her nipples are sore or she has flat inverted nipples & the infant does not want to take the breast. If a mother says that the infant is not able to feed, or mentions any difficulty with feeding assess breastfeeding or watch her try to feed the infant with a cup to see what she means by this. An infant who is not able to feed should be referred urgently to doctor.

How many times in 24 hours do you breastfeed? The recommendation is that the babies be breastfed as often & for as long as the baby wants, day & night. This should be 8 or more times in 24 hours.

Does your baby get any other food or drink? A baby should be exclusively breastfed. (It is especially important if the mother is HIV positive for breastfeeding to be exclusive.) Find out if the baby is receiving any other foods or drinks such as other milk, juice, tea, thin porridge, dilute cereal, or even water. Ask how often he receives it & the amount.

Has the baby fed in the last hour? If the baby has not fed in the last hour, you can assess breastfeeding now. You may have to wake the baby. If baby has fed in the last hour, wait until baby is ready to feed again.

ASSESS WEIGHT GAIN

What is the baby’s weight, and has s/he been gaining satisfactorily?

<table>
<thead>
<tr>
<th>Normal growth in a newborn baby</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Less than 10% weight loss after birth</td>
</tr>
<tr>
<td>• Weight gain of at least 10g / kg / day</td>
</tr>
</tbody>
</table>

If the baby is less than 10 days old, the following questions should be asked:

• Has the baby lost more than expected weight? (more than to 10% of birth weight).
• Has the baby regained birth weight at 10 days? Term babies usually regain birth weight after a few days.
• Is the baby gaining sufficient weight? Plot the baby’s weight on the fetal-infant growth chart or on the Road to Health chart and see if baby is gaining weight. A term baby should gain approximately 20g / kg / day.
• Use Chart 3.3 on p.52-53 in the Newborn Care Chart booklet to Assess feeding and weight gain in Low Birth weight babies)
Document the findings of your feeding assessment on the Feeding Assessment Recording Form below.

**ASSESS FEEDING: Breastfeeding**

Observe the breastfeed for four minutes, check attachment:

- Chin touching breast  □ yes □ no
- Mouth wide open  □ yes □ no
- Lower lip turned out  □ yes □ no
- More areola above than below the mouth  □ yes □ no
- not attached  □ no
- not well attached  □ no
- good attachment  □ yes

Is the young infant suckling effectively (that is, slow deep sucks, sometimes pausing)?
- not sucking at all  □ no
- not suckling effectively  □ no
- suckling effectively  □ yes

Thrush present?
- yes □ no

Replacement feeding

If an HIV positive mother has chosen not to breastfeed

assess replacement feeding:

Which breastmilk substitute?

Assess weight gain every week in a low birth weight baby

**ASSESS WEIGHT GAIN IN LOW BIRTH WEIGHT**

Weigh and plot weight daily
Establish daily and weekly weight gain

Weight loss in first 7 days
- < than 10% of body weight □ yes □ no
- > than 10% of body weight □ no
- Birth weight regained in 14 days □ yes □ no

Weight gain
- > 5g/kg/ day over last few days

**BABIES**

Evaluate reasons for poor weight gain if present
- Inadequate feed volume □ yes □ no
- Inadequate heating or KMC □ yes □ no
- < 1.5kg – breastfeeding □ no
- < 1.2kg cup fed □ yes □ no
- Baby unwell □ no

**ASSESS FOR POSSIBLE FEEDING PROBLEM – LOOK, LISTEN, FEEL FOR SIGNS**

If the baby has not fed in the last hour, ask the mom to put the baby to the breast and observe baby feeding. You will assess or check, if baby is able to attach, positioning and check if baby is sucking well.

Is baby able to attach?
- Good attachment
- Not well attached
- Not attached at all

(i) Good attachment

The four signs of good attachment are:

1. Chin touching breast
2. Mouth wide open
3. Lower lip turned outward
4. More areola visible above than below the mouth

If all of these four signs are present the infant has **good attachment**.

**GOOD ATTACHMENT**

**POOR ATTACHMENT**

**Signs of good attachment:**
- More areola above baby’s mouth
- Mouth wide open
- Lower lip turned outwards
- Chin touching breast
- Slow, deep sucks and swallowing sounds

**Signs of poor attachment:**
- Baby sucking on the nipple, not the areola
- Rapid shallow sucks
- Smacking or clicking sounds
- Cheeks drawn in
- Chin not touching breast
(ii) Not well attached
If attachment is not good, you may see:
1. Chin not touching breast
2. Mouth not wide open, lips pushed forward
3. Lower lip turned in, or
4. More areola (or equal amount) visible below infant's mouth than above it
If you see any of these signs of poor attachment, the infant is not well attached. If a baby is not well attached, the result may be pain and damage to the nipples. Or the baby may not remove breast milk effectively, which may cause engorgement of the breast. The infant may be unsatisfied after breastfeeds and want to feed very often or for a very long time. The baby may get too little milk and not gain weight, or the breast milk may dry up. All these problems may improve if attachment can be improved. If breastfeeding is in any way painful or uncomfortable for the mother, less milk will be formed. Furthermore, the milk that is formed does not flow well, because the let-down reflex is not functioning effectively.

(iii) Not attached at all
If a very sick baby cannot take the nipple into his mouth and keep it there to suck, he has no attachment at all. He is not able to breastfeed at all.

Is the baby well positioned?
If the baby is not well attached then check the positioning.

CHECKING POSITIONING
- Is the mother supporting the whole body?
- Is the baby facing her breast?
- Is the nose opposite her nipple?
- Is the infant's head and body straight?

Is the baby suckling effectively? (slow deep sucks, sometimes pausing)
- Not at all
- Not suckling effectively
- Suckling effectively

(i) Sucking effectively
The infant is suckling effectively if he suckles with slow deep sucks and sometimes pauses. You may see or hear the infant swallowing. If you can observe how the breastfeed finishes, look for signs that the infant is satisfied. If satisfied, the infant releases the breast spontaneously (that is, the mother does not stop the infant from breastfeeding in any way). The infant appears relaxed, sleepy, and loses interest in the breast.

(ii) Not sucking effectively
An infant is not suckling effectively if he is taking only rapid, shallow sucks. You may also see indrawing of the cheeks. You do not see or hear swallowing. The infant is not satisfied at the end of the feed, and may be restless. He may cry or try to suckle again, or continue to breastfeed for a long time.

(iii) Not sucking at all
An infant who is not suckling at all is not able to suck breast milk into his mouth and swallow. Therefore he is not able to breastfeed at all.
If a blocked nose seems to interfere with breastfeeding, clear the infant's nose by instilling a few drops of saline. Then check whether the infant can suckle more effectively.

Look for ulcers or white patches in the mouth at the tongue and inside of the cheek. This is thrush and looks like milk curds on the inside of the cheek, or a thick white coating of the tongue. Try to wipe the white off. The white patches of thrush will remain or come off leaving red areas in place of the thrush.

**CLASSIFY BREASTFEEDING**

Use the questions and signs you have elicited to classify feeding and growth. The following table (from p. 50 of Newborn Care Chart booklet) demonstrates the classification for breastfeeding.

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Not able to feed or No attachment at all or Not suckling at all</td>
<td>NOT ABLE TO FEED</td>
<td>• Treat for serious acute infection or severe disease</td>
</tr>
<tr>
<td>•</td>
<td></td>
<td>• If the baby is &lt; 3 days old and no risk factors for sepsis, treat for encephalopathy</td>
</tr>
<tr>
<td>• Not well attached to the breast or Not suckling effectively or Feeding &lt; 8 times in 24 hours or Baby receiving other foods or fluids, e.g. formula milk or water as well as breast milk</td>
<td>FEEDING PROBLEM</td>
<td>• Teach the correct positioning</td>
</tr>
<tr>
<td>•</td>
<td></td>
<td>• Assess the mother for breast problems</td>
</tr>
<tr>
<td>•</td>
<td></td>
<td>• Counsel the mother to breastfeed on demand and at least 8 times in 24 hours</td>
</tr>
<tr>
<td>•</td>
<td></td>
<td>• Counsel the mother to exclusively breastfeed</td>
</tr>
<tr>
<td>• Poor weight gain</td>
<td>POOR GROWTH</td>
<td>• Encourage exclusive breastfeeding on demand</td>
</tr>
<tr>
<td>•</td>
<td></td>
<td>• Exclude sepsis</td>
</tr>
<tr>
<td>• Good weight gain</td>
<td>GROWING WELL</td>
<td>• Encourage the mother to continue exclusive breastfeeding</td>
</tr>
</tbody>
</table>

(i) **Not able to feed**

The baby is classified as not able to feed if:
- He /she is not able to feed,
- He / she is not attached at all
- He / she is not suckling at all

The baby who is not able to feed, is rarely not able to swallow. This is uncommon and may be the result of a severe neurological problem. These babies will also not be able to cup feed, and will need nasogastric tube feeds.

Also classify the baby as severe disease in the initial assessment of the newborn (under Assess and Classify on p. 13 in Module 1 and p. 7 in Newborn Care Chart booklet) and treat the baby for **severe disease**.
- Check the baby’s blood glucose level.
- Commence an IV infusion at the correct rate for age and weight.
- Rewarm the baby if he is cold and keep the baby warm. The baby’s temperature may be kept low if neonatal encephalopathy is suspected (Chart booklet p. 37).
- Give oxygen if the baby’s blood oxygen saturation is low
- Start antibiotics if infection is suspected or there is a risk factor.
- Do and record hourly observations on the baby
(ii) Feeding problem

The baby is classified as having a feeding problem if she is not well attached, is not sucking effectively, is feeding less than 8 times in 24 hours and is receiving other feeds or fluids. The feeding problem may be due to one of the following problems.

The baby may not be attaching well to the breast
- Look carefully to see how the baby is attaching and advise and help the mother if necessary

The baby may not be suckling well
- Check to see how the baby is suckling. Sometimes the baby suckles well for a short time and then stops. The baby seems “to get tired”. This occurs particularly when the baby has been ill and is just starting to suckle again, and when a preterm baby is starting to suckle.

The baby may not be getting frequent enough feeds.
- Preterm babies need to get feeds at least 3 hourly (8 feeds in 24 hours), day and night.
- Mothers do not always give 3 hourly feeds at night, so that the baby may not get sufficient milk over the 24 hours.

The baby may be getting feeds other than breast milk, such as porridge.
- Remember that for the first 6 months of life a baby only needs breast milk. All other types of feed are unnecessary. Babies grow best on breast milk feeds.
- Sometimes the mother gives water feeds. This is wrong, as it is only fluid and has no nutritional value.

The baby may have a problem in the mouth, such as oral thrush which should be treated. Refer babies who have congenital abnormalities of the mouth such as a cleft palate.

The mother may have a problem with her breasts, such as:
- Engorged breasts. The nipples are often flat when this happens
- Sore or cracked nipple
- Mastitis or a breast abscess
- Occasionally the mother does not produce enough milk

Act now
- Help the mother to position the baby correctly so that the baby can attach well to the breast. If the baby is not suckling well, it may be necessary to add some cup feeds until the suckling improves.
- Ensure that the baby is getting the correct number of feeds. Pay particular attention to night feeds.
- If the baby has thrush, treat it. If the baby has a cleft palate, he may be able to breast feed, but some of these babies need to be fed by nasogastric tube.
- If the mother has a breast problem manage it appropriately.
- If the mother is not producing sufficient milk, ensure that she is drinking sufficient fluids, especially in hot weather. Insufficient fluid intake is a common reason for the mother being unable to produce sufficient milk. Allow the baby to suckle frequently. The more the baby suckles, the more milk the mother will produce. Very occasionally, it may be necessary to use drugs, but this seldom helps.
(iii) Poor growth
A baby should be classified as poor growth, if the baby is has:
- Loss of weight of after birth of more than 10% of birth weight
- Weight gain of less than 10g / kg / day
There may be several reasons for poor growth, and thus feeding and factors need to be considered and managed appropriately.

Feeds: The best way to assess whether or not the baby is getting enough feed is to assess the growth. A baby who is not getting sufficient milk will not grow properly.

Infections: If the baby has an infection, even if he is getting sufficient feeds, he may not grow well. If a baby is not gaining weight well and there is not a feeding problem, always look for an infection. Urinary tract infections may have no symptoms, other than the baby not gaining weight.

Warmth: Babies will not grow well if they are not kept warm. Small babies in Kangaroo Mother Care (KMC) must be kept in the KMC position all the time in order to ensure that they have a normal temperature.

(iv) Growing well
Normal growth, as described above is:
- Weight loss after birth of less than 10%
- Weight gain of at least 10g / kg / day
If a baby is growing well, he will be getting enough milk. The mother should be praised and encouraged to continue breastfeeding. The baby’s feeds should still be assessed and any problems with breastfeeding should be identified early.
3.2 ASSESS FEEDING IN BABY RECEIVING REPLACEMENT MILK

Assess feeding in the baby whose mother has decided on replacement feeding. Replacement feeding is only advised if the mother is HIV positive and the mother has decided on replacement feeding. For replacement feeding to be successful the mother must have access to enough formula milk, have electricity and water to boil and clean the utensils and a fridge to store the milk. She also needs the support from her family to give replacement feeds and not feel obliged to also breastfeed.

FEEDING CHOICES IN WOMEN WITH HIV- INFECTION

**Breast milk**

Breast milk can contain small amounts of HIV & approximately 5 - 15% of babies who are given breast milk & other fluids or foods by HIV positive women can become HIV positive through breast feeding. The chances of transmitting HIV from breastfeeding depends on:

- How much HIV is in the mother’s body (viral load)
- Recent new HIV infection
- How long she breast feeds
- Conditions of the breast (such as cracked nipples)
- Conditions in the baby’s mouth (sores, infection)
- Exclusive or mixed feeding

However if the mother is on triple antiretroviral treatment and her viral load is less than 1000 copies/ml the risk of HIV transmission through breastfeeding is very low.

Evidence suggests that mixed feeding (breast with other food or drinks) leads to higher infection rates. This may be because the other food or drinks lead to inflammation in the infant’s intestines - and an easy path for the virus to enter the body. Many women give mixed feeding from an early age, because it is commonly believed that the breast milk is not sufficient and other foods or fluids are needed, or because the mother is not with the infant all the time.

Exclusive breastfeeding builds up the intestinal mucosa of babies, thus decreasing the risk of mother-to-child transmission of HIV. Exclusive breastfeeding reduces the chances of breast problems e.g. mastitis, thus preventing the accumulation of HIV in the breast milk. If a women exclusively breastfeeds for 6 months the risk of transmission of the virus to her baby is 5% or 1 in 20.

Other ways to reduce the chances of passing the virus through breastfeeding are:

- Ensuring that the mother is on HAART if she has a CD4 count less than 350. This will decrease the transmission rate to 1 – 2%
- Giving ARV treatment to the baby for the duration of breastfeeding.
- Exclusive breastfeeding for 6 months
- Expressing and heat treating all breast milk

**Replacement milk**

The advantage of replacement feeding is that she will not transmit the HIV virus to the baby if she gives him no breast milk. Replacement feeding has a number of disadvantages. These include:

- Increased frequency and severity of diarrhoea and respiratory infections. In many situations the risk of illness and death from not breastfeeding is greater than the risk of HIV infection through breastfeeding
- Increased risk of persistent diarrhoea
- Increased risk of malnutrition
ASSESS REPLACEMENT FEEDING – ASK, CHECK, RECORD

The baby’s feeding should be assessed on the following occasions:

- On admission, unless the admission is an emergency, in which case this information can be asked for when the baby’s condition has been stabilised.
- Daily, when assessing the baby
- Before discharge
- At every follow up visit

If you are assessing the baby for the first time ASK the mother the following questions

**How is feeding going?** Start with an open ended question to allow the mother to express in her own words any problems she may be experiencing.

**What milk is being used to feed the baby?** Determine what milk is being used to feed the baby, and if this is sage/

**How many times during the day and night do you feed the baby?** Remember to ask about how many feeds are given during the night, and how much the baby is getting. Compare this with the recommended volumes on pg 57 in the Newborn Care Charts and determine if the infant is getting sufficient milk.

**How are the feeds being prepared?** Let the baby’s mother demonstrate and explain how she prepares the feeds. Determine whether they are being prepared correctly and hygienically.

**Is the baby given replacement feeds exclusively, or is the baby also being given some breast milk?** When the mother is HIV positive, the ideal is to either exclusively breast feed or give exclusive replacement feeds.

**How is the milk being given? (Cup or Bottle?)** From a hygienic point of view it is better to use a cup to feed the baby, but it is difficult to overcome the “tradition” of using bottles. Cups are much easier to clean properly the bottles.

How are the the bottle / utensils cleaned and stored? If possible, let the mother demonstrate how she does this.

ASSESS FOR POSSIBLE FEEDING PROBLEM – LOOK, LISTEN, FEEL FOR SIGNS

**Watch the baby during feeding**

If the baby is not sucking at all, or not taking cup feeds, he has a severe illness or a severe infection.

**Look at the baby’s mouth**

- There may be an infection such as thrush
- There may be a cleft palate
- The nose may be blocked with secretions. These can be wiped away and saline drops put in the nose before each feed.

**Check the baby’s weight gain**

<table>
<thead>
<tr>
<th>Normal growth in a newborn baby</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10% weight loss after birth</td>
</tr>
<tr>
<td>Weight gain of at least 10g / kg / day</td>
</tr>
</tbody>
</table>
CLASSIFY REPLACEMENT FEEDING

Use the questions and signs you have elicited to classify feeding and growth. The following table (from p. 51 of Newborn Care Chart booklet) demonstrates the classification for feeding.

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Not able to suck / feed</td>
<td>NOT ABLE TO FEED</td>
<td>• Treat for serious acute infection or severe disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If the baby is &lt; 3 days old and no risk factors for sepsis, treat for asphyxia</td>
</tr>
<tr>
<td>• Milk incorrectly or unhygienically prepared or</td>
<td>FEEDING PROBLEM</td>
<td>• Counsel the mother appropriately (p. 56, 57 in Chart booklet)</td>
</tr>
<tr>
<td>• Giving inappropriate replacement milk or other foods / fluids or</td>
<td></td>
<td>• Check the feeding volumes</td>
</tr>
<tr>
<td>• Giving insufficient amounts of milk or</td>
<td></td>
<td>• Check that the feed is being correctly prepared</td>
</tr>
<tr>
<td>• Mixing breast milk and replacement milk or</td>
<td></td>
<td>• Check if the mother is doing KMC (p.14) and assess feeding and weight gain in</td>
</tr>
<tr>
<td>• Thrush</td>
<td></td>
<td>• LBW babies (p. 52, 53 in Chart booklet)</td>
</tr>
<tr>
<td>• Poor weight gain</td>
<td>POOR GROWTH</td>
<td>• Encourage the mother to continue feeding</td>
</tr>
<tr>
<td>• Good weight gain</td>
<td>GROWING WELL</td>
<td></td>
</tr>
</tbody>
</table>

(i) **Not able to feed**

The baby who is not able to feed may have a severe disease. Classify the baby as severe disease in the initial assessment of the newborn (under Assess and Classify on p. 13 in Module 1 and p. 7 in Newborn Care Chart booklet) and treat the baby for **severe disease** as for the breastfed baby above.

(ii) **Feeding problem**

A feeding problem is present when

- The milk is incorrectly or unhygienically prepared
- Inappropriate replacement milk or other foods or fluids are given
- Insufficient amounts of feeds are given
- The infant has thrush.

When there is a feeding problem, review the safe preparation of formula milk with the mother and the amount of replacement feed to be given (p. 56-57 in Chart booklet).

- Teach the mother how to how to clean and sterilise the equipment properly
- The mother needs to know make and give the correct amount of feed
- Ensure that the mother knows that it is necessary to feed the baby at least 3 hourly even at night
- Teach the mother the correct powder to water ratio when making up the feeds
- Ensure that the mother knows and understand that only milk is needed by the baby for the first 6 months of life

If the baby has a problem in the mouth, treat any local lesions or infections such as thrush. Refer babies who have congenital abnormalities of the mouth such as a cleft palate. Sometimes these babies are fitted with a plate which enables them to suckle.
(iii) Poor growth
As for breastfed babies, a baby should be classified as poor growth, if the baby has:

- Loss of weight of after birth of more than 10% of birth weight
- Weight gain of less than 10g / kg / day

There may be several reasons for poor growth, and thus feeding and factors need to be considered and managed appropriately.

