Ministry of Health & Family Welfare
Government of India
New Delhi
2009

Facility Based IMNCI (F-IMNCI)
Participants Manual

World Health Organization

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सत्यमेव जयते

NATIONAL RURAL HEALTH MISSION
राष्ट्रीय ग्रामीण स्वास्थ्य मिशन
(2005-2012)

Ministry of Health & Family Welfare

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Facility Based (F-IMNCI)

Participants Manual

Module1: Emergency Triage Assessment and Treatment (ETAT)

Module 2: Facility Based Care of Sick Young Infant

Module 3: Facility Based Care of Sick Child

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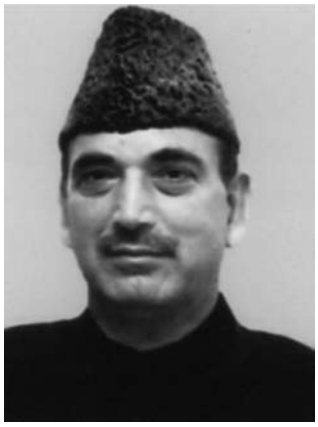


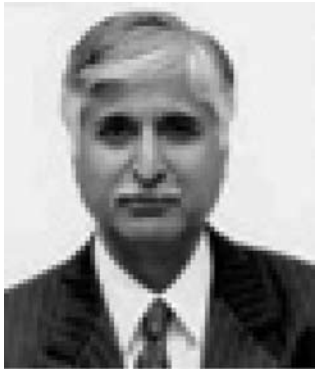
MESSAGE

Effective Sick Newborn and Child Care is a crucial challenge that is faced by every health care setting dealing with sick Newborn and Child. Training of Doctors, Nurses and ANMs in low resource settings is an urgent need. A key component is to equip the staff with appropriate knowledge and skills to improve the quality of service delivery. The Ministry of Health and Family Welfare is addressing this through launch of the Facility Based Integrated Neonatal and Childhood illness (F-IMNCI). A simple and scalable training module on F-IMNCI has been developed for this programme. This training will enhance the multi-skills missing at facilities to manage newborn and childhood illness.

This programme provides evidence-based knowledge in improving newborn and child health care at facilities. The health provider after training will furnish all the required care for a newborn and child, identify and manage common complications, stabilize newborns and child needing additional interventions.

I am sure that this programme will act as an enabling tool for newborn and child survival in the country and also help address the acute shortage of Pediatricians at facilities.

Ghulam Nabi Azad
Union Minister for Health and Family Welfare
Government of India



FOREWORD

The National Population Policy Goals aims at achieving an Infant Mortality Rate of 30/1000 live births by the year 2010. The National Rural Health Mission launched in April 2005 reiterates this commitment.

The Ministry of Health and Family Welfare is implementing the Integrated Management of Neonatal and Childhood Illness (IMNCI) as a key child health strategy within the National Reproductive Child Health Programme II and the National Rural Health Mission. The aim of the strategy is to implement a comprehensive newborn and child health package at the household and the community level through medical officers, nurse and LHVs. However this excludes the skills required at facilities to manage new born and childhood illness. The long term program needs therefore can only be met if the health personnel and workers possess optimum skills for managing newborn and children both at the community level as well as the facility level. The F-IMNCI training manual would be able to provide the optimum skills needed at the facilities by the Medical officers and Staff Nurses.

According to the Bulletin on Rural Health Statistics 2007, there is an acute shortage of Pediatricians in the country; as against the required number of 4045 there are only 898 pediatricians in position. The introduction of F-IMNCI will help build capacities of the health personnel at facilities to address new born and child hood illness and thus help bridge this acute shortage of specialists.

The Child Health Division, Department of Health and Family Welfare have prepared these operational guidelines to enable States to roll out F-IMNCI in their States. I congratulate the Division and the other Professional Bodies, Development Partners and Field Experts who have given their whole hearted assistance for the development of this Operational Manual.

I am sure that this manual, when implemented in word and spirit, will go a long way in reducing the enormous burden of newborn and child mortality in our country.

Naresh Dayal. IAS
Secretary (Health & Family Welfare)
Ministry of Health and Family Welfare
Government of India

PREFACE

The Government of India is committed to achieve a reduction in infant and child mortality to achieve the National Population Policy and National Rural Health Mission Goal of Infant mortality of 30 per thousand live births. The Integrated Management of Neonatal and Childhood Illness (IMNCI) is the Indian adaptation of the WHO-UNICEF generic Integrated Management of Childhood Illness (IMCI) strategy and is the centrepiece of newborn and child health strategy under Reproductive Child Health II and National Rural health Mission.

F-IMNCI is the integration of the Facility based Care package with the IMNCI package, to empower the Health personnel with the skills to manage new born and childhood illness at the community level as well as the facility. It helps to build capacities to handle referrals taking place from the community. Referrals include the most common childhood conditions responsible for over 70 per cent of all deaths in children under the age of 5 years in resource poor setting.

The implementation of F-IMCI strategy will help improve the performance and quality of health workers. The critical element of this strategy is the evidence-based integrated approach with a focus on new born and child hood illness. This package will also help address the acute shortage of pediatricians at facilities.

An operational manual for implementation of F- IMNCI in States has been developed with inputs form various professional bodies such as Indian Academy of Pediatrics, NNF, WHO and UNICEF and Field level experts. It would not have been possible to bring out these guidelines without their active interest and support. I thank them all.

I would also like to place on record my appreciation for the hard work and untiring efforts put in by the Child Health Division in developing these operational manual.

Amit Mohan Prasad, IAS
Joint Secretary (RCH)
Ministry of Health and Family Welfare
Government of India

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MODULE-I

Emergency Triage Assessment and Treatment

PARTICIPANTS MANUAL

SECTION. I INTRODUCTION

This module describes a sequential process for managing sick young infants and children as soon as they arrive in hospital. The module contains guidelines for triage, emergency treatment, and inpatient care of all children including newborn babies in small hospitals where basic laboratory facilities and inexpensive essential drugs are available.

1.0 Learning objectives

At the end of the course the participants will be able to:

- Carry out ETAT (Emergency Triage, Assessment and Treatment) of all sick young infants and children when they arrive at a health facility.
- Understand the management process of sick newborn and children referred to a hospital.

1.1 Management process of the sick child (Chart 1)

a. The first step in assessing children referred to a hospital should be triage – the process of rapid screening to decide to which of the following group(s) a sick child belongs:
   - First assess every child for emergency signs. Those with **emergency signs** require immediate emergency treatment.
   - If emergency signs are not present, look for priority signs. Those with **priority signs** should alert you to a patient who is seriously ill and needs immediate assessment and treatment.
   - Children with no emergency or priority signs are treated as **non-urgent** cases.

b. Once emergency signs are identified, prompt emergency treatment needs to be given to stabilize the condition of the child.

c. After the child with emergency signs is stabilised, take a detailed history and perform examination relevant to the presenting problems.

d. Perform relevant laboratory investigations.

Laboratory investigations needed at small hospitals
Essential • Hemoglobin • Blood smear and RDT for malaria • Blood glucose • Microscopy of CSF, urine and stool • Blood grouping and cross-matching • Serum bilirubin • X-rays **Desirable** • CBC (Complete blood counts including platelet count) • Routine urine, stool examination • Blood and CSF culture

e. A list of possible diagnoses should be made. A sick child often has more than one diagnosis or clinical problem requiring treatment.

f. After deciding the main diagnosis and any secondary diagnoses or problems, treatment should be started (Specific and Supportive).

g. Once the diagnosis is made, children fit enough to be discharged with treatment and follow-up advice can be sent home. Those who are admitted should be closely monitored for response to treatment.

h. Plan the discharge after improvement. At discharge, teach the mother all treatments needed to be carried at home, advise her when she must return to hospital with child immediately, and arrange follow-up.