Feeds: The best way to assess whether or not the baby is getting enough feed is to assess the growth. A baby who is not getting sufficient milk will not grow properly.

Infections: If the baby has an infection, even if he is getting sufficient feeds, he may not grow well. If a baby is not gaining weight well and there is not a feeding problem, always look for an infection. Urinary tract infections may have no symptoms, other than the baby not gaining weight.

Warmth: Babies will not grow well if they are not kept warm. Small babies in Kangaroo Mother Care (KMC) must be kept in the KMC position all the time in order to ensure that they have a normal temperature.

(iv) Growing well
Normal growth, as described above is:

- Weight loss after birth of less than 10%
- Weight gain of at least 10g / kg / day

If a baby is growing well, he will be getting enough milk. The mother should be praised and encouraged to feeding. The preparation of baby’s replacement feeds and cleansing of bottles and utensils should still be assessed and any problems with feeding should be identified early.
ASSESS FEEDING AND WEIGHT GAIN IN LOW BIRTH WEIGHT BABIES

ASSESS WEIGHT GAIN – ASK, CHECK, RECORD

Weigh babies every day. Plot the daily weight of the baby on the “Weight, feeding and treatment chart” and calculate the weight gain or loss for the day and every week. Use an infant scale that can measure 10g weight intervals or less. A scale which measures in 50g intervals is not suitable for use with preterm infants or in a KMC unit.

All babies normally lose weight in the first week after birth. This is due to:
• an excess amount of fluid in the body at birth
• coping with the increased metabolic demands of extrauterine life

It is considered normal for a newborn baby to lose 10 % of his / her body weight in the first 7 – 10 days of life. This means that a baby who weighs 1000g at birth can be expected to lose about 100 g in the first 7 – 10 days. This baby could then weigh as little as 900g on day 10.

Low birth weight babies usually regain their birth weight by 14 days. This means that after two weeks a low birth weight baby might only weigh the same as he did at birth.

**EXPECTED WEIGHT LOSS AND WEIGHT GAIN IN LOW BIRTH WEIGHT BABIES**

<table>
<thead>
<tr>
<th>Expected weight loss:</th>
<th>Babies may lose 10% of their birth weight in the first week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected initial weight gain:</td>
<td>Initial loss regained in 7-14 days (ie. back to birth weight)</td>
</tr>
<tr>
<td>Minimum expected weight gain after initial loss should be Preterm = 10g/kg/day Term = 20g/kg/day</td>
<td></td>
</tr>
<tr>
<td>Birth weight 1 kg: Expected weight gain is at least 10g / day, or 70 – 100g / week</td>
<td></td>
</tr>
<tr>
<td>Birth weight 2 kg: Expected weight gain is at least 20g / day, or 150+g / week</td>
<td></td>
</tr>
<tr>
<td>Birth weight 3 kg: Expected weight gain is at least 30g / day, or 200+g / week</td>
<td></td>
</tr>
</tbody>
</table>

**CLASSIFY WEIGHT GAIN IN LOW BIRTH WEIGHT BABIES**

In all babies with a birth weight less than 2.5kgs (Low Birth Weight babies), it is important to Assess feeding and Classify weight gain at least once or twice a week (p. 52 in the Chart booklet). Weight gain should be classified as:

**Inadequate weight gain**
• The baby has lost more than 10% of birth weight or
• The baby is gaining weight at less than 10g / kg / day

**Adequate weight gain**
• The baby has lost less than 10% of birth weight or
• The baby is gaining weight at least 10g / kg / day

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 10% weight loss in first week</td>
<td>INADEQUATE WEIGHT GAIN</td>
<td>Determine the cause of inadequate weight gain</td>
</tr>
<tr>
<td>Weight gain insufficient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate weight gain or Less than 10% weight loss in first week</td>
<td>ADEQUATE WEIGHT GAIN</td>
<td>Continue feeding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When able to suckle start breastfeeding</td>
</tr>
</tbody>
</table>

Now see Exercise Module 6.3 – and do exercise 3A
IF INADEQUATE WEIGHT GAIN, DETERMINE CAUSE AND CLASSIFY

If the baby has inadequate weight gain, determine and classify the cause. A baby with inadequate weight gain usually has

- Insufficient feeds or
- Incorrect feeding method or
- Incorrect thermo neutral environment or
- Illness

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>CLASSIFY</th>
<th>ACT NOW</th>
</tr>
</thead>
</table>
| • Baby seems unwell, lethargic, less than normal movement | SERIOUS ILLNESS | • Investigate and treat for sepsis or specific infections
• Check for PDA, other rare causes |
| • Inadequate feed volume for age and weight | INSUFFICIENT FEEDS | • Correct feed volume
• Increase feeds by 20ml/kg/day until 180ml/kg/day of feeds (p.22-23) |
| • Baby < 1.8kg is not getting continuous KMC
• Baby < 1.5 kg is not adequately heated | INADEQUATE TEMPERATURE CONTROL | • Correct the environmental temperature (p.14-16) |
| • Preterm baby < 1.5kg is suckling from breast
• Baby < 1.5 kg is cup fed | INCORRECT FEEDING METHOD | • Correct feeding (p.22-23) |
| • No problems identified | NO OBVIOUS CAUSE FOUND | • Consider rarer causes
• Consult a paediatrician at the referring hospital for advice |

You will want to ASK the mother the following questions

(i) Is the baby ill?
- Assess the baby for priority signs using the charts 1.2 on p. 6-7 of the Chart book and for infections using the charts 2.2.3 and 2.2.4 on p. 35-36 of the Newborn Care Chart booklet.
- Treat the baby according to what is found
- Urinary tract infections are very difficult to diagnose in newborn babies, and may only present with poor growth. If there is no other obvious cause, the urine should be checked for pus cells and nitrites.

(ii) What feed volume is being given? (ml/kg/day), and what volume should be given?

Determine the feed volume being given to the baby in ml/kg/day.

For example: A 20 day old baby weighing 1.6 kilogram is getting 20ml 3 hourly.
- Daily feeds: 20ml x 8 = 160ml / 24 hours
- Daily feed / kg + 160 / 1.6 = 100ml / kg / day
- On day 20 a baby should be getting 150 - 180ml/kg/day (see p. 22 in Chart booklet)
- The total volume needed is therefore 1.6kg x 180 = 288ml / day (24 hours)
- The feeds should therefore be 288 / 8 = 36ml 3 hourly

The Chart booklet shows on p. 22 and 24 that this baby should be getting 180ml / kg of milk per day, or 36ml every 3 hours.

(iii) Is the feeding method correct?
A fetus starts to swallow at about 12 weeks gestation, so that even a very preterm baby can swallow, but can only take very small amounts at a time, so that feeding is very slow if given by cup. A baby only starts to suckle at about 34 weeks gestation. Breast feeding is therefore unlikely to succeed before this. A baby who is sick or recovering may take some days to be able to cope with the normal feeds for his / her age.

MODULE 3: ASSESS FEEDING AND COUNSEL 121
Therefore it is necessary to assess the following for low birth weight infants:

- How is the baby being fed? (Breast, cup, or naso/orogastric tube)
- Is this appropriate for baby’s development or condition?

In some cases, extra milk may have to supplement breastfeeding:

- Babies who get tired when breastfeeding while recovering from an illness or who are just “learning” to suckle. When this happens they may not be able to finish a feed and therefore not get enough milk to supply their energy needs. Babies expend a lot of energy while breastfeeding.
- Very small babies who are being cup fed, can only take small sips of milk at a time. This means that the baby may take a long time to finish a feed. Often they fall asleep before they have finished.

If supplemental feeds are needed, they can be given either by a cup, in bigger babies, or by nasogastric tube, in smaller babies. Sometimes it is necessary to revert to cup or nasogastric feeds for a few more days until the baby is able to cope with the feeds.

(iv) Is the baby being kept in a suitably warm environment?
Babies need energy to grow (gain weight) and to keep warm. If a baby needs to use a lot of his energy intake to keep warm, he will not be able to grow properly. Therefore:

- Assess the baby’s environmental temperature
- Is the baby maintaining a normal temperature?
- Is the small baby in an incubator adequately covered (woollen cap, booties, plastic wrap)

Babies may not gain weight adequately if they are not kept in the correct environmental temperature. They will be using their energy to keep warm. Check the following:

- Is the incubator set at the correct temperature? Use table 1 on p.16 of the Newborn Care Chart booklet as a reference to check this.
- Are there any draughts in the room?
- Is the incubator too close to a cold window?
- Is a baby who should be getting continuous KMC actually receiving continuous KMC?

(v) Is there no obvious reason for the poor weight gain?
When no obvious cause can be found, consult a paediatrician. The baby may have to be transferred for investigation.

⚠️ Remember to check for a urinary tract infection!

3.4 COUNSELLING PRINCIPLES

COUNSELLING SKILLS

All healthcare workers require counselling skills, but this is particularly true for those who work with newborns. The birth of a child can be an emotional and stressful time for the whole family, and if the baby is sick, or has an abnormality, or a poor prognosis, or in the tragic event of a loss of a baby, the healthcare worker needs to be skilled in communicating such news and providing support to the mother and the family.
Communication skills

- Be respectful and understanding
- Do not attempt to counsel when you are sitting behind a desk. Sit in a chair next to the person or people being counselled. A desk is a barrier to communication.
- Listen to the family’s or mother’s concerns and encourage them to ask questions and express their emotions. It is good to allow people to express their emotions and to say what they think and feel.
- Use simple and clear language. Do not use medical or technical words or descriptions.
- Ensure that the family understands any information that you have given. It often helps to ask them to repeat what you have said or explained. It is useful to give them written information which they can read later.
- If a baby needs to be transferred, explain the reason for the transfer and how the baby will be transferred. Remember that the baby’s mother needs to go with the baby, so that she and the family need to understand the reasons for this.
- If a baby has a poor prognosis, is not improving or has had a sudden deterioration, discuss this with the mother and explain the current management. You will usually have to do this several times before she understands.
- Respect the family’s right to privacy and confidentiality. Counselling should never be done in a public place.
- Respect the family’s cultural beliefs and customs, and accommodate the family’s needs as much as possible. In many instances it is necessary to have an important and senior family member present at these times. This can assist with decision making.
- Allow the mother or family enough time to think about and discuss major decisions.
- Obtain informed consent before doing any procedures
- Remember that health care providers may feel anger, guilt, sorrow, pain and frustration. Death and illness occur in spite of everyone doing what is right. Ensure that systems are in place for enabling health workers to get support and counselling when they need it.

Listening and Learning Skills

- Use helpful non-verbal communication
- Ask open questions
- Use responses & gestures which show interest
- Reflect back what the mother says
- Empathize – show that you understand how she feels
- Avoid words which sound judging

The listening and learning skills will assist you when you counsel a mother about feeding or about any concerns that she may have. When you counsel the mother, first listen to her, and ask open questions so she has the opportunity to express her problems in her own words. Use helpful non-verbal communication, sit next to her and show her you are interested in her problem. Reflect back what she says to confirm to her that you have heard her problem. Avoid words which sound judging.

After you have listened to the mother and learned of her problem, offer her counselling. You need to accept what she thinks and feels even if you do not agree with her. Always recognise and praise what she is doing right. Give her practical help, especially with feeding and caring for her baby. Give a little relevant information using simple language. Further information can be given on other occasions. Prioritise your counselling as she may not remember everything. Give her suggestions rather than commands. That way she makes the decision on what to do.
Confidence Building Skills

- Accept what a mother thinks & feels
- Recognize & praise what a mother & baby are doing right
- Give practical help
- Give a little relevant information
- Use simple language
- Make one or two suggestions, not command

Counselling is not about giving instructions. There will be some education and information provision, but the critical issue is to reach an appropriate decision based on understanding, together with the mother or family.
3.5 FEEDING METHODS
Correct positioning, attachment and cup feeding

The mother may present with a number of problems such as not enough milk, the baby cries a lot, or she has painful or cracked nipples. Helping the mother with correct positioning and attachment will solve most of these problems. Before doing this take time to listen to the mother, understand and accept her problem. She probably lacks confidence and needs praise, practical help and relevant information.

Almost all mothers can produce enough milk, usually when a mother thinks she does not have enough breast milk, her baby is in fact getting all that he needs. If the baby is gaining weight adequately he is probably getting enough milk. If he is not getting enough milk it is probably because of poor positioning and attachment. You will then need to build the mothers confidence and help her with positioning and attachment. Frequent and exclusive breastfeeding will ensure the mother has enough milk. The baby may be crying because he is poorly attached and not getting enough milk. If he is growing well, the crying can be normal. You will need to assess breastfeeding and counsel the mother.

There are several reasons that an infant may be poorly attached or not able to suckle effectively. He may have had bottle feeds, especially in the first few days after delivery, as it is common for mothers to discard colostrums incorrectly. His mother may be inexperienced. She may have had some difficulty and nobody to help or advise her. For example, perhaps the infant was small and weak, the mother's nipples were flat or there was a delay starting to breastfeed.

The infant may be poorly positioned at the breast. Positioning is important because if it is poor then there will also be poor attachment. **Good positioning** is recognised by the following signs:

- Infant's neck is straight or bent slightly back,
- Infant's body is turned towards the mother,
- Infant's body is close to the mother, and
- Infant's whole body is supported.

If the mother feels the need to support the breast while feeding she needs to do no more than cup the breast in the palm of her hand. Grasping the breast above the areola 'scissor-fashion' between two fingers is unnecessary and can interfere with the flow of the milk to the nipple. **Poor positioning** is recognized by any of the following signs:

- Infant's neck is twisted or bent forward,
- Infant's body is turned away from mother,
- Infant's body is not close to mother, or
- Only the infant's head and neck are supported.
IMPROVING POSITIONING & ATTACHMENT
Always observe a mother breastfeeding before you help her, so that you understand her situation clearly. Do not rush to make her do something different. If you see that the mother needs help, first say something encouraging, like:

"She really wants your breast milk, doesn't she?"

If in your assessment of breastfeeding you found any difficulty with attachment or suckling, help the mother to position and attach her infant better. Make sure that the mother is comfortable and relaxed, for example sitting on a low seat with her back straight. Then follow the steps in the box below.

Explain what might help and ask if she would like you to show her. For example, say something like,

"Breastfeeding might be more comfortable for you if your baby took a larger mouthful of breast. Would you like me to show you how?"

If she agrees, you can start to help her.

TEACH CORRECT POSITIONING & ATTACHMENT FOR BREASTFEEDING
The mother must be seated comfortably

Show the mother how to hold her infant:-
- With the infant’s head & body straight
- Facing her breast, with infant’s nose opposite her nipple
- With infant’s body close to her body
- Supporting infant’s whole body, not just neck & shoulders

Show her how to help the infant to attach. She should:-
- Touch her infant’s lips with her nipple
- Wait until her infant’s mouth is opening wide
- Move her infant quickly onto her breast, aiming the infant’s lower lip well below the nipple

Look for signs of good attachment & effective suckling. If the attachment or suckling is not good, try again.

COUNSELLING ON POSITIONING
- As you show the mother how to position and attach the infant, be careful not to take over from her. Explain and demonstrate what you want her to do. Then let the mother position and attach the infant herself.
- Then look for signs of good attachment and effective suckling again. If the attachment or suckling is not good, ask the mother to remove the infant from her breast and to try again.
- When the infant is suckling well, explain to the mother that it is important to breastfeed long enough at each feed. She should not stop the breastfeeding before the infant wants to.
COUNSELLING ABOUT OTHER FEEDING PROBLEMS

If a mother is breastfeeding her infant less than 8 times in 24 hours, advise her to increase the frequency of breastfeeding. Breastfeed as often & for as long as the infant wants, day & night.

If the breastfed infant receives other foods or drinks, counsel the mother about breastfeeding exclusively until 6 months, and stopping or reducing the amount of the other foods or drinks.

If the HIV negative (or HIV status unknown) mother does not breastfeed at all, consider referring her for breastfeeding counselling and possible relactation. If the mother is interested, a breastfeeding counsellor may be able to help her to overcome difficulties and begin breastfeeding again.

CUP FEEDING

How to feed a baby with a cup (ideal for expressed breast milk):

- Hold the baby sitting upright or semi-upright on your lap.
- Hold the small cup of milk to the baby’s mouth. Tip the cup so that the milk just reaches the baby’s lips. The cup rests lightly on the baby’s lower lip and the edge of the cup touches the outer part of the baby’s upper lip. The baby will become alert.
- Do not pour milk into the baby’s mouth: A low birth weight baby starts to take milk with the tongue. A bigger / older baby sucks the milk, spilling some of it.
- When finished, the baby closes his / her mouth and will not take any more. If the baby has not had the required amount, wait and then offer the cup again, or offer more frequent feeds.
3.6 REPLACEMENT FEEDING

COUNSELLING ON REPLACEMENT FEEDING

- The baby only needs milk feeds. Other food and fluids are not necessary, and may be harmful.
- Prepare the correct strength and amount just before use (correct numbers of scoops of powder for the volume of water)
- Use the milk within an hour and discard any that is left over (a fridge can store formula for 24 hours)
- Cup feeding is safer than bottle feeding
- Clean the cup and utensils with soap and water
- If using a bottle, also boil it for 5 minutes or sterilise it after each use

TEACH A MOTHER CORRECT REPLACEMENT FEEDING

Firstly, ensure that the mother has access to a regular supply of replacement milk. She may choose to give commercial infant formula or to use home prepared formula from cows’ milk. Ensure that she is using a formula suitable for the baby. If she is using a modified cow’s milk, ensure that she knows how to mix it correctly.

CALCULATING THE AMOUNT OF REPLACEMENT FEED TO BE GIVEN

According to the baby’s weight or age advise the mother how much and how frequently to feed the baby. Use the table below (see also p. 57 in Newborn Care Chart booklet)

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Weight in kilos</th>
<th>Approx. amount of replacement feed in 24 hours</th>
<th>Previously boiled water per feed</th>
<th>Number of scoops per feed</th>
<th>Approx. number of feeds</th>
<th>Number of tins of formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>3</td>
<td>400 ml</td>
<td>50</td>
<td>2</td>
<td>8 x 50 ml</td>
<td>2</td>
</tr>
<tr>
<td>2 weeks</td>
<td>3</td>
<td>400 ml</td>
<td>50</td>
<td>2</td>
<td>8 x 50 ml</td>
<td>4</td>
</tr>
<tr>
<td>6 weeks</td>
<td>4</td>
<td>600 ml</td>
<td>75</td>
<td>3</td>
<td>7 x 75 ml</td>
<td>6</td>
</tr>
<tr>
<td>10 weeks</td>
<td>5</td>
<td>750 ml</td>
<td>125</td>
<td>5</td>
<td>6 x 125 ml</td>
<td>8</td>
</tr>
<tr>
<td>14 weeks</td>
<td>6.5</td>
<td>900 ml</td>
<td>150</td>
<td>6</td>
<td>6 x 150 ml</td>
<td>8</td>
</tr>
<tr>
<td>4 months</td>
<td>7</td>
<td>1050 ml</td>
<td>175</td>
<td>7</td>
<td>6 x 175 ml</td>
<td>8</td>
</tr>
<tr>
<td>5 months</td>
<td>8</td>
<td>1200 ml</td>
<td>200</td>
<td>8</td>
<td>6 x 200 ml</td>
<td>8</td>
</tr>
</tbody>
</table>

The mother will need a jug or measure to correctly measure the amount of water she requires. If she does not have a measure with 25 ml markings on it, let her bring a container such as a glass jar from home. Measure the amount of water, for example 75 ml and pour this into the mother’s container. Make a mark on the jar at the level of the water. She will use the scoop from the tin to measure the milk.