1.2 Principles of in-patient care for sick children

a. Basic Principles of Child Care

Basic principles of child care for providing good in-patient care should include following practices:

- Communicating with the parents.
- Arranging the paediatric ward so that the most seriously ill children get the closest attention.
- Allowing the mother to stay with the child.
- Keeping the child comfortable.
- Preventing the spread of nosocomial infection by encouraging the staff to wash hands regularly, providing water and soap and other measures.
- Maintaining warmth in the area in which young infants or children with severe malnutrition are being looked after in order to prevent hypothermia.

b. Key aspects in monitoring

The key aspects in monitoring the progress of a sick child are:

- Making a plan at the time the child enters hospital, to monitor the child regularly.
- The frequency of monitoring, which will depend on the nature and severity of the child's clinical condition.
- Using a standard chart to record essential information to facilitate prompt identification of any problems that require change in treatment.
- Bringing these problems to the attention of the doctors or other senior staff who have the experience and authority to act on these findings and, if necessary, change the treatment.

c. Discharge from the hospital

Careful monitoring of the child's overall response to treatment and correct planning of discharge from the hospital are just as important as making the diagnosis and initiating the treatment. The discharge process for all sick children should include:

- Correct timing of discharge from the hospital.
- Counseling the mother on correct treatment and feeding of the child at home.
- Ensuring the child's immunization status and record card are up-to-date.
- Communicating with the health personnel who referred the child or who will be responsible for follow-up care (discharge card or a referral note; this will lead to more appropriate referrals to hospital and better relationship between hospital and community health workers).
- Instructing mother on when to return for follow-up care and signs indicating the need to return immediately.
- Assisting the family with special support (eg, providing equipment for a child with disability).

d. Providing follow-up care

- Children who are discharged from the hospital should return for follow-up care to the hospital or if this is not possible then to a first-level referral facility for checking the child's condition in relation to the present problem.
- Mother should be advised to return immediately if the child develops any of the following signs:

Young infant:

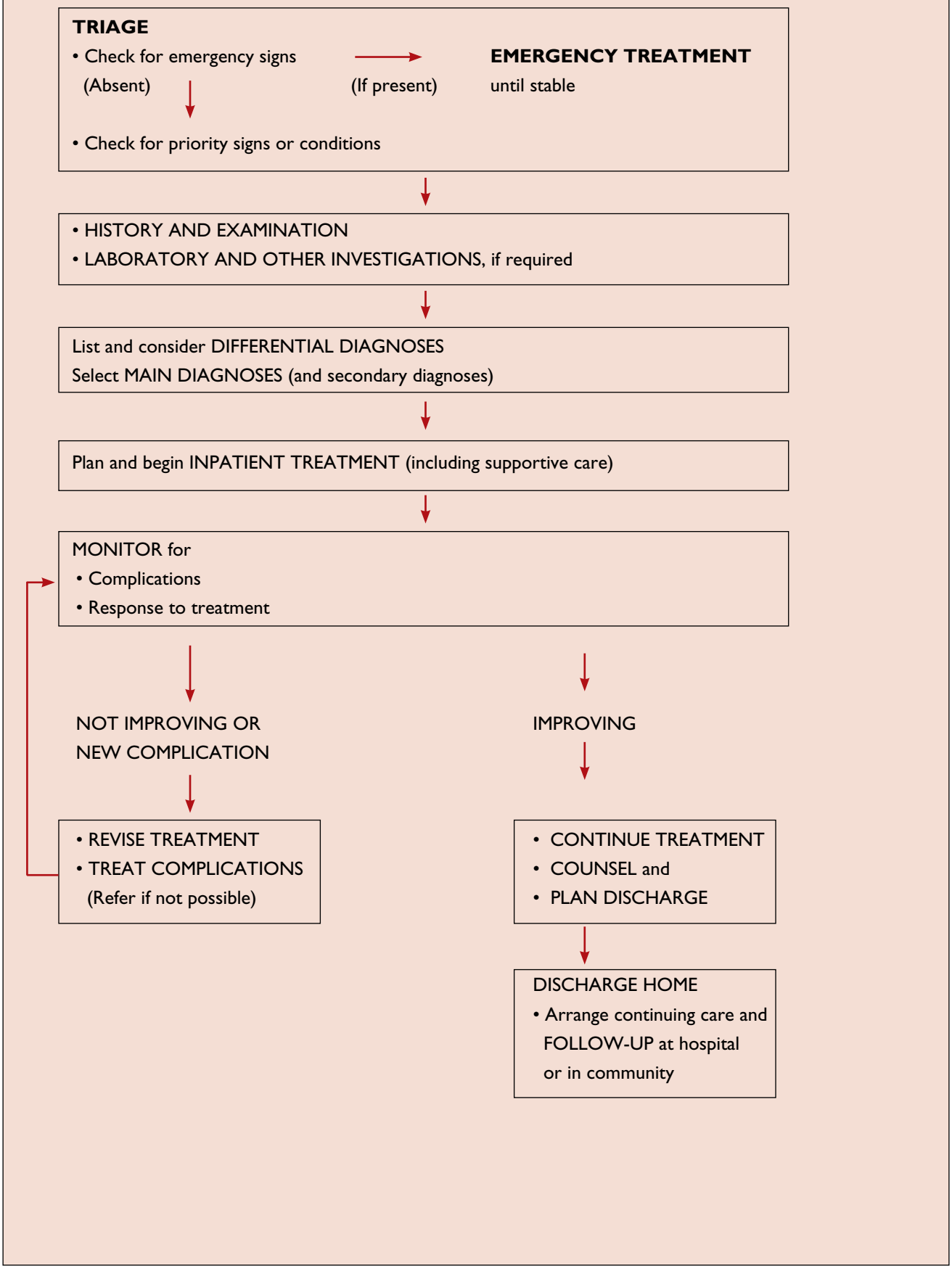
- Breastfeeding or drinking poorly.
- Becomes sicker.
- Develops a fever or feels cold to touch.
- Fast breathing.
- Difficult breathing.
- Yellow palms and soles (if infant has jaundice).
- Diarrhoea with blood in stool.

Sick child:

- Not able to drink.
- Becomes sicker.
- Develops a fever.
- In a child with cough or cold: fast or difficult breathing.
- In a child with diarrhoea: blood in stool or drinking poorly.

- Remind the mother about the child's next immunization visit.

Chart 1: Steps in the management of sick young infants and children admitted to hospital



SECTION. 2 EMERGENCY TRIAGE ASSESSMENT AND TREATMENT

ETAT guidelines help in identifying children with life-threatening conditions that are most frequently seen in developing countries. While a dedicated team should continue to run the emergency department 24 hrs, it is very important that new doctors are taught the skills and are fully supervised. Nurses are the most important personnel in any emergency department since they are involved in the emergency care at all stages. Hence, it is equally important that they are well trained in important life saving procedures and their skills are renewed at frequent intervals. Besides the medical staff other helping and non-clinical staff can also be trained to recognize some of the life-threatening situations.

2.0 Learning objectives

After completion of this section the participant should be able to:

- Triage all sick young infants and children when they arrive at a health facility into the following categories:
  - Those with **emergency** signs.
  - Those with **priority** signs.
  - Those who are **non-urgent** cases.\

Categories after Triage	Action
Emergency cases (E)	Emergency treatment
Priority cases (P)	Rapid assessment and action
Non-urgent cases (N)	Can wait

- Assess airway and breathing and give emergency treatments.
- Assess the status of circulation and level of consciousness.
- Manage shock, coma, and convulsions.
- Assess and manage severe dehydration in a child with diarrhoea.

2.1 How to Triage

Keep in mind the ABCD steps: Airway, Breathing, Circulation, Coma, Convulsion, and Dehydration. Make sure that the child is warm at all times.

This is described in Chart 2.

Chart 2: Triage

ASSESS FOR EMERGENCY SIGNS (In all cases)

TREAT:
- **Check for head/neck trauma before treating child (do not move neck if cervical spine injury possible)**
- **Give appropriate treatment for + ve emergency signs**
- **Call for help**
- **Draw blood for glucose, malaria smear, Hb)**

AIRWAY AND BREATHING	• Not breathing or gasping **or** • Central cyanosis **or** • Severe respiratory distress	→ Any Sign Positive	• Manage airway • Provide basic life support (Not breathing/gasping) (Chart 3) • Give oxygen • Make sure child is warm*
CIRCULATION	Cold extremities **with**: • Capillary refill longer than 3 sec, **and** • Weak and fast pulse	→ IF POSITIVE Check for severe acute malnutrition	• If the child has any bleeding, apply pressure to stop the bleeding. Do not use a tourniquet • Give oxygen • Make sure child is warm* • Insert I/V and begin giving fluids rapidly (Chart 4) If not able to insert peripheral I/V, insert an umbilical or intraosseous line **IF SEVERE ACUTE MALNUTRITION** (Age ≥2 months) **If lethargic or unconscious:** • Insert I/V line and give IV glucose and fluids (Chart 5) **If not lethargic or unconscious:** • Give glucose orally or by NG tube • Proceed immediately to full assessment and treatment
COMA CONVULSING	• Coma **or** • Convulsing (now)	→ IF COMA OR CONVULSING	• Manage airway • Position the child • Check and correct hypoglycaemia • If convulsions continue give I/V calcium in young infants • If convulsions continue, give anticonvulsants
SEVERE DEHYDRATION (ONLY IN CASES WITH DIARRHOEA)	Diarrhoea plus any two of these: • Lethargy • Sunken eyes • Very slow skin pinch	→ DIARRHOEA plus TWO SIGNS POSITIVE Check for severe acute malnutrition	• Make sure child is warm* • Insert I/V line and begin giving fluids rapidly following PLAN C **IF SEVERE ACUTE MALNUTRITION** (Age ≥2 months) • Do not start I/V immediately • Proceed immediately to full assessment and treatment

* Check temperature; if baby is cold to touch, rewarm

IF THERE ARE NO EMERGENCY SIGNS LOOK FOR PRIORITY SIGNS:

These children need prompt assessment and treatment

• Tiny baby (<2 months)	• Respiratory distress (RR > 60/min)	• Temperature <36.5°C or > 38.5°C
• Bleeding	• Trauma or other urgent surgical condition	• Restless, continuously irritable, or lethargy
• Pallor (severe)	• Referral (urgent)	• Poisoning
• Malnutrition: visible severe wasting	• Oedema of both feet	• Burns (major)

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

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

Summary

Triage is the sorting of patients into priority groups according to their need. All children should undergo triage.

The main steps in triage are:

- Look for emergency signs.
- Check for head/neck trauma.
- Treat any emergency signs you find.
- Call for Help
- Draw blood for emergency samples.
- Look for any priority signs.
- Place patients with priority signs at the front of the queue.
- Move on to the next patient.

EXERCISE - 1

1. Indicate the correct chronological order of the following actions:

☐ Ask about head or neck trauma.

☐ Call a senior health worker to see any emergency.

☐ Have blood specimens taken for laboratory analysis.

☐ Look for any priority signs.

☐ Look for emergency signs.

☐ Move on to the next patient.

☐ Place priority patients at the front of the queue.

☐ Start treatment of any emergency signs you find.

2. Mayank, three weeks old, is brought to you with complaints of 4 days of diarrhea and vomiting. His temperature is 36.2°C and he is lethargic, breathing normally, his hands are cold and capillary refill is < 3 sec. The eyes are normal, skin pinch takes more than 3 sec, and he has a weak and fast pulse. On the basis of the triage chart, categorize the child. List the signs on the basis of which you assigned the category.

3. An 8-day-old baby fed on top milk is brought to a health facility with complaints of diarrhoea. The eyes and skin pinch are normal and baby is alert. On the basis of the triage chart, categorize the child. List the signs on the basis of which you assigned the category.

4. Monu, one year old, had a seizure outside the hospital. He became unconscious. His breathing sounds very wet and noisy and there is drooling from his mouth. He has central cyanosis. On the basis of the triage chart, categorize the child. List the signs on the basis of which you assigned the category.

SECTION. 3 ASSESSMENT AND TREATMENT OF EMERGENCY SIGNS

All sick children are assessed for **A**irway, **B**reathing, **C**irculation, **C**oma, **C**onvulsions and severe **D**ehydration **(ABCD)**. In view of the poor outcome in many small infants and severely malnourished children due to co-existent hypothermia and hypoglycaemia, the management of these is detailed here before ABCD. Efforts should be made to maintain euglycemia and euthermia while managing ABCD.

Maintaining Temperature

Maintaining temperature is an essential step in managing sick newborns and sick children, for example with shock or with severe acute malnutrition (SAM). As soon as a sick child is brought with temperature below 35.5°C or who is cold to touch (where thermometer is not available), maintain thermal environment as given below.

Thermal environment

- Keep the infant dry and well wrapped.
- Cap, gloves and stockings are helpful to reduce heat loss.
- Keep the room warm (at least 25°C) making sure that there is no heat source directed straight at the newborn.
- Keep the baby under a radiant warmer and re-warm so as to bring the child's temperature to 36.5°C.
- Pay special attention to avoiding chilling the infant during examination or investigation.
- Monitor temperature every half hourly for first 2 hrs and then every 2 hourly.

Check and Treat Hypoglycaemia

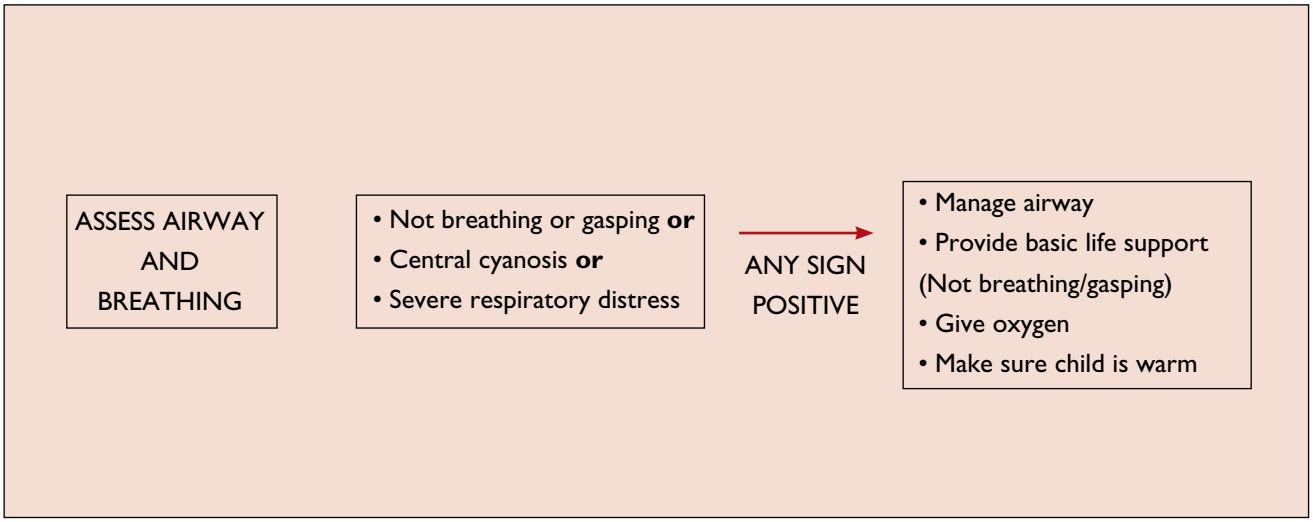
Check for blood glucose in all children presenting with emergency sign, those with severe acute malnutrition and all sick young infants:

- If hypoglycaemia detected (defined as < 45 mg/dl for young infants and < 54 mg/dl in older sick children beyond 2 months), give I/V bolus dose of 10% dextrose, in the dose of 2 ml/kg for young infants, and 5 ml/kg for older children.
- If you can not measure blood glucose, give bolus dose as above.
  Details of management of hypoglycaemia in young infants are given in *section 6.2*.

3.1 Managing Airway and Breathing

The letters **A** and **B** in "**ABCD**" represent "airway and breathing". If there is no problem with the airway or breathing, you should look for signs in the areas represented by **C**.To assess if the child has an airway or breathing problem you need to know:

- Is the child breathing?
- Is the child blue (centrally cyanosed)?
- Does the child have severe respiratory distress?



3.1.1 Is the Child Breathing?

To assess whether or not the child is breathing, there are three things you must do:

- **Look:** If active, talking, or crying, the child is obviously breathing. If none of these, look again to see whether the chest is moving.
- **Listen:** Listen for any breath sounds. Are they normal?
- **Feel:** Can you feel the breath at the nose or mouth of the child?