After washing her hands and boiling the water she will place the correct number of level scoops into the container. She will then add the correct amount of boiled water to the powder. If she is making 75ml of milk, she will place 3 scoops of formula in her container and then add water up to the mark, which has been measured at 75ml.

The following page contains simple instructions for preparing formula in the order in which a mother would do them. The pictures make it clearer. You can give the mother a copy. Write on it the number of scoops, quantity of water and frequency of feeds.
How to Prepare Milk Feeds

These instructions for preparing formula can be copied and given to mothers.
Fill in the number of scoops, quantity of water and frequency of feeds.
Demonstrate and let mothers practice the preparation of formula.

Always use the marked cup or glass and spoon to measure water and the scoop to measure the formula powder.

Wash your hands before preparing a feed.

Bring the water to the boil and then let it cool. Keep it covered while it cools.

Measure the formula powder into the marked cup or glass.
Make the scoops level. Put in ______ scoops.

Add a small amount of the cooled boiled water and stir.
Fill the cup or glass to the mark (_______ ml) with the water. Stir well.

Feed the baby using a cup.

Give the baby _____ feeds a day.

Wash the utensils.
Come back to the health centre on ___________________
EXPLAIN THE REQUIREMENT FOR CLEAN & SAFE FEEDING

Clean hands

Wash your hands before preparing the babies milk.

Wash your hands thoroughly:
• With soap
• With plenty of clean running or poured water
• Front, back, between the fingers, under the nails

Let your hands dry in the air or dry them with a clean cloth. It is best not to dry them on your clothing or a shared towel.

Clean utensils

Clean utensils thoroughly
• Use a clean table/mat, that can be cleaned each time it is used
• Wash utensils with cold water immediately after use, and then wash with hot water and soap. Use a soft brush to reach all the corners
• Keep utensils covered to keep off insects and dust until you use them
• Use a clean cup to give any drink to a baby
• If bottles are used clean with soap and water and a brush and then boil in water for 5 minutes

Safe water

Use boiled water and keep it clean
• Bring the water to boil briefly before use.
• Put the boiled water in a clean, covered container. If the water has been stored for more than a day, re-boil it before use.
• Use the feed within one hour, of preparation. If the baby does not finish the feed, she should give it to an older child or use for cooking.

Safe storage

Store the replacement milk safely
• If a mother has a refrigerator, all the formula for one day can be made at one time and stored in the refrigerator in a sterilised container with a tight lid. For each feed, some of the formula is poured into a feeding cup
• Some families keep previously boiled water in a thermos flask. This is safe for water. But it is NOT safe to keep warm milk or formula in a thermos flask. Bacteria grow when milk is kept warm.
RECOMMEND CUP FEEDING & SHOW HER HOW TO CUP FEED A BABY

- Clean the cup and utensils with soap and water
- If using a bottle, also boil it for 5 minutes or sterilise it after each use

TEACH A MOTHER CORRECT REPLACEMENT FEEDING

Firstly, ensure that the mother has access to a regular supply of replacement milk. She
- Cups are easily available in every household
- Cups are easy to clean so the risk of contamination is less than with bottles
- Cup feeding is associated with less risk of diarrhoea, ear infections and tooth decay

A cup cannot be propped beside the baby. The caregiver has to hold the baby and pay attention. This ensures social contact during feeding and adult attention if the baby is having any difficulties

HOW TO FEED A BABY BY CUP

- Hold the baby-sitting upright or semi-upright on your lap.
- Hold the small cup of milk to the baby’s lips.
  - Tip the cup so that the milk just reaches the baby’s lips.
  - The cup rests lightly on the baby’s lower lip, and the edges of the cup touch the outer part of the baby’s upper lip.
- The baby becomes alert, and opens his mouth and eyes.
  - A pre-term baby starts to take the milk into his mouth with his tongue.
  - A full term or older baby sucks the milk, spilling some of it.
- **Do not pour** the milk into the baby’s mouth. Just hold the cup to his lips and let him take it himself.
- When the baby has had enough, he closes his mouth and will not take any more. If he has not taken the calculated amount, he may take more next time, or you may need to feed him more often.
- Measure his intake over 24 hours - not just at each feed.

DISCUSS THE DANGERS OF MIXED FEEDING & HOW SHE MAY DEAL WITH PRESSURE TO BREASTFEED

Explaining why she is not breastfeeding can create real difficulties for the HIV positive mother. In some situations, she can say that she is not breastfeeding because she is ill, but she does not say what illness.

- If her husband or other family member knows that she is HIV positive and supports her, they can say that she is a good mother even if she does not breastfeed.
- In some situations, where a number of mothers allow their HIV status to be disclosed, or they belong to support groups that know about each other, this can help to overcome the problem of stigma.
3.7 WHEN TO RETURN

What does a mother of a newborn baby need to know about when her baby needs to be seen again, after they have gone home?

BABY BECOMES ILL

When the baby becomes ill, he/she needs to be seen urgently.

The following babies can be seen at the PHC clinic:

- Babies with discharging eyes, especially if it is pus
- Babies with umbilical sepsis, especially if there is pus draining and the skin around the umbilicus is red.
- Babies who have septic skin lesions. These are usually pustules.
- Babies with jaundice – the eyes and skin look yellow

The following babies need to be seen at a hospital:

- A baby who is not taking feeds well or is not suckling well. This is often an early sign of a baby who is severely ill.
- Babies who have convulsions
- Babies who breathe rapidly
- A baby who has diarrhoea
- A baby who is bleeding

The mother needs to be told where the baby needs to go. However, many rural mothers, especially, may not have the money to go directly to the hospital, and will therefore go to the nearest clinic. The staff at the clinic must therefore be able to provide emergency care for the baby before transferring him/her.

It is important to remember that many of these babies may come to the clinic first because their mothers do not have money to go directly to the hospital.

Whether at a clinic or hospital, the baby must be ASSESSED AND CLASSIFIED, and then given appropriate TREATMENT and CARE.

ROUTINE FOLLOW UP

3 days of age (normal babies)
Assess:
- Weight gain
- Feeding
- Jaundice
- Other priority signs
- How is the mother coping?

3 – 7 days after discharge, if the baby was admitted
Assess:
- Weight gain
- Feeding
- Other priority signs
- How is the mother coping?

Weekly for low birth weight (less than 2000g), until the weight is 2.5 kg
Assess:
• Weight gain
• Feeding
• Head circumference
• KMC

At 6 weeks of age, all babies
Assess:
• Weight
• Head circumference
• Feeding
• For immunisation
• Mother HIV positive:
  o Do PCR on the baby
  o start cotrimoxazole for the baby

At 8 weeks of age if mother is HIV positive (or two weeks after PCR taken)
• Get PCR result

4 months (18 weeks corrected age): High risk babies
Assess:
• Weight gain
• Head circumference
• Feeding
• Developmental screen

9 months High risk babies
Assess:
• Weight gain
• Head circumference
• Developmental screen

If at any stage there is anything abnormal:
• Follow the Assessment / Treatment / Care plan
• If not sure, consult a paediatrician

⚠️ All mothers need to have an understanding of why and when their babies need to be seen at a clinic or hospital

📚 Now see Exercise Module 6.3 – and do exercise 3B
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4.2 DEVELOPMENT CHART (0–12 MONTHS) ....................................................................................... 144
INTRODUCTION

Deciding when a baby is ready for discharge requires an assessment of the baby, the mother and the home circumstances where the baby will go to. Babies who are term, are feeding well and have had no serious illness can be discharged earlier than babies who are pre-term, low-birth weight, feeding poorly or have had serious illness. This module describes the full assessment of the baby’s condition, feeding, growth and the assessment of the mother’s condition and ability to cope and handle the baby and feeding well in order to be discharged. Many babies who have been low birth weight will be discharged from the KMC unit and a KMC score is useful in knowing when the baby is ready for discharge.

Before discharge, immunizations need to be given and all details about the birth and postnatal period need to be recorded in the baby’s discharge papers and a Road To Health Card, as well as dates for routine follow up visits.

Mothers should be counselled when to bring back her baby in case of emergency or signs of illness, and should know when to return with her baby for routine follow up visits. During all visits, babies should be assessed for priority signs, for weight gain and growth as well as checking their developmental progress.

OBJECTIVES

At the end of the module you will be able to

- Understand which babies can be discharged and when
- Understand how to assess babies in KMC and use the KMC Score Sheet
- Counsel mother on when to return with the baby for routine and emergency care
- Assess returning ill babies for review at the PHC or hospital
- Assess and treat babies returning for routine care over the first few months of follow up, and counsel the mother appropriately at each visit
4.1 DISCHARGE AND NEONATAL FOLLOW UP

4.1.1 DISCHARGE

WHEN SHOULD BABIES BE DISCHARGED?

Normal, well babies (these are usually term babies)
- The mother is well
- The mother is coping well with her baby
- The baby is well
- The baby is feeding well – preferably breast feeding
- If the birth weight was less than 2.5 kg, the mother is practising KMC

A baby who was small or sick
- The baby is no longer sick
- The baby has been growing well (weight loss less than 10% of birth weight and weight gain at least 10g / kg / day)
- The baby is feeding well
- The mother is well
- The mother is coping well with the baby and feeding
- The mother is practising KMC
- The KMC score is adequate to allow the baby to be discharged

CHECKLIST FOR DISCHARGE

1. Weight 1.8 kg or more AND
2. KMC score > 19 or more (if breast feeding) AND
3. No apnoea for at least 7 days and no longer on theophylline AND
4. All other problems resolved
5. Adequate weight gain (Chart book, p. 52)
6. Appropriate feeding
7. Immunizations given
8. HIV status known and, if positive, antiretrovirals and feeding support given
9. An appropriate follow up arrangement made for 3 - 5 days after discharge
   o Follow up every week until the baby weighs 2.5 kg.
   o Thereafter the baby can be followed up at the clinic
   o Babies weighing < 1.5 kg at birth, or who have had a complicated course, need a neurodevelopmental evaluation at 4 and 9 months
10. Iron and multivitamin supplements prescribed
11. Maternal VDRL, TB status checked and managed
12. All information has been appropriately recorded on the Newborn Admission Sheet
13. Copy of newborn admission sheet sent to referring hospital with baby
4.1.2 USING THE KMC SCORE SHEET

Most babies who have been low birth weight will be discharged from the KMC unit. A KMC score has been developed to assist in knowing when the baby is ready for discharge. This score sheet was originally compiled for the intra-hospital KMC Training Programme in Bogotá, Colombia. (see Newborn Care Chart booklet p. 72)

- The mother is evaluated according to her breastfeeding abilities, breast milk production, knowledge of KMC, acceptability and application of KMC, confidence in handling her baby and administration of medicines. The score sheet has also been adapted for mothers who do not breastfeed.
- The baby is evaluated according to his / her ability to feed successfully.
- The socioeconomic status of the family is assessed

The discharging of mother and baby depends if the following scores are satisfactory:

<table>
<thead>
<tr>
<th>The mother</th>
<th>The baby:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- More areola above baby’s mouth</td>
<td>- attaches well to the breast</td>
</tr>
<tr>
<td>- understands KMC</td>
<td>- suckles well</td>
</tr>
<tr>
<td>- is producing enough milk</td>
<td>- gains weight daily</td>
</tr>
<tr>
<td>- is able to breastfeed her baby</td>
<td></td>
</tr>
<tr>
<td>- is confident in taking care of her baby</td>
<td></td>
</tr>
</tbody>
</table>

All the above factors are incorporated into the daily score sheet.

- The daily KMC score must be assessed daily to evaluate the progress of the mother and baby.
- The evaluation of the daily score chart is done on day 1 of admission into the KMC ward. It is important to weigh babies daily while KMC is being practiced, using an electronic or digital scale. It must be able to measure in intervals of 10 g or less.
- There are ten factors used to score both mother and baby. The score for each factor ranges from 0 to 2. 0 is the lowest score and 2 are the highest score.

FACTORs EVALUATED IN THE KMC SCORE CHART

Socio-economic factors

- The mother is asked if she has support at home. This includes family support, financial support and access to water and electricity. If she stays alone with small children, is not working and does not have any water and electricity in her house, then the score will be 0.
- If the mother has family support like a mother / mother in law or her husband who support her both financially and emotionally, then the score will be 1.
- If the mother has financial, family and material resources at home like water supply and electricity, and can afford to care for both herself and her baby at home, the score will be 2.

It is important to observe if the mother has anybody visiting her while in hospital. If she does, it will strengthen the point that the mother is likely to be well supported after discharge. The evaluation of the economic status of the mother will benefit both the mother and baby. If the mother comes from a very poorly resourced background with no support, she can be kept longer in hospital and be discharged once baby has gained more weight.

Discharging a baby from poor socio-economic background too early may put the baby at risk.
Mother’s milk production (breast feeding mothers)
- If the mother is breastfeeding, the best way to assess whether she is producing enough milk is to see how much weight the baby is gaining. A breast fed baby who is gaining weight well is getting enough milk from the breast.
- If the baby is being fed breast milk by cup, observe the amount of milk that the mother expresses at feeding time. If she expresses between 0 - 10 ml the score will be 0. If she expresses between 10 - 20 ml the score will be 1. If she expresses between 20 - 30 ml (or more) the score will be 2.

Positioning and attaching the baby to the breast (breast feeding mothers)
If the mother is breastfeeding, observe how breastfeeding is going. The mother should be able to attach the baby to the breast. Observe the four main points of good attachment (Chart book, p. 55).
- If the mother still needs assistance to position and attach the baby to the breast, the score will be 0.
- If she occasionally needs assistance, then the score will be 1.
- If she is able to position and attach the baby to the breast on her own, the score will be 2.

Baby’s ability to suckle from the breast (breast feeding mothers)
As the baby may be still very small, he/she may not be able to suckle well from the breast. When the mother breastfeeds the baby, observe whether or not the baby gets tired.
- If the baby tires very quickly the score will be 0.
- If the baby gets tired infrequently, the score will be 1.
- If the baby is able to breastfeed on his/her own then the score will be 2.
To do this assessment the health worker needs to be present when the mother breastfeeds her baby.

Confidence in handling the baby
Many mothers find it difficult to handle small babies at first, because they think that the babies are very fragile. Therefore, observe the mother during procedures like napkin changing, feeding and bathing.
- If the mother always needs assistance the score will be 0.
- If she occasionally needs assistant the score will be 1.
- If she does not need assistance the score will be 2.

Baby’s weight gain per day
- If the baby’s weight gain per day is between 0 – 10g, the score will be 0.
- If the baby gains between 10 - 20g per day, the score will be 1
- If the weight gain per day is between 20 - 30g the score will be 2.
All babies should have scored either 1 or 2 before discharge.
If the baby is not gaining weight adequately, ASSESS AND CLASSIFY the weight gain (Chart book, p. 52, 53) and manage accordingly (Chart book, p 52, 53, and p. 22, 23)

Confidence in administering iron and multivitamin drops
Low birth weight babies are routinely given iron and multivitamin drops according to guidelines on their management. The mother is supported and assisted while in hospital so as to be able to continue giving these drops at home.
- If the mother is not confident, the score is 0.
- If she has some confidence, the score is 1.
- If she is fully confident, the score will be 2.
Knowledge of KMC
The mother is given information about KMC while she is in hospital, so that she understands the important aspects of KMC. Information discussed with her include the benefits of KMC to her and the baby, how to care for the baby in hospital and at home. The mother should be able to appreciate KMC and be willing to practise KMC even at home.

Evaluate daily the mother’s knowledge of KMC.
- If she has no knowledge, the score will be 0.
- If she has some knowledge, the score will be 1.
- If she is knowledgeable, the score will be 2.

You can develop your own testing tool for mothers according to the information that is given to them on admission in KMC unit.

Acceptance and application of KMC
The acceptance and application of KMC by mother’s follows after the information has been given to the mother about KMC. First teach mother skin-to-skin position and how to put the baby in the KMC position. Inform the mother about the importance of continuous KMC. Observe if the mother is doing continuous KMC in the ward.
- The mother who is not putting the baby on continuous KMC on her own will show that she has not yet accepted KMC. The score will be 0.
- A mother who partly accepts or sometimes puts the baby in the KMC position will be scored 1.
- The mother who is able to apply KMC on her own will score 2.

Confidence in caring for the baby at home.
The mother should be confident in caring for the baby in hospital, and knows that she will be able to manage at home. The health worker will be able to evaluate this factor only if she spends most of the time with the mother while in hospital.
- If the mother does not feel confident that she will be able to care for the baby at home the score should be 0.
- If she is not always sure how she will cope at home, the score should be 1.
- If she feels confident that she will be able to care for the baby at home the score should be 2.

At the end of the evaluation, the score that determines the mother and baby’s readiness to be discharged home should be above 19 if the mother is breastfeeding. If the mother is formula feeding the score should be above 15.

It is important to always have a health work allocated in the KMC unit to continuously monitor and observe mothers and babies in KMC. The applicability and acceptance of KMC will only be observed if there is continuous monitoring.
KMC Daily Score Sheet

Based on the Intra-hospital KMC Training Programme in Bogota, Colombia

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>Score</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-economic support</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Mother's milk production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby's ability to suckle at the breast / cup feed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby's weight gain per day</td>
<td>0-10g</td>
<td>10-20g</td>
</tr>
<tr>
<td>Confidence in administering vitamin and iron drops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of KMC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acceptance &amp; application of KMC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confidence in caring for baby at home</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL SCORE per day

Now see Exercise Module 6.4 – and do exercise 4A
4.1.3 **NEONATAL FOLLOW UP**

What does a mother of a newborn baby need to know about when her baby needs to be seen again, after they have gone home?

**WHEN BABY BECOMES ILL**

When the baby becomes ill, he/she needs to be seen urgently.

**The following babies can be seen at the PHC clinic:**
- Babies with discharging eyes, especially if it is pus
- Babies with umbilical sepsis, especially if there is pus draining and the skin around the umbilicus is red.
- Babies who have septic skin lesions. These are usually pustules.
- Babies with jaundice – the eyes and skin look yellow

**The following babies need to be seen at a hospital:**
- A baby who is not taking feeds well or is not suckling well. This is often an early sign of a baby who is severely ill.
- Babies who have convulsions
- Babies who breathe rapidly
- A baby who has diarrhoea
- A baby who is bleeding

The mother needs to be told where the baby needs to go. However, many rural mothers, especially, may not have the money to go directly to the hospital, and will therefore go to the nearest clinic. The staff at the clinic must therefore be able to provide emergency care for the baby before transferring him/her.

It is important to remember that many of these babies may come to the clinic first because their mothers do not have money to go directly to the hospital.

Whether at a clinic or hospital, the baby must be ASSESSED AND CLASSIFIED, and then given appropriate TREATMENT and CARE.

**ROUTINE FOLLOW UP**

**3 days of age (normal babies)**
Assess:
- Weight gain
- Feeding
- Jaundice
- Other priority signs
- How is the mother coping?