If the child is not breathing, you need to manage the airway and support the breathing artificially by ventilating the child with a bag and mask and continue further steps as given in Chart 3.

3.1.2 Does the Child Show Central Cyanosis?

Cyanosis occurs when there is an abnormally low level of oxygen in the blood. This sign may be absent in a child who has severe anemia. To assess for central cyanosis, look at the mouth and tongue. A bluish or purplish discoloration of the tongue and the inside of the mouth indicates central cyanosis.

3.1.3 Does the Child have Severe Respiratory Distress?

Observe whether the child has significant discomfort from not getting enough air into the lungs. Is there difficulty in breathing while talking, feeding or breastfeeding? Is the child breathing very fast, have severe lower chest wall in-drawing, or using the accessory muscles for breathing which cause the head to nod or bob with every inspiration? The latter is particularly seen in young infants. Is there any abnormal noises heard when breathing? A harsh noise while breathing in is called stridor, a short noise when breathing out in young infants is called grunting. Stridor in a calm child and grunting are signs of severe respiratory distress.

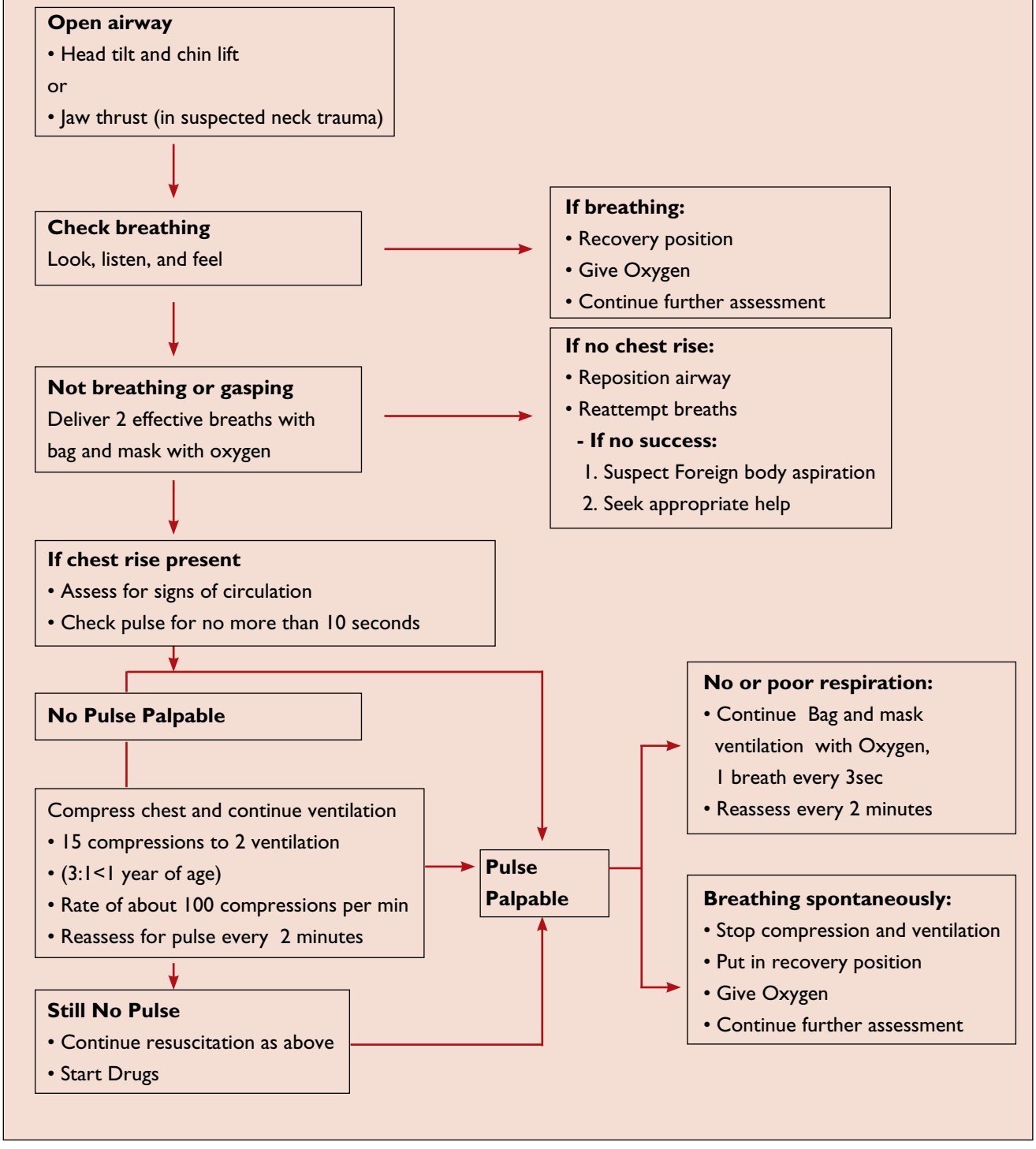
Signs of severe respiratory distress
- Respiratory rate ≥ 70/min
- Severe lower chest in-drawing
- Head nodding
- Grunting
- Apnoeic spells
- Unable to feed due to respiratory distress
- Stridor in a calm child

If the child is breathing adequately, go to section 3.2 and quickly continue the assessment for other emergency signs.

3.1.4 Basic Life Support

Basic Life Support for a young infant is different from that of an older child because of differences in anatomy and physiology. The following sections refer to children older than 2 months. For young infants, *refer to the Module-2, Section 4.4.*

CHART 3: Providing basic life support



3.1.5 Management of airway in a child with gasping or who has just stopped breathing

Always ask and check for head or neck trauma before treating, as this will determine how much a child can be moved. If a child has trauma you must avoid further injury during assessment or treatment.
It is also important to know the child's age because you will position an infant (under 12 months of age) differently from an older child.

a. Positioning to Improve the Airway when no neck trauma suspected

No neck trauma is suspected	
Child conscious	**Child unconscious**
• Inspect mouth and remove foreign body, if present. • Clear secretions from throat using suction catheter. • Let child assume position of maximal comfort. • Give Oxygen. • Continue with further assessment.	• Open the airway by Head tilt and Chin lift method. • Inspect mouth and remove foreign body, if present • Clear secretions from throat • Check the airway by looking for chest movements, listening for breath sounds and feeling for breath.

Head tilt-chin lift maneuver (Fig 1)

The neck is slightly extended and the head is tilted by placing one hand on to the child's forehead. Lift the mandible up and outward by placing the finger tips of other hand under the chin.

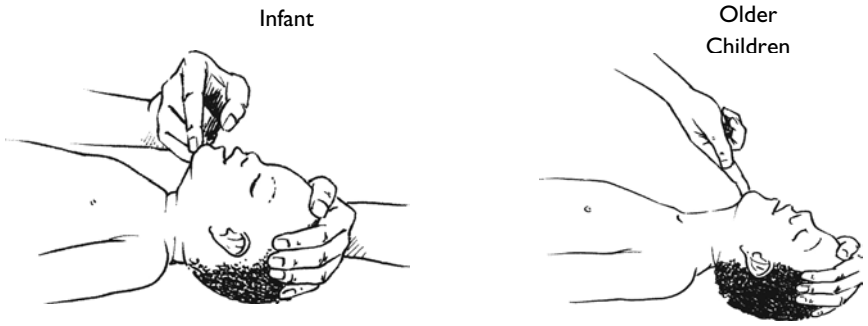


Fig 1: Position for opening airway

b. Positioning to Improve the Airway when neck trauma suspected

To limit the risk of aggravating a potential cervical spine injury, open the airway with a jaw thrust while you immobilize the cervical spine. It is safe to use in cases of trauma for children of all ages.

Neck trauma suspected (possible cervical spine injury)
• Stabilize the neck, as shown in figure 2. • Inspect mouth and remove foreign body, if present • Clear secretions from throat by suction catheter • Check the airway by looking for chest movements, listening for breath sounds, and feeling for breath

Jaw thrust maneuver (Fig 2)

The jaw thrust is achieved by placing two or three fingers under the angle of the jaw on both sides, and lifting the jaw upwards and outward. The jaw thrust maneuver is also used to open the airway when bag-mask ventilation is performed.