**3 – 7 days after discharge, if the baby was admitted**
Assess:
- Weight gain
- Feeding
- Other priority signs
- How is the mother coping?
Weekly for low birth weight (less than 2000g), until the weight is 2.5 kg
Assess:
- Weight gain
- Feeding
- Head circumference
- KMC

At 6 weeks of age, all babies
Assess:
- Weight
- Head circumference
- Feeding
- For immunisation
- Mother HIV positive:
  - Do PCR on the baby
  - start cotrimoxazole for the baby

At 8 weeks of age if mother is HIV positive (or two weeks after PCR taken)
- Get PCR result

4 months (18 weeks corrected age): High risk babies
Assess:
- Weight gain
- Head circumference
- Feeding
- Developmental screen

9 months High risk babies
Assess:
- Weight gain
- Head circumference
- Developmental screen

If at any stage there is anything abnormal:
- Follow the Assessment / Treatment / Care plan
- If not sure, consult a paediatrician

All mothers need to have an understanding of why and when their babies need to be seen at a clinic or hospital
**NEONATAL FOLLOW UP CHART**  
(see p. 60 in Newborn Care Chart booklet)

<table>
<thead>
<tr>
<th>Visit</th>
<th>Assess</th>
<th>Treat, Counsel, Follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 days after discharge</td>
<td>• Assess and classify weight gain (Chart book, p. 52, 53)</td>
<td>Counsel on feeding</td>
</tr>
<tr>
<td></td>
<td>• Assess and classify for priority signs</td>
<td><strong>Low birth weight</strong></td>
</tr>
<tr>
<td></td>
<td>• Assess and classify weight gain (Chart book, p. 52, 53)</td>
<td>Gaining well: follow up in 2 weeks</td>
</tr>
<tr>
<td></td>
<td>• Assess and classify for priority signs</td>
<td>Not gaining: follow up in 3 days</td>
</tr>
<tr>
<td></td>
<td>• Measure and record head circumference</td>
<td>Losing weight: readmit</td>
</tr>
<tr>
<td></td>
<td>• Multivitamin drops 0.6 ml / day</td>
<td>Multivitamin drops 0.6 ml / day</td>
</tr>
<tr>
<td></td>
<td>• Ferrous lactate 0.6 ml / day</td>
<td>Ferrous lactate 0.6 ml daily for 6 months</td>
</tr>
<tr>
<td></td>
<td>• Counsel on feeding</td>
<td><strong>Low birth weight visits until 2500g</strong></td>
</tr>
<tr>
<td></td>
<td>• Assess and classify weight gain (Chart book, p. 52, 53)</td>
<td>Multivitamin drops 0.6 ml daily for 6 months</td>
</tr>
<tr>
<td></td>
<td>• Assess and classify for priority signs</td>
<td>Ferrous lactate 0.6 ml daily for 6 months</td>
</tr>
<tr>
<td></td>
<td>• Measure and record head circumference</td>
<td>Counsel on feeding</td>
</tr>
<tr>
<td>Low birth weight visits</td>
<td>• Assess and classify weight gain (Chart book, p. 52, 53)</td>
<td>If well at 2500g, for routine PHC clinic follow up</td>
</tr>
<tr>
<td>until 2500g</td>
<td>• Assess and classify for priority signs</td>
<td>• Birth weight less than 1500g, and / or</td>
</tr>
<tr>
<td></td>
<td>• Measure and record head circumference</td>
<td>• Serious illness (p. 58)</td>
</tr>
<tr>
<td></td>
<td>• Multivitamin drops 0.6 ml daily for 6 months</td>
<td>• Follow up at 18 weeks corrected age and 9 months for developmental screen</td>
</tr>
<tr>
<td>6 weeks HIV exposed</td>
<td>• Assess growth and feeding</td>
<td><strong>6 weeks HIV exposed</strong></td>
</tr>
<tr>
<td></td>
<td>• Do PCR</td>
<td>• Counsel on feeding</td>
</tr>
<tr>
<td></td>
<td>• Assess growth and feeding</td>
<td>• Get PCR result in 2 weeks. If +ve, do a CD4 count and follow up at the paediatric HIV clinic</td>
</tr>
<tr>
<td></td>
<td>• Measure and record head circumference</td>
<td>• PCR –ve: routine follow up at clinic</td>
</tr>
<tr>
<td></td>
<td>• Assess development</td>
<td>• PCR –ve, and breast feeding, repeat PCR 6 weeks before stopping and 6 weeks after stopping breast feeding,</td>
</tr>
<tr>
<td>18 weeks corrected age</td>
<td>(Chart book, p. 61, and below)</td>
<td>• Repeat HIV antibody test at 18 months</td>
</tr>
<tr>
<td></td>
<td>• According to problems identified</td>
<td><strong>9 months</strong></td>
</tr>
<tr>
<td></td>
<td>• If delayed motor development, start physiotherapy</td>
<td>• According to problems identified</td>
</tr>
<tr>
<td></td>
<td>• If delayed motor development, start physiotherapy</td>
<td>• If delayed motor development, start physiotherapy</td>
</tr>
<tr>
<td></td>
<td>• If delayed speech development, assess hearing</td>
<td>• If delayed speech development, assess hearing</td>
</tr>
</tbody>
</table>

Now see Exercise Module 6.4 – and do exercise 4B
### 4.2 DEVELOPMENT CHART (0–12 MONTHS)

Use this development chart as a guide to assess the baby’s development on all routine and non-routine follow up visits (see p. 61 in Newborn Care Chart booklet)

<table>
<thead>
<tr>
<th>Months</th>
<th>Gross-motor</th>
<th>Fine-motor-adaptive</th>
<th>Communication</th>
<th>Personal-social</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Walks alone (10 steps) Walks with one hand held</td>
<td>Retains 3 cubes Simple formboard (one circle in) Replaces pegman</td>
<td>Jabbers with expression Where’s daddy - looks at father</td>
<td>Holds a spoon</td>
</tr>
<tr>
<td>11</td>
<td>Stands at furniture - lifts one foot at a time Cruises around furniture Creeps like a bear</td>
<td>Holds car and explores with index finger Thumb index finger opposition</td>
<td>Imitates one or two words 2-3 words with meaning (include mama, dada)</td>
<td>Finger feeds</td>
</tr>
<tr>
<td>10</td>
<td>Sitting, can recover toy behind him</td>
<td>Throws objects Clicks two cubes together</td>
<td>One word with meaning Shakes head for no Object permanence, find cube under cover</td>
<td>Deliberate casting Pushes arm into sleeve Pulls off hat</td>
</tr>
<tr>
<td>9</td>
<td>Crawls Pulls up to stand</td>
<td>Removes pegman from car Exploratory mouthing</td>
<td>Says mama, dada Babblestunefully Waves bye bye</td>
<td>Stranger anxiety Holds and eats a biscuit</td>
</tr>
<tr>
<td>8</td>
<td>Sits alone for 1 minute Prone - pivots in a circle using arm</td>
<td>Retains one cube in each hand Grasps ring by the string</td>
<td>Combines syllables e.g. ba-ba, ma-ma</td>
<td>Plays peek-a-boo</td>
</tr>
<tr>
<td>7</td>
<td>Sits alone for 1 minute</td>
<td>Retains 1 cube in hand at a time</td>
<td>Shouts for attention Responds when called</td>
<td>Drinks from a cup</td>
</tr>
<tr>
<td>6</td>
<td>Prone - extended arm support rolls from supine to prone</td>
<td>Shakes, waves and bangs objects Grasps ring, mouth and transfer</td>
<td>Makes m sound Object permanence - looks after dropped object</td>
<td>Smiles, pats mirror image Chews solids</td>
</tr>
<tr>
<td>5</td>
<td>Rolls from prone to supine</td>
<td>Grasps ring Crumples paper</td>
<td>Combines sounds e.g. ag-hoo</td>
<td>Holds cup</td>
</tr>
<tr>
<td>4</td>
<td>Pulls to sit - no headlag</td>
<td>4 part sequence, reach, grasp, retrieve, mouth</td>
<td>Giggles and laughs Initiates vocalisation</td>
<td>Friendly towards strangers</td>
</tr>
<tr>
<td>3</td>
<td>Prone - elbow support Supine - symmetrical lie</td>
<td>Follows through 180 Fingers one hand with other when lying quietly</td>
<td>Coos, chuckles and squeals</td>
<td>Obvious pleasure at being handled</td>
</tr>
<tr>
<td>2</td>
<td>supported sitting - head vertical</td>
<td>Follows past the midline Hand to mouth as voluntary act</td>
<td>Vowel sounds</td>
<td>Enjoys a bath Smiles at mother</td>
</tr>
<tr>
<td>1</td>
<td>Lifts head when prone</td>
<td>Follows to midline</td>
<td>Cries when hungry Throaty sounds Startles to sound</td>
<td>Sucks well Watches mother when feeding</td>
</tr>
</tbody>
</table>
MODULE 5:

ROUTINE CARE

SICK & SMALL NEWBORNS

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INTRODUCTION

Most babies who are born are born at term after a normal pregnancy and labour, and are themselves normal. Nonetheless, they all need basic care as part of the post birth routine immediately in the labour ward or in theatre.

Some may need resuscitation at birth, and if necessary most do respond to basic resuscitation, while a few may need more advanced resuscitation.

Once in the post-natal ward or neonatal unit, routine post-natal care is given, including an review of risk factors which must be excluded.

OBJECTIVES

At the end of the module you will be able to

- Provide routine care to a newborn baby immediately after birth
- Assess the need for resuscitation at birth and provide basic newborn resuscitation if necessary
- Provide routine post-natal care in the clinic or hospital
5.1 ROUTINE CARE AT BIRTH : LABOUR WARD OR THEATRE

IMMEDIATELY AFTER BIRTH

1. The baby must be dried with a warm towel. A wet baby gets cold very quickly and this can result in hypothermia (Chart book p. 12).

2. Then “ASSESS AND CLASSIFY”. The following 3 questions must be asked:
   - Is the baby breathing spontaneously?
   - Is the heart rate more than 100 beats per minute?
   - Is the baby centrally pink?

3. If the answer to any of these questions is “No”, then the baby needs resuscitation NOW (Chart book, p. 65-66).

4. The Apgar score also helps to identify problems. The Apgar score is done at 1 and 5 minutes. The score at 1 minute tells you whether or not the baby needs resuscitation. The 5 minute score tells you whether or not the resuscitation has been successful.

All the above factors are incorporated into the daily score sheet.
- The daily KMC score must be assessed daily to evaluate the progress of the mother and baby.
- The evaluation of the daily score chart is done on day 1 of admission into the KMC ward. It is important to weigh babies daily while KMC is being practiced, using an electronic or digital scale. It must be able to measure in intervals of 10 g or less.
- There are ten factors used to score both mother and baby. The score for each factor ranges from 0 to 2. 0 is the lowest score and 2 are the highest score.

The 1 minute Apgar score
- A score of more than 7 means that the baby does not need resuscitation
- A score of 4 to 7 means that the baby needs resuscitation
- A score of less than 4 means that the baby is severely asphyxiated and needs urgent and vigorous resuscitation

APGAR SCORE CHART

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate</td>
<td>Absent</td>
<td>&lt; 100 / min</td>
<td>&gt; 100 / min</td>
</tr>
<tr>
<td>Respiration</td>
<td>Absent</td>
<td>Slow or irregular</td>
<td>Good, crying</td>
</tr>
<tr>
<td>Muscle Tone</td>
<td>Limp</td>
<td>Slight flexion</td>
<td>Active, moves</td>
</tr>
<tr>
<td>Response to stimulation</td>
<td>No response</td>
<td>Grimace</td>
<td>Vigorous cry</td>
</tr>
<tr>
<td>Colour</td>
<td>Blue or pale</td>
<td>Body pink, limbs blue</td>
<td>Pink all over</td>
</tr>
</tbody>
</table>
5. If the baby has a lot of secretions, turn him onto his side. Secretions do not block the airway. Suctioning is not good as it can depress the baby's respiration.

6. After the baby has made a few cries, clamp and cut the umbilical cord. Later when it is convenient, replace the clamp with a disposable clamp or cord ligature.

7. If the baby is born in theatre (his / her mother has had a caesarean section) and is normal, when the basic care has been given, put the baby in a warm incubator in the theatre and take him to the postnatal ward with his / her mother. The baby should not be dressed or covered with a blanket in the incubator so that it is easy so observe him / her. Normal post caesarean section babies should NOT be sent to the neonatal unit.

8. If the baby has needed to be resuscitated, or if the 5 minute Apgar score is 7 or less, then the baby must be admitted to the neonatal unit.

CHECK RISK FACTORS

Risk Factor: Membranes ruptured for more than 18 hours

At the end of the evaluation, the score that determines the mother and baby's readiness to be discharged home should be above 19 if the mother is breastfeeding. If the mother is formula feeding the score should be above 15.

What is the risk?
- The risk is that the baby may also be infected.
- When the membranes have been ruptured, there is a risk that microorganisms from the vagina can get into the amniotic sac and cause infection (chorioamnionitis). As the baby is living in this environment, he / she may become infected.

How is infection recognised?
- The liquor (amniotic fluid) may smell bad
- There may be no evidence at all that there is any infection
- The fact that the liquor was infected may only become evident when the baby becomes ill.

What infections can the baby get?
- Pneumonia
- Septicaemia
- Conjunctivitis
- Omphalitis

How should the baby be treated?
- A well term baby who is breast feeding does not need any specific treatment
- If the baby has an infection, he / she should be treated for the specific infection
- In a baby with a birth weight of less that 2000g, the baby should be given prophylactic antibiotics
- All preterm and low birth weight babies should be admitted for observation

Feeding the baby with breast milk will prevent many serious infections
Risk Factor: Mother has diabetes mellitus

What is the risk to the baby?
- When the mother has a high blood sugar level, more sugar crosses the placenta to the baby. This often results in the baby growing more than normal. It also results in the baby producing more insulin in order to keep his/her blood sugar levels normal. When the baby is born, his/her insulin levels may be high, so that the baby’s blood sugar levels can become very low in the first few hours after birth.
- The risk is therefore hypoglycaemia in the first few hours after birth

What action must be taken? (see Chart book, p. 21)
- A heel prick (strip) blood sugar level must be done at birth and hourly for at least the first 6 hours after birth
- The baby must be fed immediately after birth and 3 hourly for the first day
- If the baby is unable to take feeds, he/she must have a IV infusion started (Neonatalyte)

Risk Factor: Mother is HIV Positive

Check that the mother has had appropriate antiretroviral treatment
The baby must get:
- Nevirapine must be given orally to the baby within 72 hours of delivery
- The baby must be given AZT according to the protocol, for at least 7 days.
Check on the mother’s feeding choice for the baby
For more information, see Chart book, p. 48

Check the baby carefully

Weigh the baby

Measure the head circumference

Look for signs of serious illness
- Central cyanosis
- Grunting
- Fast breathing
- Chest indrawing
- Baby is floppy (decreased tone)
- Baby has less than normal movements
- Major congenital abnormality

Admit the baby to the neonatal unit if:
- There are any signs of serious illness
- The baby weighs more than 4 kg, or less than 2 kg
- The head circumference is less than the 3rd centile or more than the 97th centile

Give the baby vitamin K and eye prophylaxis

Before leaving the labour ward ALL babies (even sick babies) must be given:
- Vitamin K 1mg IMI into the lateral aspect of the mid thigh. Oral vitamin K must not be used.
- Chloramphenicol eye ointment. This must be put into both the baby’s eyes
Keep the mother and baby together

One of the basic principles of newborn care is that the mother and her newborn baby should always be kept together – unless there is a very good medical reason why this is not possible.

As soon as the essential care has been given to the baby, place the baby on the mother’s chest and cover the baby and mother with a blanket. This is an important step in the bonding process for both the mother and her baby.

Let the baby suckle as soon as possible. This is an important step in establishing breast feeding, and also helps the uterus to contract and so reduce the chance of post-partum haemorrhage.

The same principles apply when the mother has had a caesarean section. Normal babies who have been born by caesarean section must NOT be sent to the nursery. They should be kept in a warm incubator in the theatre and given to the mother as soon as the operation is finished. While in the incubator they should not be dressed or wrapped in blankets. It is important that the theatre staff are able to see the baby. The baby and mother can then be transferred to the postnatal ward together.

Bonding and breast feeding are both critically important for newborns. They can only happen effectively when mother and baby are together.

Identify and record, and transfer

The baby must be formally identified with the mother. Show the baby to the mother as soon as possible after delivery and give her the baby to hold, or put the baby on her chest.

Then put name tags on the baby’s wrist and ankle. The name tag must have the mother’s name, hospital record number, the infant’s sex, and the date and time of birth.

The identification must be checked with the transferring health worker and the receiving health worker and the mother every time the baby is moved from one ward to another – such as from labour ward to postnatal ward.

The baby must be transferred to the postnatal ward with the mother unless, the baby has needed admission to the neonatal unit or the mother is too ill to care for her baby.

Summary: Routine Care at Birth

Immediately after birth
- Dry the baby
- Assess, Classify and Treat
- Cut and clamp the cord when the baby has breathed, or if he / she needs resuscitation
- Place the baby on the mother’s chest as soon as possible

If the baby is not breathing well, does not have a pink tongue or has a heart rate of less that 100 beats per minute, start resuscitation with a bag and mask IMMEDIATELY
- Examine the baby carefully
- Eye prophylaxis and Vitamin K
- Ensure bonding and feeding
- Identify the baby
- Document the findings and information
5.2 RESUSCITATION OF THE NEWBORN

STEPS IN NEWBORN RESUSCITATION

Resuscitation is made up of 5 steps:

A: Anticipation
A: Airway
B: Breathing
C: Cardiovascular
D: Drugs

Admit the baby to the neonatal unit if:
- There are any signs of serious illness
- The baby weighs more than 4 kg, or less than 2 kg
- The head circumference is less than the 3rd centile or more than the 97th centile

A. ANTICIPATION

Every person and all the equipment at all the resuscitation areas must always be ready to resuscitate a newborn baby. Always assume that when a baby is born, he / she will need to be resuscitated.

This means that:
- Everybody working in a labour ward must know how to resuscitate a baby
- All the equipment must be ready to use, connected and in working order

If a baby needs to be resuscitated, at least 2 people will be needed

A. AIRWAY

Suctioning
- If there is meconium stained liquor, the mouth and pharynx, and then the nose must be suctioned at the delivery of the head, before the baby has taken a breath. A large size catheter is needed for this – the smallest is f10. Once you have suctioned the meconium, put the suction equipment down.
- Excessive suctioning of the airway may depress the baby’s breathing!
- It is not necessary to suction secretions as they do not obstruct the airway.

Position
- The baby must be placed on a flat, horizontal surface. The head end should not be lower than the feet.
- The head must not be hyper-extended. Therefore it must not be placed in the hole in the mattress (if this is present).
- The position of the head is in a slightly extended position

If the baby is breathing, but has a heart rate of less than 100 beats per minute or is centrally cyanosed (has a blue tongue) give oxygen through a bag and mask without ventilating.
B. BREATHING  (the most important part of resuscitation in a newborn baby)

Asphyxia neonatorum is defined as: Failure to initiate and maintain spontaneous respiration at 1 minute after birth

Breathing in a newborn baby usually starts as the result of the stimulation of being born. The environmental temperature of the room is almost always a lot lower than the intrauterine environment and will make the baby gasp and then start breathing. Drying the baby is also a strong stimulus. It is not necessary to smack the baby, flick his / her feet or provide other forms of external stimulation as these will not help.

Ventilation (breathing for the baby) using a bag and mask (sometimes an endotracheal tube) is the key process of resuscitating a newborn baby.
- If the baby is not breathing, ventilation must be started immediately.
- Squeeze the bag firmly at a rate of 40 – 60 breaths per minute
- Most babies will be successfully resuscitated by bag and mask ventilation only.

C. CARDIOVASCULAR

If the baby is being adequately ventilated, but remains centrally (tongue) blue and the heart rate is less than 60 per minute, chest compressions must be started.

Chest compressions are done encircling the chest with the hands and pressing with the thumbs on the lower end of the sternum, or by pressing on the lower end of the sternum with two fingers. The chest must be compressed by about 1/3 of the antero-posterior diameter of the chest.

Give 3 compressions for every breath every +/- 2 seconds – counting 1,2,3, bag will achieve the correct rate.

D. DRUGS

If the heart rate is still less than 60 beats per minute, the baby will need to be intubated and given drugs.
- Give adrenaline (0.01 mg / kg) IV or via the endotracheal tube. This can be repeated 2 – 3 times
- Give naloxone 0.1 mg / kg (IM / subcutaneously / via the endotracheal tube) if the mother has had pethidine or morphine less than 4 hours before delivery.
- Give N. saline (0.9%) 10 ml / kg IV over 15 minutes. This helps to correct shock and the right to left shunt of blood through the heart, and therefore improve the pulmonary circulation.

Drugs are not usually very effective in newborn resuscitation. Ventilation is the most important procedure.

When to stop resuscitating a baby
- When the baby is breathing spontaneously with a heart rate of >100 beats per minute and is centrally pink
- When, after about 30 minutes there is no sign of spontaneous respiration, the heart rate remains less than 100 beats per minute and the baby is centrally blue.
NEWBORN RESUSCITATION ALGORITHM

A

AIRWAY
Remove MECONIUM or BLOOD if present before stimulating

Warm, Position, Clear Airway, Dry and Stimulate

Breathing, Blue and HR >100

Assess
Breathing, Colour and HR

Breathing, Pink and HR >100

Supportive Care

Apnoea or Blue or HR < 100

Administer Oxygen

B

BREATHE
(Ventilation at rate of 40 – 60 / min)
Count: Bag, 2, 3

Assess
Breathing, Colour and HR

HR > 60 ↑

HR < 60 ↓

C

CHEST COMPRESSION
(Rate of 120 / min)
Ratio: 3 Compressions : 1 Ventilation until intubated
Count: 1, 2, 3, Bag

Assess
Breathing, Colour and HR

HR > 60 ↑

HR < 60 ↓

D

DRUGS
Adrenaline (0.01 mg / kg IV / ET every 3 – 5 mins pm)
Naloxone (0.1 mg / kg IV (diluted) only if narcotic used)
Dextrose (0.5 - 1 g / kg IV (diluted) only if hypoglycaemic)

MODULE 5: ROUTINE CARE
5.3 ROUTINE CARE OF THE NEWBORN: POSTNATAL WARD

IDENTIFY AND WARD CARE

Ask, check, record
- The baby must be identified and the identification bands checked by the referring nurse, the receiving nurse and the mother. The ID band must be dated and signed.

Look, listen, feel
- Examine the baby thoroughly

Treat, observe and care
- Normal term babies can be weighed on day 3 and twice per week thereafter.
- Allow demand feeding. Exclusive breast feeding should be practised wherever possible. When replacement feeding is practised, ensure that the correct amount of feed is given (ml / kg / day).
- Chart the input and output. In normal babies it is sufficient to record “breast fed” with the time, and “wet” when the nappy is changed. When the baby is getting replacement feeds, the amount and time of the feed must be recorded.
- Routine observations – temperature, respiratory rate, heart rate, colour and activity – should be done 12 hourly.
- Apply surgical spirits to the umbilicus and base of the cord 6 hourly. Ensure that the spirits gets right down to the base of the cord.
- Routine bathing of babies is not recommended. Blood and meconium can be wiped off using wet swabs. Vernix should not be removed as it protects the baby from infections. It will disappear in 2 to 3 days. Wipe the baby’s face, neck, ears, buttocks and perineum and dry well twice per day (“top and tail”)

MOTHER’S RPR STATUS
Mother is RPR positive
- Examine the bay carefully for signs of congenital syphilis. (See Chart book, p 45)
- Treat the mother and baby (See Chart book, p 45, 46)

Mother’s RPR status is unknown
- Take blood from the mother for RPR
- Treat the mother and baby (See Chart book, p 45, 46)
- Do not discharge the baby until the mother’s RPR result is known and both mother and baby have been appropriately treated.

MOTHER HAS HAD TB IN THE LAST 6 MONTHS
- Examine the baby for signs of respiratory distress, and check the abdomen for an enlarged liver. These signs may not always be present at birth, so that the baby will need to be followed up carefully.
- Manage the baby according to the protocol (Chart book, p 47)

MOTHER’S HIV STATUS
Mother is HIV positive (See Chart book, p 48)
- Check whether the mother is on any treatment, and if so, what treatment.
- The baby should get a single dose of nevirapine as soon as possible after delivery (always within 72 hours)
- Give the baby AZT according to the protocol (Chart book, p 48)

Mother’s HIV status is unknown
- The mother must be counselled and tested for HIV as soon as possible. No mother or baby must be discharged home without the mother’s HIV status being known,
(unless the mother absolutely refuses to be tested) and both mother and baby having been started on the appropriate treatment (See Chart book, p 48)

- When the mother’s HIV status is known, The appropriate treatment should be given (Chart book, p 48).

**MOTHER’S BLOOD GROUP IS O OR RHESUS NEGATIVE**
- Check the baby’s TSB (or use Bilicheck) at 6 hours of age.
- If the TSB is 80 µmol / l or more, start phototherapy.
- Check the TSB 6 – 12 hourly after that and manage according to the phototherapy graph (See Chart book, p 41).

**MOTHER’S BLOOD GROUP UNKNOWN**
- Check the mother’s blood group
- Check the baby’s TSB at 6 hours of age.
- If the TSB is 80 µmol / l or more, start phototherapy.
- Check the TSB 6 – 12 hourly after that, if the mother is blood group O or Rhesus positive, and manage according to the phototherapy graph (See Chart book, p 41).

**CHECK FOR ABNORMALITIES OR ILLNESS**
The mother is almost always the person who first detects that there is something wrong with the baby – that he / she is sick. It is very important to listen to what the mother says about her baby.

- Ask the mother if she has any concerns about the baby.
- Is the baby feeding well?
- Has the baby passed meconium?
- Examine the baby fully with the mother present, and encourage her to ask questions or comment about her baby.
- Record the findings on the examination chart in the Maternity record.
- If the baby is in the nursery, record the findings on the examination chart or Initial assessment chart in the Newborn Admission Record.

**CHECK FOR JAUNDICE**
- Remember that babies whose mothers are blood group O or Rhesus negative are at high risk for jaundice starting on the first day of life. The management of these babies is described in section 7.3.5 (above) and in the Chart book, p. 41.
- It is normal for most babies to have some jaundice. This is highest on about day 3 of life.
- The principle of managing jaundice in the newborn is:
  - If the baby looks jaundiced, check the bilirubin level (laboratory or “bilicheck”)
  - Use the graph on p. 41 of the Chart book to decide whether or not the baby needs to be treated with phototherapy.
  - Start phototherapy while waiting for the result, if the blood was sent to the laboratory.

**CHECK HOW THE BABY IS FEEDING**
- Assess breastfeeding, if the baby is being breast fed (See Chart book, p.55)
- Assess replacement feeding, if the baby is not being breast fed (See Chart book, p 56, 57). Note especially how it is being mixed and how much is being given. The mother will probably need to be shown several times.
- If the baby is not feeding well, counsel the mother appropriately, and remember:
  - Breast milk is never “too weak”.
  - It is very seldom that the mother will not produce enough milk for her baby.
  - Make sure that she drinks enough fluids especially in hot weather.
ENSURE THAT THE BABY GETS ROUTINE PREVENTIVE CARE
  • Check that the baby has received vitamin K and eye prophylaxis (chloramphenicol eye ointment in the eyes). This can easily be forgotten in a baby who is born before arrival (BBA).
  • Polio drops and BCG vaccine must be given before the baby is discharged – within 5 days in a normal baby.

DISCHARGE AND PLAN FOLLOW UP
  Check that:
  • All the risk factors have been correctly managed
  • The baby has received all the necessary preventive treatment
  • The baby is feeding well
  • The baby is active and well
  • Record all the findings on the baby’s notes
  • Record a summary of the information on the baby’s Road to Health Card
  • Give the mother a date to have the baby checked after 3 days and again in 6 weeks
EXERCISE MODULE

EXERCISES

SICK & SMALL NEWBORNS

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PRE-TEST QUESTIONNAIRE

Please ring the one, most correct answer on the scoring sheet.

Example: A normal Apgar score at 1 minute is:
   a) Above 10
   b) 7 – 10
   c) 3 – 6
   d) Below 3
   Answer: a  b  c  d

MULTIPLE CHOICE QUESTIONS

1. A low Apgar score identifies:
   (a) Maternal acidosis
   (b) Maternal sedation
   (c) Infants who need resuscitation
   (d) Hypothermia

2. The 5 minute Apgar score is used to:
   (a) Predict brain damage
   (b) Evaluate the response to resuscitation
   (c) Indicate the need for Narcan
   (d) Stopping all resuscitation

3. Narcan is useful where the following has been administered to the mother:
   (a) Spinal anaesthesia
   (b) General anaesthesia
   (c) Morphine or Pethidine
   (d) Diazepam (Valium)

4. What should be done with the normal term infant after delivery:
   (a) Given to the mother
   (b) Dried and given to the mother
   (c) Placed in an incubator
   (d) Taken to the nursery for examination

5. Suctioning of the infant should be done:
   (a) In all infants
   (b) In preterm infants
   (c) When meconium is present
   (d) When clear secretions are observed in the mouth

6. Causes of asphyxia may be:
   (a) Hypoxia
   (b) Maternal analgesia
   (c) Immaturity
   (d) All of the above

7. Basic resuscitation should include:
   (a) Listening to the heart rate
   (b) Giving oxygen by mask
   (c) Ventilation with mask and bag
   (d) All of the above
8. Bathing of an infant is advised:
   (a) As soon as possible after birth
   (b) Before feeds are given
   (c) Before the age of 12 hours
   (d) None of the above

9. Cord care consists of:
   (a) Application of alcohol or spirits daily
   (b) Use antibiotic creams or drops
   (c) Covering with sterile dressing
   (d) Giving it a twist every day to enhance separation

10. In healthy infants breastfeeding should be commenced:
    (a) After first bathing the baby
    (b) After full examination in the nursery
    (c) Only after Vit K has been given
    (d) Immediately after birth

11. Eye care after birth should be:
    (a) Applying some colostrum
    (b) Cleaning with normal saline
    (c) Instillation of antibiotic drops or ointment
    (d) Instillation of silver nitrate

12. What immunization(s) is done in the neonatal period?
    (a) BCG
    (b) BCG and polio
    (c) Diphtheria, pertussis and tetanus (DPT)
    (d) Hepatitis B

13. Kangaroo Mother Care can be started:
    (a) At birth
    (b) As soon as the preterm infant is stable
    (c) When the infant is receiving oxygen
    (d) All of the above

14. How can the gestational age of an infant be determined?
    (a) Maternal weight gain
    (b) Ultrasound late in pregnancy
    (c) Birth weight
    (d) Examination of the infant

15. A preterm infant is one who:
    (a) Weighs less than 2500g
    (b) Is born before 37 weeks
    (c) Weighs less than 2000g
    (d) Needs intubation at birth

16. Underweight for age (growth retardation) is defined as:
    (a) Weight between 10th and 90th centile
    (b) Weight below 50th centile
    (c) Weight below 10th centile
    (d) None of the above
17. Preterm labour may result from:
   (a) Multiple pregnancy
   (b) Chorioamnionitis
   (c) Ante partum haemorrhage
   (d) Any of the above

18. Preterm infants are at risk for:
   (a) Hypothermia
   (b) Respiratory distress
   (c) Apnoea
   (d) All the above

19. A term infant who is wasted is at risk for:
   (a) Apnoea
   (b) Respiratory distress
   (c) Hypoglycaemia
   (d) Feeding difficulties

20. Wasting is diagnosed by the following:
   (a) Poor muscle tone
   (b) Hyperactivity
   (c) Short stature (length)
   (d) Poor subcutaneous tissue with wrinkled skin

21. Incubators are used to:
   (a) Provide warmth
   (b) Allow for observation
   (c) Act as isolation
   (d) All of the above

22. Prevention of infection in a nursery is achieved by:
   (a) Not allowing visitors
   (b) Scrupulous hand care
   (c) Gowns and masks
   (d) Use of prophylactic antibiotics

23. Thermal synchrony produced by KMC means that:
   (a) The mother’s temperature adjusts to the baby’s temperature
   (b) The baby’s temperature adjusts to the mother’s temperature
   (c) The father’s temperature adjusts to the baby’s temperature
   (d) All of the above

24. While experiencing KMC the baby:
   (a) Breathes more rapidly
   (b) Has less severe retractions
   (c) Has fewer apnoeic attacks
   (d) Needs more oxygen

25. KMC has resulted in:
   (a) Fewer infections
   (b) Fewer serious infections
   (c) More viral infections
   (d) Fungal skin infections
26. Chorioamnionitis is:
   (a) Infection of the cervix
   (b) A serious event for maternal health
   (c) Ascending inflammation of the membranes
   (d) A cause of fetal death

27. Cephalhaematoma:
   (a) Is a haemorrhage under the periosteum of a cranial bone
   (b) Is usually bilateral
   (c) Needs draining
   (d) Is related to breech delivery

28. Infants who are overweight (large) for their gestational age are:
   (a) Prone to hypoglycaemia
   (b) Increased loss of weight after birth
   (c) Associated with maternal diabetes
   (d) All of the above

29. Meconium aspiration occurs maximally:
   (a) During first stage of labour
   (b) During second stage of labour
   (c) At the time of the first breath
   (d) After several inspirations

30. Pneumonia may result from infection:
   (a) Antenatally
   (b) During delivery
   (c) In post partum period
   (d) Any of the above

31. Septicaemia presents as:
   (a) Hypothermia
   (b) Hyperthermia
   (c) Irritability
   (d) Convulsions

32. Lethargy is seen in:
   (a) Hypoglycaemia
   (b) Septicaemia
   (c) Intraventricular haemorrhage
   (d) All of the above

33. Hypothermia:
   (a) Is not serious
   (b) Can lead to hypoglycaemia
   (c) Can lead to acidosis
   (d) Can lead to septicaemia

34. Warming of the cold infant should be done:
   (a) Slowly over 4 hours
   (b) Over 2 hours
   (c) As rapidly as possible
   (d) The time period does not matter
35. Hypoglycaemia is defined as:
   (a) Blood glucose below 2.5 mmol/l
   (b) Blood glucose between 2.5 – 3.5 mmol/l
   (c) Blood glucose above 3.5 mmol/l
   (d) All of the above

36. Clinical signs of hypoglycaemia include:
   (a) Any deviation from normal behaviour
   (b) Vomiting
   (c) Sweating
   (d) Jaundice

37. Mild hypoglycaemia is managed by:
   (a) Waiting for an hour before repeating the blood glucose
   (b) Glucagon injection
   (c) An immediate milk feed
   (d) Insulin subcutaneously

38. Severe (symptomatic) hypoglycaemia is best managed by:
   (a) Milk feeds
   (b) Hydrocortisone
   (c) An IV bolus of 50% dextrose
   (d) A 10% IV glucose infusion

39. Hypoglycaemia may cause:
   (a) Heart failure
   (b) Brain damage
   (c) Apnoea
   (d) All of the above

40. The commonest cause of neonatal jaundice is:
   (a) Blood transfusion
   (b) Slow liver enzyme function (physiologic)
   (c) Haemorrhagic disease of the newborn
   (d) Hepatitis

41. Haemolysis due to ABO incompatibility occurs when:
   (a) Mother is group A and baby group O
   (b) Mother is group B and baby group O
   (c) Mother is group O and baby group O
   (d) Mother is group O and baby group A

42. Physiologic jaundice presents with raised bilirubin levels on:
   (a) Day one (1)
   (b) Day two (2)
   (c) After day five (5)
   (d) Second week

43. Management of neonatal jaundice should be:
   (a) Phototherapy
   (b) Phototherapy plus serum bilirubin level
   (c) Phototherapy plus antibiotics
   (d) Phototherapy plus IV glucose infusions
44. High bilirubin levels may cause:
   (a) Death
   (b) Long-term brain damage
   (c) Hearing loss
   (d) Any of the above

45. During phototherapy:
   (a) The eyes should be covered
   (b) Feeds discouraged
   (c) Stools sent to the laboratory
   (d) All of the above

46. Respiratory distress of the newborn is diagnosed by:
   (a) Low oxygen levels (decreased saturations or central cyanosis)
   (b) Chest indrawing
   (c) Grunting
   (d) All of the above

47. The most important factor in treating respiratory distress is:
   (a) Giving antibiotics
   (b) Placing infant in an incubator
   (c) Giving oxygen
   (d) Correcting glucose levels

48. Apnoea of prematurity is best prevented by:
   (a) Routine use of oxygen
   (b) Delaying gastric feeds
   (c) Use of theophylline
   (d) Maintaining a high incubator temperature

49. Meconium aspiration syndrome is most often seen in:
   (a) Preterm infants
   (b) Prolonged rupture of membranes
   (c) Following fetal distress
   (d) Infants of diabetic mothers

50. Convulsions in the newborn may be caused by:
   (a) Hypoxia
   (b) Hypoglycaemia
   (c) Meningitis
   (d) All of the above

51. Clinical features of infants with Hypoxia-Ischaemic Encephalopathy include:
   (a) Brisk primitive reflexes
   (b) Hyperactivity
   (c) Good head control
   (d) None of the above

52. Prevention of Hydroptic Ischaemic Encephalopathy is best achieved by:
   (a) Good intra-partum care of the fetus
   (b) Phenobarbitone to the mother
   (c) Ventilating the baby for 24 hours
   (d) Giving parenteral calcium gluconate to the infant
53. Congenital syphilis can be present when:
   (a) The mother has a positive serology (RPR) test
   (b) The baby has a distended abdomen
   (c) The baby appears normal
   (d) All the above

54. Cup feeding can be commenced at the gestational age of:
   (a) 28 weeks
   (b) 30 weeks
   (c) 32 weeks
   (d) 34 weeks

55. A poor weight gain in the preterm infant may indicate:
   (a) A low fluid intake
   (b) A low serum sodium level
   (c) Insufficient calories (energy) intake
   (d) All of the above

56. Injections in the newborn infant should be given:
   (a) Into the upper arm (deltoid muscle)
   (b) Into the gluteal muscle
   (c) Subcutaneously
   (d) Into the antero-lateral aspect of the thigh

57. Haemorrhagic disease of the newborn:
   (a) Presents with purpura
   (b) Is due to low platelets
   (c) Can be prevented by giving Vit K to the infant
   (d) All of the above

58. The maximal exposure of the fetus/infant to the human immune deficiency virus (HIV) occurs during:
   (a) Intra-uterine life
   (b) Delivery
   (c) Breastfeeding
   (d) Kissing by the mother

59. Exclusive breastfeeding provides sufficient nutrition for the infant for:
   (a) 3 months
   (b) 4 months
   (c) 5 months
   (d) 6 months

60. Exclusive breastfeeding is defined as giving:
   (a) Breastmilk only
   (b) Breastmilk plus water
   (c) Breastmilk plus diluted fruit juices
   (d) Breastmilk plus soft cereals
Please ring the one, most correct letter:

1. a b c d
2. a b c d
3. a b c d
4. a b c d
5. a b c d
6. a b c d
7. a b c d
8. a b c d
9. a b c d
10. a b c d
11. a b c d
12. a b c d
13. a b c d
14. a b c d
15. a b c d
16. a b c d
17. a b c d
18. a b c d
19. a b c d
20. a b c d
21. a b c d
22. a b c d
23. a b c d
24. a b c d
25. a b c d
26. a b c d
27. a b c d
28. a b c d
29. a b c d
30. a b c d
31. a b c d
32. a b c d
33. a b c d
34. a b c d
35. a b c d
36. a b c d
37. a b c d
38. a b c d
39. a b c d
40. a b c d
41. a b c c
42. a b c d
43. a b c d
44. a b c d
45. a b c d
46. a b c d
47. a b c d
48. a b c d
49. a b c d
50. a b c d
51. a b c d
52. a b c d
53. a b c d
54. a b c d
55. a b c d
56. a b c d
57. a b c d
58. a b c d
59. a b c d
60. a b c d
In this exercise you will practise using the Initial Assessment form to Assess and Classify a baby. Read the case history and then record the findings and classification on the Initial Assessment form.

**Case 1**
Maria Modise, a 24 years old Grav 2 Para 1, delivered a 3.5 kg baby girl by NVD at your hospital on the 20 April. Baby cried well after birth. She is brought through from postnatal ward to the nursery on 21 April at 09h15. Mom said she was not feeding well and the nurse noticed irregular jerky movements.

You quickly assess the need for emergency care. Baby is breathing well, no gasping, Resp rate 46 / min and Heart rate 144 / min. Blood glucose (Test strip) 2.6 mmol /L. Temperature 36.6°C. You notice irregular jerky movements of the right arm and face. Baby has decreased tone, lethargy and decreased movement. Fontanelle normal.

Document your findings using the recording form below or a standard Initial Assessment Form to Assess and Classify before comparing it with the completed form.