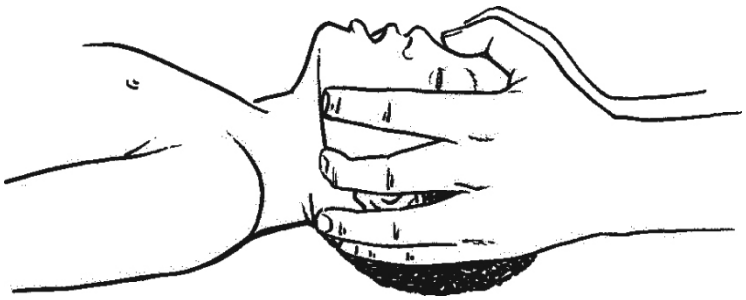


Fig2: Using Jaw thrust without head tilt

If after any of these maneuvers the child starts breathing, an oropharyngeal airway should be put and start oxygen.

3.1.6. Ventilate with Bag and Mask

If the child is not breathing even after the above maneuvers or spontaneous ventilation is inadequate (as judged by insufficient chest movements and inadequate breath sounds), ventilate with a self-inflating bag and mask. The bag is used together with a facemask.

During bag and mask ventilation it may be necessary to move the child's head and neck gently through a range of positions to determine the optimum position for airway patency and effectiveness of ventilation. A "sniffing" position without hyper-extension of the neck is usually appropriate for infants and toddlers. In children older than 2 years you may need to give padding under the occiput to obtain optimal airway position. Infants, instead, may need padding under the shoulder to prevent excessive flexion of the neck that occurs when their prominent occiput rests on the surface on which the child lies. In correct sniffing position, the opening of the external ear canal should be in line with or in front of (anterior to) the anterior aspect of the shoulder. Extreme hyperextension of the infant neck can produce airway obstruction (Fig 3).

Fig 3: Difference in padding for an infant and older child

Bags and masks should be available in sizes for the entire pediatric range (size 0, 1 and 2).

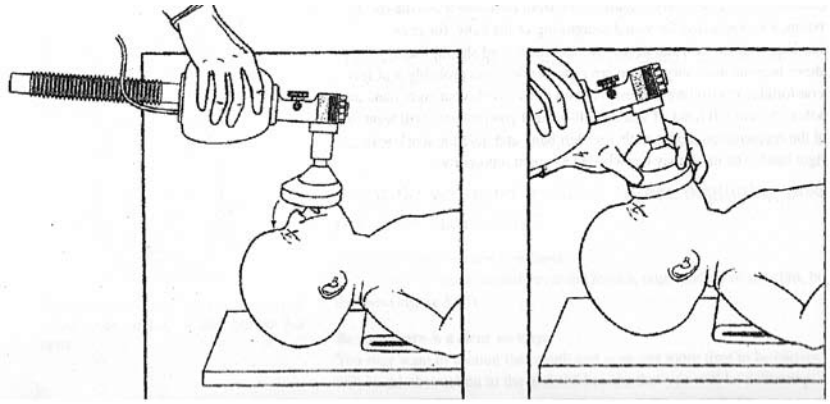


Fig 4: Bag and mask ventilation

It is important for the mask to be the correct size for the child; it must completely cover the mouth and nose without covering the eyes or overlapping the chin. The correct size and position are shown in the figure 4 & 5.

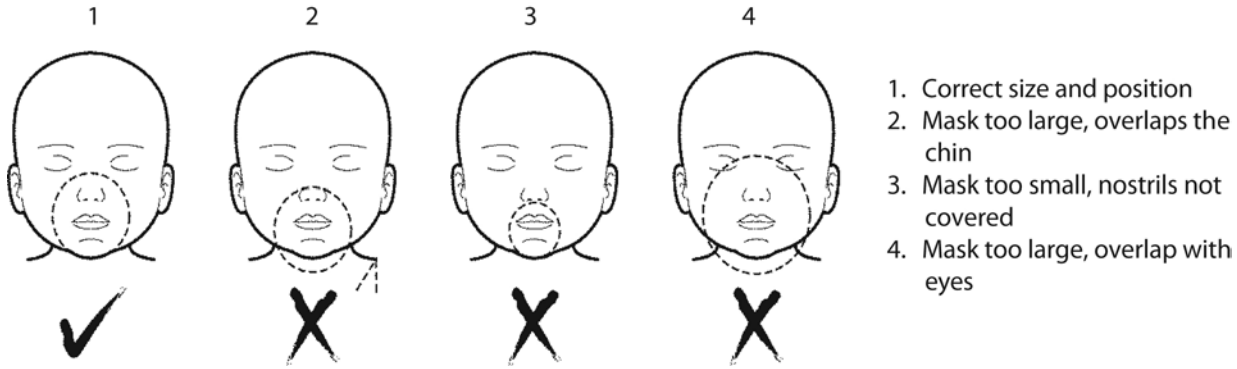


Fig 5: Choosing the correct mask size

Self-inflating bags of minimum volume 450-500ml should be used. Use force and tidal volume just enough to cause the chest to rise visibly. Reservoir and oxygen (5-6 L/min) should be connected to the self inflating bag during resuscitation.

Call for help in any child who needs Bag and mask since some of these children may additionally need chest compression.

After two effective ventilations, check the pulse (femoral, brachial or carotid) for no more than ten seconds. If pulse is absent, the second person should start chest compression.

3.1.7 Chest compressions

The techniques for chest compression vary for a child under 1 year and those between 1-8 years and are detailed below:

a. Chest compression in the infant (less than 1 year of age)

There are two techniques for performing chest compression. These techniques are:

Thumb technique, where the 2 thumbs are used to depress the sternum, while the hands encircle the torso and the fingers support the spine (Figure: 6)

2-finger technique, where the tips of the middle finger and either the index finger or ring finger of one hand are used to compress the sternum, while the other hand is used to support the baby's back (unless the baby is on a very firm surface).

- Using either method to give chest compressions, compress the lower half of the sternum but do not compress over the xiphoid. After each compression allow the chest to recoil fully because complete chest re-expansion improves blood flow into the heart.
- "Push hard": push with sufficient force to depress the chest approximately one third to one half the anterior-posterior diameter of the chest.
- "Push fast": push at a rate of approximately 100 compressions per minute.
- Release completely to allow a complete recoil of the chest by completely releasing the pressure but maintaining contact with the compression site.
- Minimize interruptions in chest compressions .

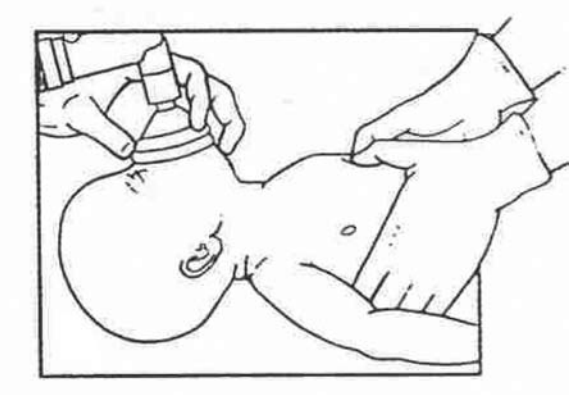


Fig 6: Thumb technique

- During cardiopulmonary resuscitation, chest compressions must always be accompanied by positive-pressure ventilation. Avoid giving a compression and ventilation simultaneously, because one will decrease the efficacy of the other. Therefore, the 2 activities must be coordinated, with one ventilation interposed after every third compression, for a total of 30 breaths and 90 compressions per minute

b. Chest compressions for the child (1 to 8 years of age) (Fig 7)

- Place the heel of one hand over the lower half of the sternum. Lift your fingers to avoid pressing on the ribs.
- Depress the sternum 1/3 to 1/2 of the depth of the chest. This corresponds to a 1 to 1-½ inches.
- Compress at the rate of approximately 100 times per minute.