<table>
<thead>
<tr>
<th>Date: _______</th>
<th>Time _______</th>
<th>Name: ________________________________________</th>
<th>Date of birth: ___________</th>
<th>Weight: _______ kg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASK:</strong></td>
<td></td>
<td>How old is the baby? __________ Where was the baby born?________________________</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>What is the baby’s current problem? _________________________________________________________________________________</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is the baby having a problem with feeding? ___________________________________________________________________________</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Has the baby had any convulsions or abnormal movements? ___________________________________________________________________</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ASSESS</strong></th>
<th><strong>CLASSIFY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathing well?</td>
<td>Y  N</td>
</tr>
<tr>
<td>Gasping?</td>
<td>Y  N</td>
</tr>
<tr>
<td>Respiratory Rate &lt; 20</td>
<td>Y  N</td>
</tr>
<tr>
<td>Pale or cold?</td>
<td>Y  N</td>
</tr>
<tr>
<td>Heart Rate &gt; 180 or &lt; 100</td>
<td>Y  N</td>
</tr>
<tr>
<td>Is baby extremely lethargic?</td>
<td>Y  N</td>
</tr>
<tr>
<td>Glucose test strip</td>
<td>______</td>
</tr>
<tr>
<td><strong>ASSESS FOR PRIORITY SIGNS:</strong></td>
<td><strong>APNOEA AND RESPIRATORY DISTRESS</strong></td>
</tr>
<tr>
<td>Central cyanosis</td>
<td>Y  N</td>
</tr>
<tr>
<td>Apnoea</td>
<td>Y  N</td>
</tr>
<tr>
<td>Fast breathing</td>
<td>Y  N</td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>______</td>
</tr>
<tr>
<td>Severe chest indrawing</td>
<td>Y  N</td>
</tr>
<tr>
<td>Grunting</td>
<td>Y  N</td>
</tr>
<tr>
<td><strong>Respiratory failure</strong></td>
<td>Yes  No</td>
</tr>
<tr>
<td><strong>Circulatory failure</strong></td>
<td>Yes  No</td>
</tr>
<tr>
<td><strong>Hypoglycaemia</strong></td>
<td>Yes  No</td>
</tr>
<tr>
<td><strong>Apnoea</strong></td>
<td>Yes  No</td>
</tr>
<tr>
<td><strong>Respiratory distress</strong></td>
<td>Yes  No</td>
</tr>
</tbody>
</table>
ASSESS FOR OTHER PRIORITY SIGNS:

Temperature _______  Birth Weight _______  Jaundice  
Increased tone  Y  N  Decreased tone / floppy  Y  N  
Irregular jerky movements  Y  N  Reduced activity  Y  N  
Lethargic or Unconscious  Y  N  Bulging fontanel  Y  N  
Abdominal distension  Y  N  Bile stained vomiting  Y  N

Classify for priority signs

Completed form for Exercise 1A, Case 1


Weight: 3.5 kg

ASK:
How old is the baby?  Day 1
Where was the baby born?  This hospital
What is the baby’s current problem?  Not feeding well
Is the baby having a problem with feeding?  Yes
Has the baby had any convulsions or abnormal movements?  Lethargic, not moving well

ASSESS NEED FOR EMERGENCY CARE

Breathing well?  Y  N  Gasping?  Y  N  
Respiratory Rate < 20  Y  N

Pale or cold?  Y  N  Heart Rate > 180 or < 100  Y  N

Is baby extremely lethargic?  Y  N  Glucose test strip 2.6 mmol/l

ASSESS FOR PRIORITY SIGNS:  APNOEA AND RESPIRATORY DISTRESS

Central cyanosis  Y  N  Apnoea  Y  N

Fast breathing  Y  N  Respiratory Rate 46 /min

Severe chest indrawing  Y  N  Grunting  Y  N

ASSESS FOR OTHER PRIORITY SIGNS:

Temperature 36.6°C  Birth Weight 3.5 kg  Jaundice  
Increased tone  Y  N  Decreased tone / floppy  Y  N  
Irregular jerky movements  Y  N  Reduced activity  Y  N  
Lethargic or Unconscious  Y  N  Bulging fontanel  Y  N  
Abdominal distension  Y  N  Bile stained vomiting  Y  N

Classify for priority signs

SEVERE DISEASE
CASE 1
A small baby, Lebo is brought to the nursery from labour ward. You assess the need for emergency care. First you assess her breathing, circulation and glucose. She is gasping, cyanosed and her Heart Rate is 120 per minute. She is pale, and extremely lethargic. Her blood glucose is 2.0 mmol / l

Document the finding of the assessment and Classify her need for emergency care.

<table>
<thead>
<tr>
<th>ASSESS</th>
<th>CLASSIFY</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSESS NEED FOR EMERGENCY CARE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breathing well? Y N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gasping? Y N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory Rate &lt; 20 Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart Rate &gt; 180 or &lt; 100 Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is baby extremely lethargic? Y N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glucose test strip __________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory failure</td>
<td>Yes No</td>
<td></td>
</tr>
<tr>
<td>Circulatory failure</td>
<td>Yes No</td>
<td></td>
</tr>
<tr>
<td>Hypoglycaemia</td>
<td>Yes No</td>
<td></td>
</tr>
</tbody>
</table>

How would you act?

______________________________

______________________________

She starts breathing regularly on her own in 30 seconds. You continue with the oxygen and assess for priority signs. Respiratory rate is 80 / min, there is grunting and flaring and severe chest in drawing. She is no longer cyanosed. Her weight is 1.4 kg and the axillary temperature is 35.2°C. She has decreased tone and less than normal movement. Her fontanelle is normal. There is no jaundice, abdominal distension, or vomiting.

Document your findings on the Initial Assessment forms and classify her for priority signs.

<table>
<thead>
<tr>
<th>ASSESS</th>
<th>CLASSIFY</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSESS FOR PRIORITY SIGNS:</td>
<td>Apnoea</td>
<td></td>
</tr>
<tr>
<td>Central cyanosis Y N</td>
<td>Yes No</td>
<td></td>
</tr>
<tr>
<td>Fast breathing Y N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory Rate _____</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe chest indrawing Y N</td>
<td>Grunting Y N</td>
<td></td>
</tr>
<tr>
<td>ASSESS FOR OTHER PRIORITY SIGNS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature Birth Weight</td>
<td>Jaundice Y N</td>
<td></td>
</tr>
<tr>
<td>Increased tone Y N</td>
<td>Decreased tone / floppy Y N</td>
<td></td>
</tr>
<tr>
<td>Irregular jerky movements Y N</td>
<td>Reduced activity Y N</td>
<td></td>
</tr>
<tr>
<td>Lethargic or Unconscious Y N</td>
<td>Bulging fontanel Y N</td>
<td></td>
</tr>
<tr>
<td>Abdominal distension Y N</td>
<td>Bile stained vomiting Y N</td>
<td></td>
</tr>
</tbody>
</table>
Identify care that is required NOW

CASE 2
A term baby Mathosi is brought to the nursery from labour ward. She was born by normal delivery. Her APGAR scores were 5 at 1 minute and 6 at 5 minutes, so she is brought to the nursery. You assess the need for emergency care. She is breathing well and not gasping. She is pale and extremely lethargic. The glucose test strip is 2.6 mmol / l.

Classify her need for emergency care

<table>
<thead>
<tr>
<th>ASSESS NEED FOR EMERGENCY CARE</th>
<th>CLASSIFY</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathing well? Y N Gasping? Y N Respiratory Rate &lt; 20 Y N</td>
<td>Respiratory failure Yes No</td>
<td></td>
</tr>
<tr>
<td>Pale or cold? Y N Heart Rate &gt; 180 or &lt; 100 Y N</td>
<td>Circulatory failure Yes No</td>
<td></td>
</tr>
<tr>
<td>Is baby extremely lethargic? Y N Glucose test strip</td>
<td>Hypoglycaemia Yes No</td>
<td></td>
</tr>
</tbody>
</table>

What would you do?

You evaluate her for priority signs. She is breathing regularly, her respiratory rate is 50 / min. There is no cyanosis, no grunting and no chest in-drawing. Her temperature is 36.8°C. She has decreased tone and is lethargic. She has reduced activity. The fontanelle is full. There is no abdominal distention or vomiting.

Complete the Assessment and classification for priority signs

<table>
<thead>
<tr>
<th>ASSESS</th>
<th>ASSESS FOR PRIORITY SIGNS: APNOEA AND RESPIRATORY DISTRESS</th>
<th>CLASSIFY</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Central cyanosis Y N Apnoea Y N</td>
<td>Apnoea Yes No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fast breathing Y N Respiratory Rate</td>
<td>Respiratory distress Yes No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Severe chest indrawing Y N Grunting Y N</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ASSESS FOR OTHER PRIORITY SIGNS:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Birth Weight</td>
<td>Jaundice Y N</td>
</tr>
<tr>
<td>Increased tone Y N</td>
<td>Decreased tone / floppy Y N</td>
</tr>
<tr>
<td>Irregular jerky movements Y N</td>
<td>Reduced activity Y N</td>
</tr>
<tr>
<td>Lethargic or Unconscious Y N</td>
<td>Bulging fontanel Y N</td>
</tr>
<tr>
<td>Abdominal distension Y N</td>
<td>Bile stained vomiting Y N</td>
</tr>
</tbody>
</table>

Classify for priority signs
Identify care that is required NOW

CASE 3
Baby Khanyile is brought to the neonatal unit from casualty. She is 10 days old. She is breathing well and has a good circulation. Blood glucose is 2.8mmol/l. Her mother says she is going stiff and not feeding well. You evaluate for priority signs. Respiratory rate is 50 per minute, there is no grunting or chest in-drawing. She has increased tone and has irregular jerky movements. The fontanelle is full. She is jaundiced. Using the Initial assessment form assess and classify her for priority signs

<table>
<thead>
<tr>
<th>ASSESS FOR PRIORITY SIGNS:</th>
<th>APNOEA AND RESPIRATORY DISTRESS</th>
<th>Classify for priority signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central cyanosis</td>
<td>Y N</td>
<td>Apnoea Y N</td>
</tr>
<tr>
<td>Fast breathing</td>
<td>Y N</td>
<td>Respiratory Rate Y N</td>
</tr>
<tr>
<td>Severe chest indrawing</td>
<td>Y N</td>
<td>Grunting Y N</td>
</tr>
<tr>
<td>Temperature</td>
<td>Y N</td>
<td>Jaundice Y N</td>
</tr>
<tr>
<td>Increased tone</td>
<td>Y N</td>
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<td>Y N</td>
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</tr>
<tr>
<td>Lethargic or Unconscious</td>
<td>Y N</td>
<td>Bulging fontanel Y N</td>
</tr>
<tr>
<td>Abdominal distension</td>
<td>Y N</td>
<td>Bile stained vomiting Y N</td>
</tr>
</tbody>
</table>

What would you do?
The following is a case study with the completed “Initial Assessment” form and the “Limpopo Newborn Admission / Discharge” sheet.

**Before** you look at the completed forms, work through the case study and complete the forms for yourself, and then compare them with the completed forms which follow. How did you do?

**Case 1**
You are working at Musasa District Hospital.

Thandi Ngobeni is a 27 year old Grav 5 para 4. All her children are alive and were born at term after normal pregnancies.

She **booked** at the antenatal clinic at your hospital when she was 18 weeks pregnant. LMP 7 / 12 / 2007 She said that she was sure of her dates.

**Investigation results**: RPR result not back, HIV negative, ABO blood group unknown, Rhesus blood group +ve, Haemoglobin 11.5 G / dl.

She has 3 further antenatal clinic visits and everything was found to be normal. An ultrasound examination at 22 weeks agrees with the gestational age by dates.

She presents **in labour** at 07h45 on 5 / 7 / 2008, with a history of labour pains starting at 05h30 that morning. The cervix was 3 cm dilated, 3 moderate to strong contractions in 10 minutes, Fetal heart normal, Membranes intact.

A decision was made to do a caesarean section for preterm labour. A female **infant** weighing 1250g was delivered at 09h07, with Apgar scores of 5/10 at 1 minute and 8/10 at 5 minutes.

The respiration was slow initially, and the baby was ventilated with a bag and mask for 1 – 2 minutes after which she was breathing well on her own.

Chloramphenicol eye ointment was put into the babies eyes and she was given Vit K 1mg IMI. Her head circumference was 27.5 cm. While still in the labour ward, the baby developed rapid respiration, grunting and substernal recession, and was transferred to the newborn nursery for further management.

5 / 7 / 2008 **On admission** to the nursery, 10h05:
Low birth weight infant, 31 weeks by dates, looks pink, respiratory rate 80 / min, grunting and substernal recession. Heart rate 146 / min, temperature 35.6 °C, oxygen saturation 78% in room air. Blood glucose on test strip 1.8 mmol / l.

**Management**: IV neonatalyte stat at 4 ml / hour. Head box oxygen 40% and monitor saturations. Keep Sats at 87–93%. Warm up in incubator–maintain baby’s temperature at 36.5 °C. Nil by mouth. Hourly observations. Check blood glucose at 11h00. For CXR at 3pm.
5 / 7 / 2008, 16h00: Still rapid respiration 80 / min, pink with sats 91% in 40% head box oxygen. Blood glucose staying above 2.5 mmol / l. Chest X-ray: suggestive of hyaline membrane disease.

6 / 7 / 2008, 09h15: Still has tachypnoea 85 / min, grunting and recession. Sats 88% in 50% head box oxygen. Passed 2 stools and urine x 5. Baby registered: Record number 79734495

7 / 7 / 2008, 08h35: Looks the same. Resp rate 80 / min. still grunting and recession. Sats 89% in 50% head box oxygen. Blood glucose normal. Mother’s RPR is negative


8 / 7 / 2008, 12h30 Bilirubin 185umol / l Continue phototherapy

9 / 7 / 2008, 11h10 Respiratory rate 60 / min Sats 91% in 28% head box oxygen. Bilirubin level 175 umol / l. Granny visited yesterday. Baby’s name is Siphokazi.

10 / 7 / 2008, 09h50 Sats 90% in room air Still looks a bit yellow Bilirubin level 165 umol / l. Continue phototherapy.

11 / 7 /2008, 08h45 No longer has a tachypnoea, minimal recession. Does not look clinically jaundiced. Stop phototherapy if bilirubin less than 110.

12 / 7 / 2008, 09h05 Off phototherapy – yesterday’s bilirubin 85 umol / l.Mother doing intermittent KMC.

29 / 7 / 2008 Weight 1450g, tolerating full EBM feeds – cup. Mother coping well. Start continuous KMC.

14 / 8 / 2008 Weight 1760g breast feeding well and good weight gain. Mother coping well and very involved with her baby. Seems to enjoy KMC. KMC score today is 20. Discharge home. Breast feed. Continue KMC. Check weight in 3 days at clinic and to hospital in 1 week. Hospital follow up at 5 months for neurodevelopmental screen.

14 / 8 / 2008, 15h20 Discharged home with mother.
**Limpopo Newborn Admission / Discharge**

**Mother's Name:** Thandi NGOBENI  
**Mothers Number:** 79405722

**Infant's Name:** Sepheza

**Hospital:** Musasa district hospital  
**Hospital Number:** 7973 4495

**Age:** 27  
**EDD:** 16/9/08  
**Parity:** 5  
**Gravity:** 4  
**RPR:** unknown  
**ABO Blood Group:** unknown  
**Rh Group:** +ve  
**Feeding choice:** EBF / EFF / Uncertain

**Birth Time:** 9:07  
**Birth Date:** 5  
**Birth Month:** 7  
**Birth Year:** 2008  
**Gender:** F  
**Birth Weight:** 1250 kg  
**HC:** 57.5 cm  
**Gest Age Score:** 30 weeks  
**Apgar 1 min:** 5  
**Apgar 5 min:** 8  
**Time to spontaneous respiration:** < 1 minutes

**Antenatal Problems:** RPR unknown

**Date of onset of labour:** 5/7/08  
**Time of onset:** 5h 30m  
**Date and time ROM:** N/A  
**Duration of rupture of membranes:** N/A - hrs

**Liquor:** normal - clean  
**Mode of delivery:** c/s  
**Problems with delivery:** c/s for preterm labour

**Placenta:** not noted  
**Weight:** 320g

**Discharge:**

**Routine care:** Chloramphenicol Eye prophylaxis

<table>
<thead>
<tr>
<th>Treatment given</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>AmphoG</td>
<td>5/7/08</td>
</tr>
<tr>
<td>Vitamin K 1mg imi</td>
<td>5/7/08</td>
</tr>
<tr>
<td>BCG</td>
<td>5/4/08</td>
</tr>
<tr>
<td>Polio</td>
<td>5/4/08</td>
</tr>
</tbody>
</table>

| Benzathine Penicillin / Proc pan (Positive or unknown RPR) | N/A |
| Anirritroviral to baby (if applicable) | N/A |
| RTHC filled in | Yes/No |

**Admission to Neonatal Unit:**

**Reason for admission:** Respiratory distress - low Birth Weight

**Problems during neonatal admission:**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Birth Weight</td>
<td>5/7/08</td>
</tr>
<tr>
<td>Preterm</td>
<td>5/7/08</td>
</tr>
<tr>
<td>Febrile - Mild dehydration</td>
<td>5/7/08</td>
</tr>
<tr>
<td>Respiratory distress - RPP unknown</td>
<td>7/7/08</td>
</tr>
<tr>
<td>Jaundice - Phototherapy + tlc</td>
<td>8/7/08</td>
</tr>
</tbody>
</table>

**Outcome:** Problems resolved. Growing well.

**Feeding at discharge:** Breast only

**Follow up Plans:** Clinic 1 week + 14/11/08  
**Date:** 21/9/08 + 14/11/09  
**Place:** Musasa D.H.

**Discharge weight:** 1960
**INITIAL ASSESSMENT: SICK AND SMALL NEWBORNS IN HOSPITAL**

Date: 5/11/08  
Time: 9:45  
Name: Thandi Mpho Hlombe  
Date of birth: 3/7/08  
Weight: 1.250 kg

**ASK:** How old is the baby?  
Where was the baby born?  
What is the baby's current problem?  
Is the baby having a problem with feeding?  
Has the baby had any convulsions or abnormal movements?  

### ASSESS

<table>
<thead>
<tr>
<th>ASSESS NEED FOR EMERGENCY CARE</th>
<th>CLASSIFY</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathing well? Y</td>
<td>N</td>
<td>Gasping? Y</td>
</tr>
<tr>
<td>Pale or cold? Y</td>
<td>N</td>
<td>Heart Rate &gt; 180 or &lt; 100 Y</td>
</tr>
<tr>
<td>Is baby extremely lethargic? Y</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>

### ASSESS FOR PRIORITY SIGNS: APNOEA AND RESPIRATORY DISTRESS

| Central cyanosis | Apnoea | Y | N |
| Fast breathing | Y | N | Respiratory Rate | |
| Severe chest indrawing | Y | N | Grunting Y | N |

### ASSESS FOR OTHER PRIORITY SIGNS:

| Temperature 35.6°C | Birth Weight 1350g | Jaundice Y | N |
| Increased tone | Y | N | Decreased tone / flopp Y | N |
| Irregular jerky movements | Y | N | Reduced activity Y | N |
| Lethargic or Unconscious | Y | N | Bulging fontanel Y | N |
| Abdominal distension | Y | N | Bile stained vomiting Y | N |

### ASSESS FOR BIRTH INJURIES, MALFORMATIONS, LOCAL INFECTIONS

| Head circumference 37.5 cm < 3rd centile | Y | N | > 97th centile | Y | N | Normal | Y | N |
| Swelling of scalp | Y | N | Unusual appearance | Y | N |
| Cleft lip / Cleft palate | Y | N |
| Eyes:  
| N |  
| Pink draining | Y | N | Red or swollen eyelid / Subconjunctival haemorrhage Y | N |
| Neural tube defect | Y | N | Gastrochisis / omphalocele | Y | N |
| Imperforate anus | Y | N |
| Pustules / rash | Y | N | Umbilicus red / pus | Y | N |
| Abnormal position | Y | N | Asymmetric movements | Y | N | Cries when limb touched | Y | N |
| Club foot | Y | N | Extra digit | Y | N | Swollen limb or joint | Y | N |
| Other: | |

### ASSESS RISK FACTORS AND SPECIAL TREATMENT NEEDS

| Mother has diabetes | Y | N | Baby > 4 kg | Y | N | |
| Mother's blood group: Rh Neg | Y | N | Group O | Y | N | Unknown | Y | N |
| Rupture of membranes > 18 hours | Y | N | Maternal fever | Y | N | Offensive liquor | Y | N |
| Apgar < 7 at 5 minutes | Y | N |
| Mother's RPR: Positive | Partially treated Unknown |
| Mother HIV status: Positive | Negative | Unknown |
| Mother has TB, or has been on TB treatment within the last 6 months | Y | N |

**ACTION**

- **Respiratory failure**  
  - Yes Y | No N
- **Circulatory failure**  
  - Yes Y | No N
- **Hypoglycaemia**  
  - Yes Y | No N

**CLASSIFY**

- **Respiratory distress**  
  - NDM
  - IV Neonatal 4 ul/ml

- **Low Birth Weight**
  - **Cyanosis**  
    - Keep baby warm
  - **CPR**

Classify for all problems

Classify for all risk factors

RPR positive on mother

RPR negative on mother

Result

GOT
Mother’s blood group is O positive; HIV status and RPR status are unknown. Baby’s birth weight is 4.2 kg, the liquor was clear and not offensive. Apgar score was 7 at 1 minute and 9 at 5 minutes. Baby’s blood group is O Positive.