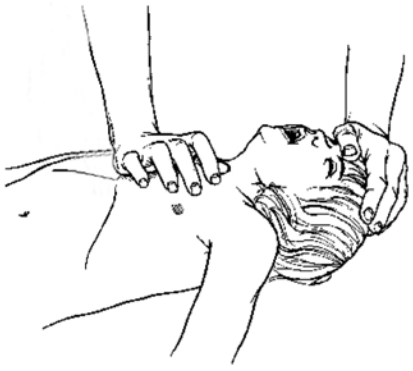


Fig 7: Chest compression for the child

- The ratio of chest compressions and ventilation should be 15:2. As it takes a number of chest compressions to raise coronary perfusion pressure, which drops with each pause (eg, to provide rescue breathing) ,Two effective breaths should be given after every 15 chest compressions.

  Bag and mask ventilation is a very effective way of ventilation if done correctly. If the health care provider has the necessary skills and equipment airway can be secured by endotracheal intubation. You should call for help or more trained hands by this time. Setup an intravenous or an intraosseous line for use of any drugs, where needed.

3.1.8 Setting up of IV access and Use of drugs:

Set up an intravenous access preferably using a large peripheral vein, in case the patient does not have an intravenous line in place. Some children may require intraosseous access in case IV access is not possible.

Adrenaline 0.1 ml /kg (1:10,000) intravenous can be used in a child who does not respond to initial ventilation and chest compressions and his pulses are absent. Two such doses can be used 3-5 minutes apart. The outcome of babies who do not respond to 2 doses of adrenaline is generally poor but the continuation of therapy may be done in situations where expertise is available or condition is potentially reversible like poisoning, hypothermia, pneumothorax, etc. The decision to terminate resuscitation rests with the treating physician which is usually based on assessment of etiology, time from arrest to CPR and co-morbid disorders.

If the child improves, (s) he can be given oxygen and fluids according to the assessment and underlying condition should be managed. An unconscious patient should be placed in recovery position as mentioned in section 3.3. An airway may be placed if the child is unable to maintain airway.

3.1.9 Giving Oxygen to a child with respiratory distress

A child with cyanosis or severe respiratory distress should be allowed to take a comfortable position of his choice and should be given oxygen. In these children begin oxygenation with a head box (8-10 L/min) or a face mask (5-6 L/min). When the child improves, catheter/prongs can be used for oxygen delivery.

Sources of oxygen to treat hypoxemia There are two possible sources of oxygen: Oxygen concentrators and Oxygen-filled cylinders.

Oxygen Delivery

Give oxygen to a child in a non-threatening manner as anxiety increases oxygen consumption and possibly respiratory distress. If a child is upset by one method of oxygen support, you should attempt to deliver the oxygen by an alternative technique. It is important to have the proper equipment to control oxygen flow rates.

NASAL CATHETER
• Use a 8 French size catheter. • 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. • Ensure that the catheter is correctly positioned. • A flow rate of 0.5-1 litres/min in infants and 1-2 litres/min in an older child shall deliver 30-35% oxygen concentration in the inspired air. • Adjust the flow of oxygen to achieve the desired concentration • Change the nasal catheter twice daily.

NASAL PRONGS
• These are short tubes inserted into the nostrils. Prongs come in different sizes for adults and children. • If you have only adult-size prongs, and the outlet tubes are too far apart to fit into the child's nostrils, cut the outlet tubes off and direct the jet of the oxygen into the nostrils. • A flow rate of 0.5-1 litres/min in infants and 1-2 litres/min in an older child • Nasal prongs are preferred over nasal catheter for delivering oxygen to young infants and children with severe croup or pertussis as catheters can provoke paroxysms of coughing. • Place them just inside the nostrils and secure with a piece of tape on the cheeks near the nose. • Take care that the nostrils are kept clear of mucus, which could block the flow of oxygen.

HEAD BOX AND FACE MASK
• Face Mask (need flow rates 5-6 litres/min) or Oxygen hood (need flow rates 8-10 lit/min), if available, are good devices to achieve oxygenation in severely distressed and in emergency situations. • Place a head box over the baby's head. Ensure that the baby's head stays within the head box, even when the baby moves. • However, the head box is a rather wasteful manner of oxygen delivery and should not be used routinely for permanent oxygen delivery on the wards. • An alternative method in emergency settings is the use of a face mask. • Using Head box with low flow of oxygen can lead to rebreathing of the expired air and is dangerous.

If the baby's breathing difficulty worsens or the baby has central cyanosis:

- Give oxygen at a high flow rate(5-10 litres/ min)
- If breathing difficulty is so severe that the baby has central cyanosis even with high flow oxygen, organize transfer and urgently refer the baby to a tertiary hospital or specialized centre capable of assisted ventilation, if possible.

Duration of oxygen therapy

Continue giving oxygen continuously until the child is able to maintain a SaO2 >92% in room air. When the child is stable and improving, take the child off oxygen for a few minutes. If the SaO2 remains above 92%, discontinue oxygen, but check again 1/2 hour later, and 3 hourly thereafter on the first day off oxygen to ensure the child is stable. Where pulse oximetry is not available, the duration of oxygen therapy is guided by clinical signs, which are less reliable.

Any child who has been successfully resuscitated or any unconscious child who is breathing and keeping the airway open should be placed in the recovery position. This position helps to reduce the risk of vomit entering the child's lungs. It should only be used in children who have not been subjected to trauma. A child with cyanosis or severe respiratory distress should be allowed to take a comfortable position of his choice. The recovery position is detailed later in the *section 3.3*

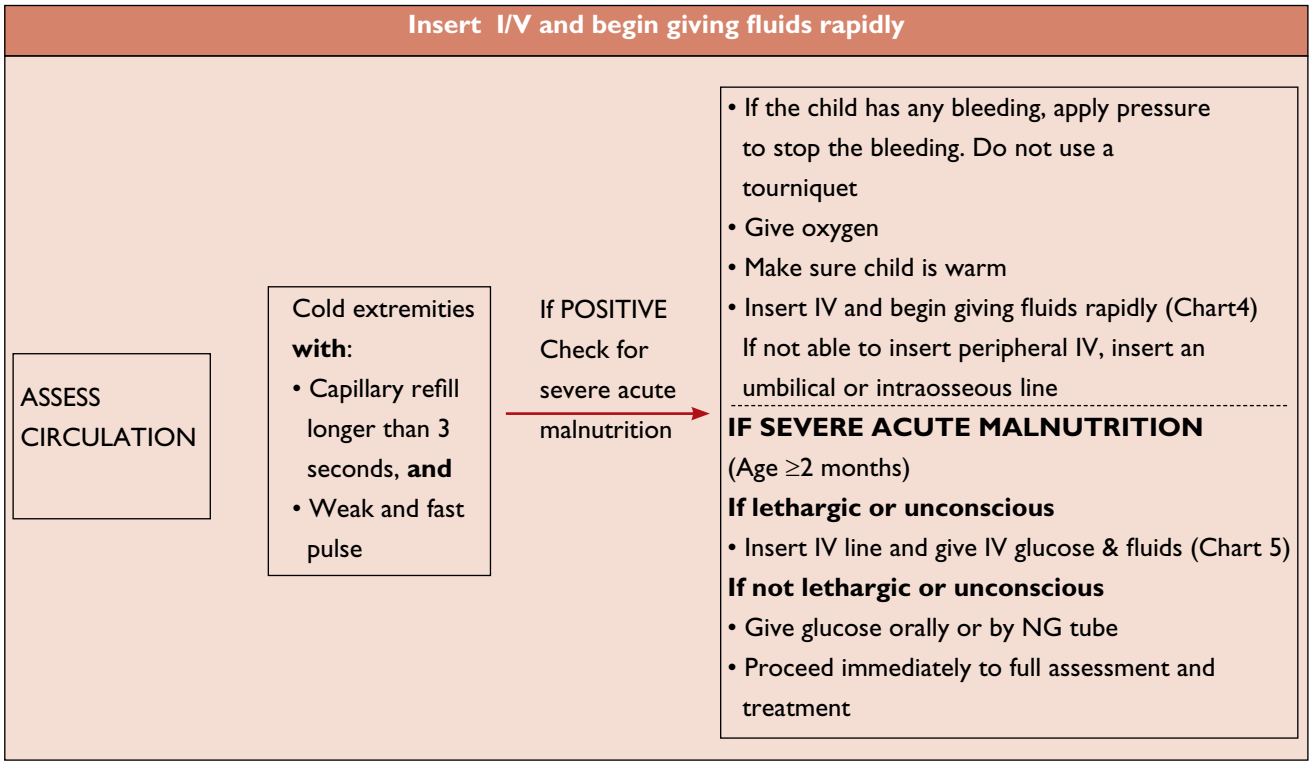
3.2 Circulation

The letter **C** in "**ABCD**" stands for **Circulation, Coma and Convulsions.**

3.2.1 Assess the circulation for signs of shock

After the airway has been opened, to assess if a child has a circulation problem you need to know:

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

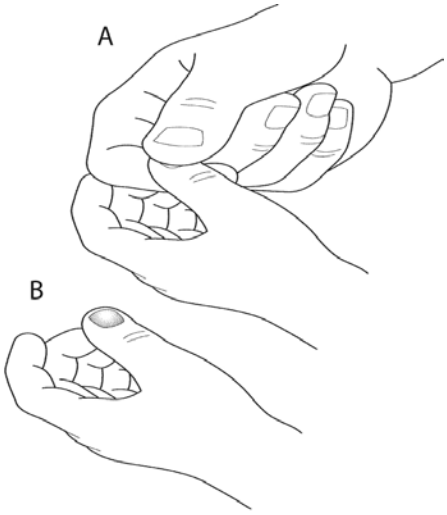


a. Are the Child's Extremities Warm?

To assess the circulation, take the child's hand and feet in your own. If it feels warm, the child has no circulation problem and you do not need to assess capillary refill or pulse. If the child's hands and feet feel cold, you need to assess the capillary refill.

b. Is the Capillary Refill Time Longer than 3 Seconds?

Capillary refill is a simple test that assesses how quickly blood returns to the skin after pressure is applied. It is carried out by applying pressure to the pink part of the nail bed of the thumb or big toe in a child and over the sternum or forehead in a young infant for 3 seconds. The capillary refill time is the time from release of pressure to complete return of the pink color. It should be less than 3 seconds. If it is more than 3 seconds the child may be in shock. Lift the limb slightly above heart level to assess arteriolar capillary refill and not venous stasis. This sign is reliable except when the room temperature is low, as cold environment can cause a delayed capillary refill. In such a situation check the pulses and decide about shock.



A. Applying pressure to the nail bed for 3 seconds

B. Check the time to the return of the pink colour after releasing the pressure

Figure 8: Checking capillary refill

c. Is the pulse weak and fast?

Evaluation of pulses is critical to the assessment of systemic perfusion. The radial pulse should be felt. If it is strong and not obviously fast (Rate > 160/min in an infant and > 140/min in children above 1 year), the pulse is adequate; no further assessment is needed. In an infant (less than one year of age) the brachial pulse may be palpated in the middle of upper arm. In a child with weak peripheral pulses, if central pulses (femoral or carotid) are also weak it is an ominous sign.

If the child has cold extremities, a capillary refill time more than 3 seconds, and a fast weak pulse, then he or she is in shock.
Note that blood pressure is not required for identifying shock because: a. Low blood pressure is a late sign in children and may not help identify treatable cases, and b. The correct size BP cuff necessary for children of different age groups may not be available

3.2.2 Shock

The most common cause of shock in children is due to loss of fluid from circulation, either through loss from the body as in severe diarrhoea or when the child is bleeding, or through capillary leak in a disease such as severe Dengue fever. In all cases, it is important to replace this fluid quickly. An intravenous line must be inserted and fluids given rapidly in shocked children without severe malnutrition.

Treatment of Shock

Treatment of shock requires teamwork. The following actions need to be started simultaneously:

- If the child has any bleeding, apply pressure to stop the bleeding. Do not use a tourniquet
- Give oxygen
- Make sure the child is warm
- Select an appropriate site for administration of fluids
- Establish IV or intraosseous access
- Take blood samples for emergency laboratory tests
- Begin giving fluids for shock.
- Assessment of shock in severe acute malnutrition (SAM) is difficult and the fluid therapy is also different
- Treatment of shock in Dengue (DHF/DSS) is detailed in the specific section of module 3

Giving fluids and other treatment for shock.

a) **Young Infants**

Fluid resuscitation: Infuse fluid bolus of 20 ml/kg of normal saline over 20-30 minutes. e.g. in a baby weighing 3 kg, 60 ml of normal saline should be infused over 20-30 minutes. If no or partial improvement (i.e tachycardia and CRT still prolonged), repeat a bolus of 20 ml/kg of normal saline.

- If the signs of poor perfusion persist despite 2 fluid boluses, start vasopressor support, except in infants with severe dehydration who should be treated as per Plan C of diarrhoea management.
- The most commonly used vasopressor in practice is dopamine. Usual starting dose is 5 -10 µg/kg/min and if no improvement occurs, the dose can be increased by increments of 5 µg/kg/min every 20 - 30 minutes to a maximum of 20 µg/kg/min.

How to give Dopamine

- For giving 1 mcg/kg/minute of dopamine
- Amount of dopamine(mg) to be added = Weight in kg x6
- To convert this dose into amount to ml of dopamine divide by 40 (1 ml of dopamine = 40 mg of dopamine)
- Add this amount of dopamine (ml) to make 100 ml of total fluid
- 1 ml/hour of this fluid gives 1 mcg/kg/minute
- To give 10 mcg/kg/minute give 10 ml/hour or 10 microdrops/minute (as 60 microdrops = 1ml)

Example: Giving 10 mcg/kg/minute for a 10 kg child

- Amount of dopamine(mg) to be added = 10 x6 =60 mg
- To convert this dose into amount to ml of dopamine: 60/40 =1.5 ml
- Add 1.5 ml of dopamine to 98.5 ml to make 100 ml of total fluid
- 10 ml/hour of this fluid gives 10 mcg/kg/minute or 10 microdrops/minute

b) Children above 2 months of age

The recommended volumes of fluids to treat shock depending on the age/weight of child are shown in Chart 4 . If the child has severe malnutrition, you must use a different fluid and a different rate of administration and monitor the child very closely. Therefore a different regime is used for these children.

Chart 4: Management of shock in a child without severe acute malnutrition

- Weigh the child. Estimate the weight if child cannot be weighed or weight not known
- Check that the child does not have severe acute malnutrition
- Give Oxygen
- Make sure child is warm

Insert an intravenous line and draw blood for emergency laboratory investigations

↓

- Give Ringer's lactate or Normal saline
- Infuse **First Bolus** -20 ml/kg as rapidly as possible in a child & over 20-30 minutes in a young infant

↓

Reassess child

No improvement:

↓

Repeat **Second Bolus** of 20 ml/kg

↓

No improvement

↓

Repeat **Third Bolus** of 20 ml/kg

↓

No improvement

↓

- Look for evidence of blood loss, if YES: give blood 20 ml/kg over 30 minutes
- If profuse diarrhoea give another bolus of Ringer's lactate or Normal saline (**Fourth Bolus**)

↓

Reassess after fourth Bolus

* Signs of improvement: Good volume and slowing pulse rate and faster capillary refill.

Reassess child after every bolus has run in

If improvement with fluid bolus at any stage:*

Fluid responsive shock

- Observe and continue fluids (70 ml/ kg over 5 hours in infants and over 2 ½ hours in a child)
- Give additional fluids if losses

If no improvement with 3 fluid boluses in sick child & 2 fluid boluses in young infant

Fluid refractory shock

Manage as septic shock

- Add broad spectrum antibiotics
- Start dopamine infusion at 10 mcg/kg/min and assess every 15 min
- Increase by 5 mcg/kg/min if no response
- Titrate up to 20 mcg/kg/min

If still no response: **Dopamine resistant shock**:

- If you suspect adrenal insufficiency, give IV Hydrocortisone 1- 2 mg/kg initial dose
- If no response: Continue same treatment and consider referral to higher center