Discuss the risk factors.
EXERCISE 2A

Written

Case 1
Baby Zama was born at home and is admitted to the neonatal unit at 6am. You assess him for Emergency care, he is breathing well, his heart rate is 160, and he does not have pallor or extreme lethargy. His Blood sugar is 2.0mmol/l. On assessment of priority his breathing is fast (RR 70), and he is grunting, his tongue is pink, his weight is 1,800g, he is very cold to touch, his extremities are blue in colour, His temperature is 34.0 °C. He has normal tone normal activity and is not lethargic.

a) What is your classification?

b) What will you do?

Study the newborn observation Chart.

c) Comment on the observation at 08h00. What will you do?

d) Comment on the observation at 12h00. What will you do?

NEWBORN OBSERVATION CHART

<table>
<thead>
<tr>
<th></th>
<th>07:00</th>
<th>08:00</th>
<th>09:00</th>
<th>10:00</th>
<th>11:00</th>
<th>12:00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resp rate</td>
<td>70</td>
<td>88</td>
<td>60</td>
<td>52</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>Grunting</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Recession</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apnoea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart rate</td>
<td>166</td>
<td>160</td>
<td>154</td>
<td>158</td>
<td>152</td>
<td></td>
</tr>
<tr>
<td>Temp Infant</td>
<td>35.5</td>
<td>36</td>
<td>36.2</td>
<td>36.5</td>
<td>37.2</td>
<td></td>
</tr>
<tr>
<td>Incubator</td>
<td>38</td>
<td>38</td>
<td>37</td>
<td>37</td>
<td>37.5</td>
<td></td>
</tr>
<tr>
<td>Oxygen</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Amt administered</td>
<td>5l</td>
<td>5l</td>
<td>5l</td>
<td>5l</td>
<td>5l</td>
<td></td>
</tr>
<tr>
<td>Baby’s colour</td>
<td>Blue hands / feet</td>
<td>Blue hands / feet</td>
<td>Pink</td>
<td>Pink</td>
<td>Pink</td>
<td></td>
</tr>
<tr>
<td>SATS</td>
<td>82</td>
<td>85</td>
<td>88</td>
<td>92</td>
<td>96</td>
<td></td>
</tr>
<tr>
<td>Blood glucose</td>
<td>2.2mmol</td>
<td>NPO</td>
<td>NPO</td>
<td>NPO</td>
<td>NPO</td>
<td>2.5mmol</td>
</tr>
<tr>
<td>Feed: mt given</td>
<td>NPO</td>
<td>NPO</td>
<td>NPO</td>
<td>NPO</td>
<td>NPO</td>
<td></td>
</tr>
<tr>
<td>Activity/movement</td>
<td>Limp</td>
<td>Limp</td>
<td>Some flexion</td>
<td>Some flexion</td>
<td>Some flexion</td>
<td></td>
</tr>
<tr>
<td>Fluid</td>
<td>IV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Amount</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amount given in 24 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL fluid intake in 24 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Answer True or False**
A baby needs incubator care, is the incubator temperature correct?

| A 6 day baby weighing 1.200g is put in an incubator with a temperature of 35°C | True | False |
| A baby weighing 2000g on day 10 is put on 32.5 °C | True | False |
| A 1500g baby at birth is put on 32.5 °C | True | False |
| A 3200g baby on day 2 is put on 30.0 °C | True | False |
| A 17 day old baby weighing 1800g is put on 33.5 °C | True | False |
| A 15 day old baby weighing 1000g is put on 34.5 °C | True | False |
| A 8 day baby weighing 1700g is put on 32 °C | True | False |
| A 12 day old baby weighing 1400g is put on 31.0 °C | True | False |
| A 15 day old baby weighing 1600g is put on 33.5 °C | True | False |
| A 3 day old baby weighing 1500g is put on 35.0 °C | True | False |

**Case 2**
Baby Sipho was born at clinic weighing 1300g. She was brought in by ambulance and was 5 hours old on arrival. You assess for emergency care. HR 146 / min, RR 82 / min Blood sugar is 1.6mmol/l.

a) What do you do?

On further assessment RR is 82/min, no cyanosis, indrawing or grunting. Temperature 31.6°C. She is pink, but feels very cold. She has reduced activity. Fontanelle is normal.

b) What is your assessment and classification?

c) What is the appropriate method for warming baby Sipho?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

d) After 2 hours, Sipho's temperature is 32.2°C. What would you do?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Case 1
You assess a 3 day old term infant for priority signs. He is cyanosed, has a respiratory rate of 90 / minute, grunting and severe chest indrawing.

a) Classify
__________________________________________________________________________
__________________________________________________________________________

b) How would you administer oxygen?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

c) How will you measure the amount of oxygen being given?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

d) How will you change the concentration of oxygen being given?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

e) What flow rate of oxygen should be administered into a head box?
__________________________________________________________________________
__________________________________________________________________________

f) How will you know that the baby is getting the correct amount of oxygen?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Case 2
Baby Bulelwa is born prematurely at 30 weeks. She is transferred from theatre to your unit on face mask oxygen. She is warm and pink, breathing well and has normal circulation and glucose. She has a respiratory rate of 70 per minute, and mild chest indrawing and no grunting. She weighs 1150g. Her oxygen saturation was 89%.

a) Classify Bulelwa
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________


After 3 hours of age, she is found to have a respiratory rate of 86 / minute with grunting and more chest indrawing. The oxygen saturation is now 81%.

b) Classify again and indicate what you would do?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

At 6 hours of age, her respiratory rate has increased to 90 / minute, and the oxygen saturation is 80%. She is receiving 40% oxygen by head box.

c) What do you do?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Her oxygen saturation remains normal (88 – 93%) in 50% head box oxygen over the next 2 days, and the respiratory rate has come down to 74 / minute. On day 5 you find that her oxygen saturation is 94%.

d) What would you do?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

On day 10 you find that she is still receiving head box oxygen 40%. Her oxygen saturation is 96%.

e) What would you do?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

f) What are the dangers of giving too little oxygen?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

g) What are the dangers of giving too much oxygen?
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Answer True or False

A 1.4 kg baby has SEVERE RESPIRATORY DISTRESS. He is unable to feed

<table>
<thead>
<tr>
<th>Statement</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>He should be started on headbox oxygen</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>He should be started on face mask oxygen</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>He should be started on CPAP</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>He should be given 100% oxygen</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>If there is no sats monitor (pulse oximeter) then the oxygen saturation of the baby does not need to be monitored</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>Free flowing oxygen into an incubator is always helpful to a baby &amp; should be used</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>When he has a nasogastric tube in situ, use nasal canula oxygen</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>If sats &lt; 88% on 80% oxygen in headbox then change to CPAP</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>ALL preterm babies need oxygen</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>Face mask oxygen should only be used briefly, when the headbox oxygen has to be removed</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>The baby can be taken out of head box oxygen during procedures e.g. drawing blood</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>A baby on headbox oxygen should be fed using a nasogastric tube</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>An air / oxygen blender mixes pure oxygen with medical air to give the required percentage of oxygen</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>A venturi mixes pure oxygen with room air</td>
<td>True</td>
<td>False</td>
</tr>
</tbody>
</table>

4 A 3kg baby has SEVERE RESPIRATORY DISTRESS. His mother has been breastfeeding him. He is placed in headbox oxygen – 40%. He remains distressed with grunting, severe chest in-drawing and cyanosis. The oxygen concentration is increased to 60%. He remains cyanosed. It is increased to 80%. On 80% oxygen the baby has saturation of 85%.

What steps should you take now?
Case 1
A preterm infant of 1700g is born in a level 1 hospital. The infant is nursed in a closed incubator but no feed was given for the past 2 hours. The blood glucose recorded is 1.5 mmol / l. The infant has irregular jerky movements.

a) Why has this infant become hypoglycaemic?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

b) How could hypoglycaemia have been prevented in this baby?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

(c) Could hypoglycaemia have caused the irregular jerky movements?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

d) How could you treat this infant?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Answer true or false

<table>
<thead>
<tr>
<th>Statement</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small and sick babies should have their blood glucose level routinely checked every 3 hrs during the first 24 hours</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>Babies of diabetic mothers should have their blood glucose checked hourly for the first 6 hours</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>All babies &gt; 4kg should have their blood glucose checked 3 hourly for 24 hours</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>Hypoglycaemia means a blood glucose &lt; 2.5 mmol / l</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>Babies who are hypothermic should have their blood glucose checked after 6 hours</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>Babies who have not been fed do not need to have their blood glucose checked regularly</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>A baby with hypoglycaemia may be asymptomatic</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>Severe hypoglycaemia means a blood glucose &lt; 1.4 mmol / l</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>Symptoms of hypoglycaemia include irregular jerky movements, lethargy, apnoeic, and convulsions</td>
<td>True</td>
<td>False</td>
</tr>
</tbody>
</table>
Case 3
A 2200g baby was born by caesarean section. The mother is very ill. The baby has not been fed yet. The baby has had an episode of apnoea

a) Why could this baby have apnoea?

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

A nurse decides to check the baby’s blood glucose level. The result is 1.3mmol/l.

b) What would you do?

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Case 4
A term baby weighing 3200g is jittery. He has not been fed as his mother is critically ill and is still in theatre for a ruptured uterus. A nurse checked his blood glucose – it is 2mmao / l.

a) What would you do?

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Case 5
A 2.8kg baby has persistently low blood sugars (ranging between 1.8 and 2mmol / l).

a) What would you do?

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Case 1
A well baby weighs 1600g on day 6. The birth weight was 1500g. He is on replacement feeds

a) What is the total volume of feed needed on day 6?
__________________________________________________________________________
__________________________________________________________________________

b) What feeds will you prescribe for this baby?
__________________________________________________________________________
__________________________________________________________________________

Case 2
A baby with a birth weight of 1500g weighs 1400g on day 3

a) What is the total fluid requirement for the 24 hours?
__________________________________________________________________________
__________________________________________________________________________

b) What feeds will you give? (amount and frequency)
__________________________________________________________________________
__________________________________________________________________________

c) How much IV fluid will you give?
__________________________________________________________________________
__________________________________________________________________________

Case 3
A well baby weighs 2000g on day 7

a) What are his fluid requirements for the 24 hours?
__________________________________________________________________________
__________________________________________________________________________

b) How should he be fed?
__________________________________________________________________________
__________________________________________________________________________

c) If he needed replacement feeds, how much would he need, and how frequently
__________________________________________________________________________
__________________________________________________________________________
Case 4
A well baby weighs 1450g on day 4. He is being fed expressed breast milk

a) How much milk must he receive in 24 hours?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

b) Write your instructions for his feeds for the day.
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Are the following statements TRUE OR FALSE?

<table>
<thead>
<tr>
<th>Statement</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 2 day old baby weighing 1200g should be given IV/Neonatalyte at 3ml/hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A 1750g baby at birth is given 15ml of milk feeds 3 hourly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All babies weighing &lt;1.5kg should be kept on NPO on day 1 &amp; be given IV Neonatalyte</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Babies receiving IV fluids to be given 5% Dextrose</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>The best feed for small &amp; sick babies is breast milk</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>A baby weighing 1.5 kg should be started on 12 ml breast milk 3 hourly</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>A baby weighing 1.450g should be started on 11ml breast milk 3 hourly on the first day</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>A baby weighing 1.600g should be given 30 mls breast milk 3 hourly by day 5</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>Babies lose 10 -15% of their body weight &amp; regain it by 14 days.</td>
<td>True</td>
<td>False</td>
</tr>
</tbody>
</table>
Case 1
Thabo was born at 32 weeks gestation with a birth weight of 1550g. His mother had had ruptured membranes for about 2 days before she went into labour. She had not had any antenatal care.

a. What risk factors does Thabo have for having an infection?

b. After admission, what would you do to prevent further infection?

c. What do you need to do to treat potential infections in Thabo?

d. Who would you allow to visit Thabo while he is in the neonatal unit?

e. Write your care plan for Thabo (at the time of admission).
1. Where should the following babies be managed?

a) A well baby weighing 2200g

b) A well baby weighing 4300g

c) A baby weighing 1400g with respiratory distress needing 60% oxygen

d) A baby weighing 3200g with Apgar scores of 3/10 at 1 minute and 6/10 ay 5 minutes

e) A baby weighing 1800g with a blood glucose level of 1.8 mmol / l

f) A baby weighing 3500g who looks yellow

g) A well baby weighing 1700g

h) A baby weighing 2900g who has had a convulsion. The 5 minute Apgar score was 7

i) A baby weighing 1250g who is having recurrent apnoea

j) A baby weighing 3400g with gastroschisis
Case 1
Bongiwe is a baby with a birth weight of 1450g. She was born at the clinic. She develops respiratory distress (respiratory rate 90 / min, subcostal indrawing and grunting)

a) What is your management plan?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

b) Where should she be managed?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

c) What must be done before transfer”?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

 d) What will you do before the baby leaves in the ambulance?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

 e) What documentation must go with the baby?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
EXERCISES FROM MODULE 3: ASSESS FEEDING & COUNSEL

EXERCISE 3A
Written

Have the following babies lost more or less than 10% of their birth weight?

1. Birth weight 1600g Day 4 weighs 1410g
   ____________

2. Birth weight 1200g Weight has come down to 950g
   ____________

3. Birth weight 950g Lowest weight 800g
   ____________

4. Birth weight 1550g Day 5 weighs 1470g
   ____________

Comment on the weight gain in these babies

1. Birth weight 1780g
   10 days weighs 1820g
   17 days weighs 1970g
   24 days weighs 2210g

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

2. Birth weight 1040g
   14 days weighs 1020g
   21 days weighs 1170g
   28 days weighs 1220g
   35 days weighs 1360g

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

3. Birth weight 1450g
   12 days weighs 1400g
   19 days weighs 1450g
   26 days weighs 1500g
   33 days weighs 1530g

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
For each case:
1. Read the description of the rest of the assessment of the infant. Record the additional assessment results on copies of the newborn infant assessment form.
2. Use the Weight for Age chart to determine if the infant is growing well.
3. Classify feeding.

**Case 1 - Sashie**
The mother says that she is breastfeeding Sashie, and that she is feeding well, but she is concerned that she does not have enough milk, and is considering giving her formula. She asks for your advice. She was tested for HIV in pregnancy. The result was negative. She says that Sashie breastfeeds 9 or 10 times in 24 hours and drinks no other fluids. Then the health worker looks at Sashie’s weight and age; it is 4.5kg. Her birth weight was 3.6kg. The health worker decides that there is no need to assess breastfeeding.

**Case 2 - Evan**
Evan's mother says that feeding is going well now, although she initially struggled to feed him, as he was so small. Her mother gave him some sugar water by teaspoon, but he is now breastfeeding well. She was tested for HIV in pregnancy and found to be HIV positive. She has decided to breastfeed Evan. He breastfeeds 6 or 7 times in 24 hours. She has not given him any other milk or drinks. The health worker checks his weight for age. His birth weight was 2.4kg and he now weighs 2.5kg.

Since Evan is low weight for age, the health worker decides to assess breastfeeding. His mother says that he is probably hungry now, and puts him to the breast. The health worker observes that Evan's chin the breast, his mouth is wide open and his lower lip is turned outward. More areola is visible above than below the mouth. He is suckling with slow deep sucks, sometimes pausing. His mother continues feeding him until he is finished.
Case 3 - Jenna
The mother says that Jenna usually feeds well but because she is ill, she is no longer feeding as well. The mother is HIV positive and her last baby died, so she has decided not to breastfeed Jenna. She feeds her 50ml of formula milk with a cup and spoon 4 times a day. She uses 50ml of boiled water and 2 scoops of milk to mix the feed. The mother sometimes puts her to the breast at night because she cries and it is difficult to make up milk at night. She says she does not have any milk. The health worker checks her weight for age. She weighs 3 kilograms. Her birth weight was 2.8 kilograms.

Since Jenna is not growing well, the health worker decides to observe her feeding. She has a cup and spoon with her and she feeds Jenna well.
EXERCISES FROM MODULE 4: DISCHARGE & FOLLOW UP

EXERCISE 4A
Written

Case 1
Baby Tendai was born on 24th May weighing 1230g at 30 weeks gestation. His mother is HIV positive and on antiretroviral therapy. His problems were: Low birth weight, preterm, hyaline membrane disease – for which he received CPAP for 3 days, hypoglycaemia, neonatal jaundice (maximum TSB 272µmol / l). He received Nevirapine at birth and was on AZT for 7 days. His mother has chosen to breast feed him.

Continuous KMC was started on 18th June. On 6th July he weighs 1750g and is breast feeding well. He has no apnoea and is on iron and multivitamin supplements.

a) Is Tendai a “high risk” baby?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

b) What is the KMC score

- Tendai's mother has a supportive husband, who has part time work, and mother-in-law. Their home has an outside tap but no electricity.
- Tendai is breast feeding exclusively
- He is able to attach well to the breast and his mother is doing this well
- He suckles well
- His mother handles him well
- Weight chart attached
- His mother needs help with giving the medications
- She says that she knows how to do KMC
- She does not always do KMC with Tendai – he is often seen lying in the bed
- She is not sure if she will be able to do KMC at home
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

C) Will Tendai need medication to take home? If yes, which medication?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Refer to Case 1 above

c) Will Tendai need medication to take home? If yes, which medication?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

a) When must Tendai come back for a check?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

b) What are the important things which must be checked?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

c) How often must he be seen again?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

d) For how long must he be followed up?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
TRAINING MODULES

APPENDICES

SICK & SMALL NEWBORNS

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## LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>APH</td>
<td>Antepartum haemorrhage</td>
</tr>
<tr>
<td>AIDS</td>
<td>Acquired immunodeficiency syndrome</td>
</tr>
<tr>
<td>AGA</td>
<td>Appropriate for gestational age</td>
</tr>
<tr>
<td>ANC</td>
<td>Antenatal care</td>
</tr>
<tr>
<td>ARV</td>
<td>Anti-retroviral</td>
</tr>
<tr>
<td>AZT</td>
<td>Azidothymidine (antiretroviral drug)</td>
</tr>
<tr>
<td>BBA</td>
<td>Born before arrival</td>
</tr>
<tr>
<td>BD</td>
<td>Twice daily</td>
</tr>
<tr>
<td>CA</td>
<td>Chorio–amnionitis</td>
</tr>
<tr>
<td>CHD</td>
<td>Congenital heart disease</td>
</tr>
<tr>
<td>CNS</td>
<td>Central nervous system</td>
</tr>
<tr>
<td>CPAP</td>
<td>Constant positive airway pressure</td>
</tr>
<tr>
<td>CRP</td>
<td>C-reactive protein</td>
</tr>
<tr>
<td>CXR</td>
<td>Chest X-ray</td>
</tr>
<tr>
<td>EBM</td>
<td>Expressed breastmilk</td>
</tr>
<tr>
<td>EBF</td>
<td>Exclusive breastfeeding</td>
</tr>
<tr>
<td>FBC</td>
<td>Full blood count</td>
</tr>
<tr>
<td>GA</td>
<td>Gestational age</td>
</tr>
<tr>
<td>GPH</td>
<td>Gestational proteinuric hypertension</td>
</tr>
<tr>
<td>HIE</td>
<td>Hypoxic-ischaemic encephalopathy</td>
</tr>
<tr>
<td>HIV</td>
<td>Human immunodeficiency virus</td>
</tr>
<tr>
<td>HMD</td>
<td>Hyaline membrane disease</td>
</tr>
<tr>
<td>HR</td>
<td>Heart rate</td>
</tr>
<tr>
<td>ICU</td>
<td>Intensive care unit</td>
</tr>
<tr>
<td>IDM</td>
<td>Infant of diabetic mother</td>
</tr>
<tr>
<td>IM</td>
<td>Intramuscular injection</td>
</tr>
<tr>
<td>IMCI</td>
<td>Integrated Management of Childhood Illnesses</td>
</tr>
<tr>
<td>IPPV</td>
<td>Intermittent positive pressure ventilation</td>
</tr>
<tr>
<td>IV</td>
<td>Intravenous injection</td>
</tr>
<tr>
<td>IVF</td>
<td>Intravenous fluids</td>
</tr>
<tr>
<td>IVH</td>
<td>Intra-ventricular haemorrhage</td>
</tr>
<tr>
<td>KMC</td>
<td>Kangaroo mother care</td>
</tr>
<tr>
<td>LBW</td>
<td>Low birth weight</td>
</tr>
<tr>
<td>LP</td>
<td>Lumbar puncture</td>
</tr>
<tr>
<td>NEC</td>
<td>Necrotising enterocolitis</td>
</tr>
<tr>
<td>NG</td>
<td>Naso-gastric</td>
</tr>
<tr>
<td>NMR</td>
<td>Neonatal mortality rate</td>
</tr>
<tr>
<td>NND</td>
<td>Neonatal death</td>
</tr>
<tr>
<td>NTD</td>
<td>Neuraltube defect</td>
</tr>
<tr>
<td>NVP</td>
<td>Nevirapine</td>
</tr>
<tr>
<td>PCR</td>
<td>Polymerase chain reaction test</td>
</tr>
<tr>
<td>PDA</td>
<td>Patient ductus arteriosus</td>
</tr>
<tr>
<td>PMTCT</td>
<td>Prevention of mother to child transmission</td>
</tr>
<tr>
<td>PROM</td>
<td>Prolonged rupture of membranes</td>
</tr>
<tr>
<td>RDS</td>
<td>Respiratory distress syndrome</td>
</tr>
<tr>
<td>RPR</td>
<td>Rapid plasma regain (screening test for syphilis)</td>
</tr>
<tr>
<td>ROM</td>
<td>Rupture of membranes</td>
</tr>
<tr>
<td>RR</td>
<td>Respiratory rate</td>
</tr>
<tr>
<td>RTHC</td>
<td>Road to health chart</td>
</tr>
<tr>
<td>TSB</td>
<td>Total serum bilirubin</td>
</tr>
<tr>
<td>TSR</td>
<td>Time to sustained respiration</td>
</tr>
<tr>
<td>TTN</td>
<td>Transient tachypnea of the newborn</td>
</tr>
<tr>
<td>VCT</td>
<td>Voluntary counselling and testing</td>
</tr>
</tbody>
</table>
KEY REFERENCES


7. South African Handbook of Resuscitation of the Newborn, Revised 2006. Printed under the auspices of the South Africa Paediatric Association (available from the Department of Paediatrics, University of the Witwatersrand)
### INITIAL ASSESSMENT FORM: SICK AND SMALL NEWBORNS IN HOSPITAL

**Date:** ________ **Time:** ________ **Name:** ________________________________________ **Date of birth:** _______________ **Weight:** ________ kg

**ASK:** How old is the baby? ____________________ Where was the baby born? ________________________________  
What is the baby’s current problem? _______________________________________________________________________________  
Is the baby having a problem with feeding? ____________________________________________________________________________  
Has the baby had any convulsions or abnormal movements? ______________________________________________________________________

### ASSESS

<table>
<thead>
<tr>
<th>Question</th>
<th>Y</th>
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<tr>
<td>How old is the baby?</td>
<td></td>
<td></td>
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<tr>
<td>Where was the baby born?</td>
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<tr>
<td>What is the baby’s current problem?</td>
<td></td>
<td></td>
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<tr>
<td>Is the baby having a problem with feeding?</td>
<td></td>
<td></td>
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<tr>
<td>Has the baby had any convulsions or abnormal movements?</td>
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### ASSESS NEED FOR EMERGENCY CARE

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<tr>
<th>Item</th>
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</thead>
<tbody>
<tr>
<td>Breathing well?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gasping?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory Rate &lt; 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pale or cold?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart Rate &gt; 180 or &lt; 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is baby extremely lethargic?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glucose test strip</td>
<td></td>
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### ASSESS FOR PRIORITY SIGNS: APNOEA AND RESPIRATORY DISTRESS

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<tr>
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</thead>
<tbody>
<tr>
<td>Central cyanosis</td>
<td></td>
<td></td>
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<tr>
<td>Apnoea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fast breathing</td>
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<td></td>
</tr>
<tr>
<td>Respiratory Rate &gt;60</td>
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<td></td>
</tr>
<tr>
<td>Severe chest indrawing</td>
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<td></td>
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<tr>
<td>Grunting</td>
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### ASSESS FOR OTHER PRIORITY SIGNS:

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<td>Temperature</td>
<td></td>
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<tr>
<td>Birth Weight</td>
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<tr>
<td>Jaundice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased tone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased tone / floppy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irregular jerky movements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lethargic or Unconscious</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulging fontanel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdominal distension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bile stained vomiting</td>
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</table>

### ASSESS FOR BIRTH INJURIES, MALFORMATIONS, LOCAL INFECTIONS

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Head circumference &lt; 3rd centile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 97th centile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swelling of scalp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unusual appearance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eyes: Pus draining</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red/swollen eyelid or Subconjunctival haemorrhage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleft lip / Cleft palate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neural tube defect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imperforate anus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastrochisis / omphalocele</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pustules / rash</td>
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<td></td>
</tr>
<tr>
<td>Umbilicus red / pus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abnormal position</td>
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<td></td>
</tr>
<tr>
<td>Asymmetric movements</td>
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<td></td>
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<tr>
<td>Cries if limb touched</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Club foot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extra digit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swollen limb or joint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
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</table>

### ASSESS RISK FACTORS AND SPECIAL TREATMENT NEEDS

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<tr>
<th>Item</th>
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<th>N</th>
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<tbody>
<tr>
<td>Mother has diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby &gt; 4 kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother’s blood group: Rh Neg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gp O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rupture of membranes &gt; 18 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal fever</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offensive liquor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apgar &lt; 7 at 5 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother’s RPR/VDRL: Positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother HIV status: Positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother has TB, or has been on TB treatment within the last 6 months</td>
<td></td>
<td></td>
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### CLASSIFY

<table>
<thead>
<tr>
<th>Item</th>
<th>Y</th>
<th>N</th>
</tr>
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<tbody>
<tr>
<td>Respiratory failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circulatory failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypoglycaemia</td>
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</tr>
</tbody>
</table>

### ACTION

<table>
<thead>
<tr>
<th>Item</th>
<th>Y</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circulatory failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypoglycaemia</td>
<td></td>
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</tr>
</tbody>
</table>

### Classify for priority signs

<table>
<thead>
<tr>
<th>Item</th>
<th>Y</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apnoea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory distress</td>
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</tr>
</tbody>
</table>

### Classify for all problems

<table>
<thead>
<tr>
<th>Item</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Classify for all problems</td>
<td></td>
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</tbody>
</table>

### Classify for all risk factors

<table>
<thead>
<tr>
<th>Item</th>
<th>Y</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classify for all risk factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIMPOPO NEWBORN ADMISSION / DISCHARGE FORM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother's Name:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infant's Name:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers Number:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital Number:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDD:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravidity:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth Time:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth Date:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth Month:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth Year:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RPR:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pos / neg / unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABO Blood Group:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rh Group:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth Weight:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HC:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gest Age Score:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VCCT:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes / No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeding choice:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antenatal Problems:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date of onset of labour:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time of onset:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date and time ROM:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of rupture of membranes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>�hrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquor:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode of delivery:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perinatal risk factors:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problems with delivery:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Placenta:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>wt:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routine care:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment given:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admission to Neonatal Unit:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admission Date:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reason for admission:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problems during neonatal admission:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeding at discharge:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow up Plans:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Place:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge weight:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge date:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
COMPLETING THE LIMPOPO NEWBORN ADMISSION / DISCHARGE SHEET

Correctly completing the Newborn admission discharge record ensures that risk factors are not missed and that all important information for the care of the baby is recorded. If you use a different record go through this now, and ensure you capture all the information. The first page of the form is completed in duplicate so that the first page can be torn out and sent with the baby if he is transferred to another facility.

a) Basic data for hospital records and identification purposes

<table>
<thead>
<tr>
<th>Limpopo Newborn Admission / Discharge</th>
<th>Hospital:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother's Name:</td>
<td>Infant's Name:</td>
</tr>
<tr>
<td>Mothers Number:</td>
<td>Hospital Number:</td>
</tr>
</tbody>
</table>

The first part is the basic information about the baby and his / her mother. This is an essential part of patient identification. It is essential to have this completed with the hospital numbers. These babies are admitted and must therefore have a hospital number.

b) Antenatal Clinic Information

<table>
<thead>
<tr>
<th>Age:</th>
<th>EDD:</th>
<th>Parity:</th>
<th>Gravidity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPR:</td>
<td>If RPR pos treated / NOT / Partial Rx</td>
<td>ABO Blood Group:</td>
<td>Rh Group</td>
</tr>
<tr>
<td>Pos / neg / unknown</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VCCT:</th>
<th>If Yes pos / neg / unk</th>
<th>If pos ARV to mom Y / N Time:</th>
<th>Feeding choice:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes / No</td>
<td></td>
<td></td>
<td>EBF / EFF / Uncertain</td>
</tr>
</tbody>
</table>

This information should be available on the mother’s antenatal card. Ideally this information should be entered in the labour ward or postnatal ward before the baby is sent to the nursery. If the baby is admitted from outside the hospital, it may be necessary to make a phone call to the centre where the baby was delivered to get the information.

Age - The mother’s age must be recorded. There may be problems in the pregnancy and delivery if the mother is either very young or over the age of 35 years.
EDD (Expected Date of Delivery) - Knowing when the baby was due to be born is helpful in deciding whether the baby has been born preterm, at term, or is post dates. This information is helpful when deciding on what the cause of problems could be.

Gravity and Parity - This will give a picture of some aspects of the mother’s past obstetric history; for example, it can indicate whether she has had abortions.

RPR - If the mother has syphilis, she must be treated in order to prevent the baby from getting the disease. There may be no clinical signs in the mother but the baby can die as the result of syphilis. If the mother is RPR positive, it is essential to know whether or not she has been adequately treated.

ABO blood group - Many places in South Africa are no longer routinely doing the ABO grouping in pregnant women. However one of the common causes of severe neonatal jaundice is an ABO blood group incompatibility. If the mother’s group is known, it must be recorded.

Rh (Rhesus) blood group - This is an essential investigation for all women at antenatal clinic. A rhesus blood group incompatibility is a serious cause of neonatal jaundice. When the mother is rhesus negative, she must receive anti-D gammaglobulin after delivery.

HIV information - This is VERY important for both the mother and baby, as well as for health workers. It is essential that all role players in the care of the mother and her baby are clear about the HIV status. Information is confidential, but it must not be a secret. The records are confidential and should not be perused by people who are not directly caring for the mother and child.

The information to be recorded is:

- Was the mother counselled and tested?
- If tested, what was the result of the test?
- If the test was positive, was she given ARVs, and when?
- What is her feeding choice for the baby?

If the answer to any of these questions is unknown, action must be taken, in consultation with the mother, to ensure the best outcome for the baby.

The HIV status of the mother must be known and recorded clearly on all relevant documents, taking into account issues of confidentiality.

Failure to do this puts the baby at risk for getting infected with HIV.

Summarise the antenatal problems, if any, in the space provided.

For example: RPR +ve, mother untreated
c) Labour Information

<table>
<thead>
<tr>
<th>Date of onset of labour:</th>
<th>Time of onset:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date and time ROM:</td>
<td>Duration of rupture of membranes: hrs</td>
</tr>
<tr>
<td>Liquor:</td>
<td></td>
</tr>
<tr>
<td>Mode of delivery:</td>
<td></td>
</tr>
<tr>
<td>Problems with delivery:</td>
<td></td>
</tr>
<tr>
<td>Placenta:</td>
<td>wt:</td>
</tr>
</tbody>
</table>

**Date and time of onset of labour** - The length of labour is important for the baby. Prolonged labour, especially, can cause fetal hypoxia. There is also a higher risk of infection and of HIV transmission when labour has been prolonged.

**Rupture of membranes** - Prolonged rupture of membranes increases the chance of the baby becoming infected, and also the chance of HIV infection of the baby if the mother is positive.

**Liquor** - The presence of infection (if known) and meconium need to be recorded.

**Mode of delivery** - Assisted deliveries, or an abnormal presentation is an alert for possible problems in the baby.

**Problems with delivery** - These must be recorded

**Placenta** - The placenta is part of the baby, and needs to be examined carefully, as this can give valuable information about the baby. In particular, the placenta must be weighed. A smaller than expected placenta suggests that the baby may be growth restricted, and a larger than usual placenta suggests that there may have been an intrauterine infection.

This information should be recorded in labour ward, but if it is not done, it is essential to get it from the mother’s notes.
## d) Birth and resuscitation information

<table>
<thead>
<tr>
<th>Birth Time:</th>
<th>Birth Date:</th>
<th>Birth Month:</th>
<th>Birth Year:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender:</th>
<th>Birth Weight:</th>
<th>HC:</th>
<th>Gest Age Score:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kg</td>
<td>cm</td>
<td>weeks</td>
</tr>
</tbody>
</table>

Apgar 1 min | Apgar 5 min | Time to spontaneous respiration: |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>minutes</td>
</tr>
</tbody>
</table>

**Resuscitation:**
- None
- Oxygen
- Mask
- Intubation

**Details of resuscitation:**

### Date and time of birth - This will be available from labour ward if it has not already been filled in on the form.

The **gender, birth weight and head circumference** are assessed and measured in labour ward unless the baby is very ill.

**Gestational age** - This means that a Ballard score must be done on all low birth weight infants. In low birth weight babies, it is not always reliable to use the patient’s dates.

**Apgar Scores**
- Every baby must have an Apgar score recorded at 1 minute.
- If this is normal, and the baby remains normal, a 5 minute Apgar score is not needed.
- However if the 1 minute Apgar score is less than 7, the baby must have the score repeated at 5 minutes.
- The 1 minute Apgar score is an indication for the need or otherwise for resuscitation.
- The 5 minute Apgar score is a measure of the success or otherwise of the resuscitation.

Babies with low Apgar scores will need to be admitted for observation and special care.

**Time to spontaneous respiration** - This is important as it has some prognostic value. Infants with a time to spontaneous respiration of 20 minutes or longer have a very poor neurological outcome.

**Resuscitation**
- None - This means that the baby was born, breathed well & needed no assistance.
- Oxygen - This means that oxygen was administered by **face mask**, but **did not need ventilation**.
- Mask - This means that the baby was ventilated using a bag and face mask.
- Intubated - This means that the baby was **intubated and ventilated** through an endotracheal tube.

**Details of resuscitation** - Write here the brief details of exactly what was done to resuscitate the baby.
e) Perinatal Risk Factors

<table>
<thead>
<tr>
<th>Perinatal risk factors:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

It is very important to identify risk factors which have been present during the antenatal period and delivery.

For example:
- Mother unbooked
  - RPR status unknown
  - HIV status unknown
  - Blood group unknown
- Low birth weight
- Preterm delivery
- Baby born at home

There are many others, but this is an illustration of how to record the risk factors, because these are things which put the baby “at risk” for problems after birth. There are almost always risk factors in babies who need admission, and there may be several in the same baby, as in the example above.

Risk factors always need action to be taken. (See chart book p xx. xx)

f) Record of admission

<table>
<thead>
<tr>
<th>Admission to Neonatal Unit:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission Date:</td>
</tr>
<tr>
<td>Reason for admission:</td>
</tr>
</tbody>
</table>

Reason for admission does not need to be a diagnosis.

For example:
A baby may have respiratory distress. The reason for admission is therefore respiratory distress, and the diagnosis of the cause may only be found out later. The reason for admission is therefore “Respiratory Distress”. Sometimes the diagnosis is known, in which case the reason for admission could be “Pneumonia” and not “Respiratory Distress”.
g) Problem list

<table>
<thead>
<tr>
<th>Problems during neonatal admission:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem: 1</td>
<td></td>
</tr>
<tr>
<td>Problem: 2</td>
<td></td>
</tr>
<tr>
<td>Problem: 3</td>
<td></td>
</tr>
<tr>
<td>Problem: 4</td>
<td></td>
</tr>
</tbody>
</table>

This is a list of the **clinical and other problems** which the baby may have during the time that he / she is in hospital. These problems may be present on admission or could develop while the baby is in the ward.

An example of a problem list is:

- Low birth weight
- Preterm
- Mother HIV +ve
- Mother severely ill – in ICU at XXX Hospital
- Jaundice Max TSB = 254
- etc

For each of these problems, write the date on which the problem was identified.

It is very important to **keep this list complete and up to date**, as it is a means of communication with other health workers who may have to manage the baby, but are not involved with him / her on a daily basis.
h) Information needed on discharge

1. Routine care given

<table>
<thead>
<tr>
<th>Discharge:</th>
<th>Treatment given:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloramphenicol Eye prophylaxis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin K 1mg imi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzathine Penicillin / Proc pen (Positive or unknown RPR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antiretroviral to baby (if applicable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTHC filled in</td>
<td>Yes / No</td>
<td></td>
</tr>
</tbody>
</table>

RTHC = Road To Health Chart

It is important to record all this information, because:
- It is essential for the health of the baby that these medications are given and the necessary tests done.
- A copy of this page is given to the mother when the baby is discharged, and it serves as a communication document to the Primary Health Clinic staff when they see the baby.

The information should be entered on the chart as soon as it is done. This is the confirmation that the relevant procedure has been carried out.

2. Summary of Outcome

Outcome:

This is a brief summary of the hospital management and clinical state of the baby on discharge.

For example:
A low birth weight baby had problems of respiratory distress (pneumonia), which has resolved, and has been on Kangaroo Mother Care

The notes should read: Pneumonia resolved. Mother has been doing KMC. Good weight gain.

Remember that the problem list must be completed!! If it is not completed, this comment will not make sense!
3. **Plans for the future**

<table>
<thead>
<tr>
<th>Feeding at discharge:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Follow up Plans:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
</tr>
<tr>
<td>Place:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Discharge weight:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge date:</td>
</tr>
</tbody>
</table>

- **Feeding method:** It is important for the PHC sister to know the feeding method on discharge, as she will be able to support the mother in this, or find out why the method has been changed, if this has happened.

- **Follow up plans:** The note should read something like: Routine clinic visits. Needs neurodevelopmental follow up in 4 months at the hospital. Add the date of the follow up visit in the appropriate place.

- **Discharge weight:** **Very important.** It is needed in order to assess the weight gain since discharge from the hospital.

- **Discharge date:** Also very important as it gives the time span between discharge and the clinic visit.

📖 **See Exercise Module 6.1 again – and do exercise 1D**