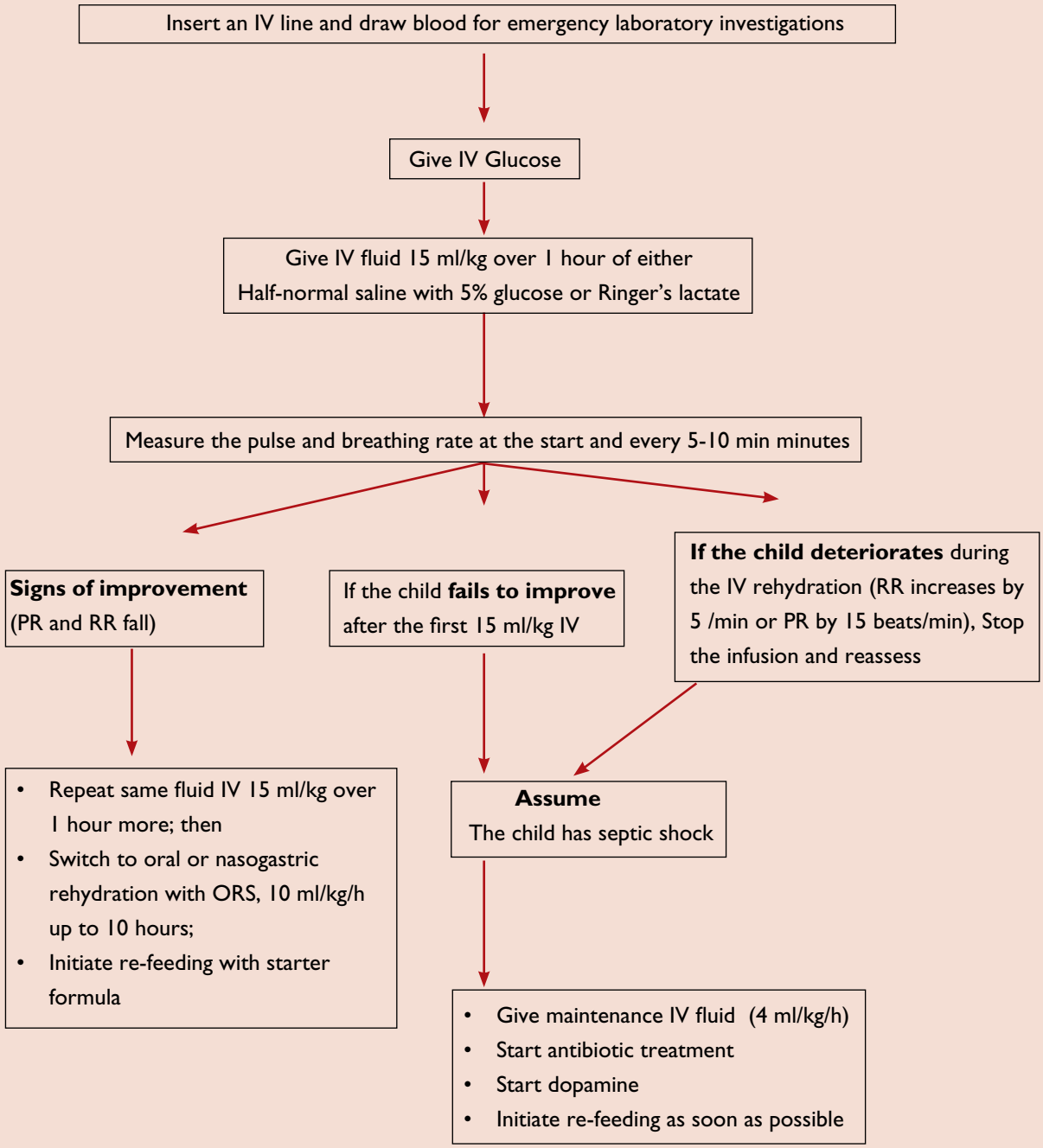
If deterioration (features of fluid over load at any stage):

- Stop fluid bolus and observe
- Check Urine output

Chart 5: Management of shock in a child with severe acute malnutrition

Give this treatment only if the child has signs of **shock AND is lethargic or has lost consciousness**

- Weigh the child. Estimate the weight if child cannot be weighed or weight not known
- Give Oxygen
- Make sure child is warm



Management of shock in a child with severe acute malnutrition

If the child has severe malnutrition, you must use a different fluid and a different rate of administration and monitor the child very closely. Sometimes children with severe malnutrition have circulatory signs suggesting shock, but have sepsis rather than hypovolemia. It is important to follow the standard guidelines for caring for a child with severe malnutrition. If possible, avoid IV fluids – use a nasogastric (NG) tube or oral fluids. Only if the child is lethargic or unconscious and cannot swallow or tolerate an NG tube (e.g. vomiting), use ½-strength normal saline with 5% glucose or Ringer's Lactate at 15 ml/kg in 1 hr, but monitor carefully. Stay with the child and check the pulse and breathing rate every 5 minutes. Discontinue the intravenous infusion if either of these increase (pulse by 15, respiratory rate by 5/min). If the child shows signs of improvement, give repeat IV 15 ml/Kg over 1 hour and then switch to oral or nasogastric ORS. If the child fails to improve after the first 15 ml/Kg IV, assume the child has septic shock and manage as per guidelines in Chart 5.

EXERCISE - 2

1. Sunita four-month old baby is brought to hospital with fever, respiratory rate of 60/min. She has had 2 episodes of vomiting and watery diarrhoea. Weight 5 kg. Her hands are cold. The capillary refill is more than 3 seconds. The femoral pulse is palpable but fast and weak. There is no chest indrawing and there are no abnormal respiratory noises. List the emergency signs. Write the initial steps of management.

2. Vijay 12 months old is brought to you with loose stools and vomiting. He weighs 5.0 kg and has visible severe wasting. The child is very lethargic and extremities are cold with capillary refill of more than 3 seconds. The pulses are weak and fast and has mild respiratory distress. List the emergency signs. Write the initial steps of management.

3. A 7 days old baby weighing 2 kg is admitted with refusal to feeds, fast and weak pulse with mottling of skin, cold extremities and a CRT of 5 seconds.
   a) What are the steps of initial management?

   b) After giving 2 fluid challenges, CRT is still 4 seconds with HR of 190 bpm. How will you proceed?

3.3 Coma and Convulsion

C also represents "**Coma and Convulsion**".

The following signs indicate impaired neurological status: coma, lethargy, and convulsions.

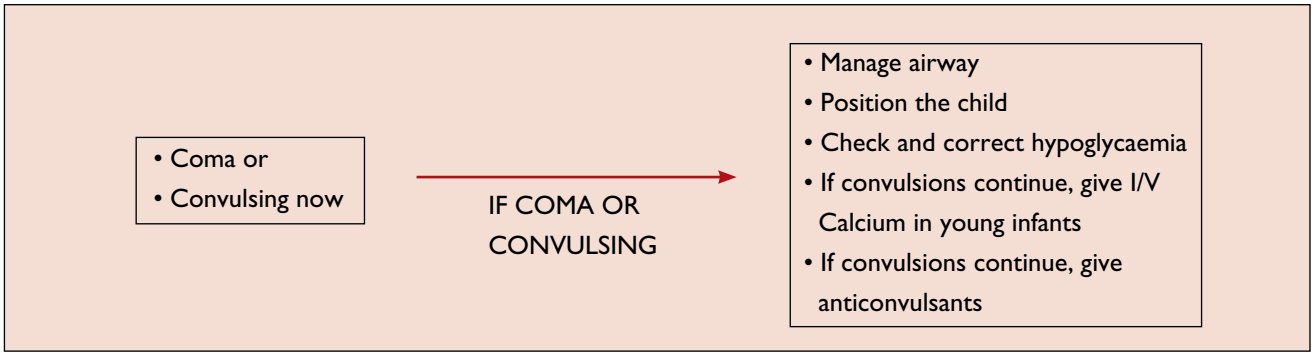
Assess the child for coma and convulsion

To assess the child's neurological status you need to know:

- Is the child in coma?
- Is the child convulsing?

3.3.1 Is the Child in Coma?

A child who is awake is obviously conscious and you can move to the next component of the assessment. If the child is asleep, ask the mother if the child is just sleeping. If there is any doubt, you need to assess the level of consciousness:



Try to wake the child by talking to him/her, e.g. call his/her name loudly. A child who does not respond to this should be gently shaken. A little shake to the arm or leg should be enough to wake a sleeping child. Do not move the child's neck. If this is unsuccessful, apply a firm squeeze to the nail bed, enough to cause some pain. A child who does not wake to voice or being shaken or to pain is unconscious.

To help you assess the conscious level of a child is, a simple scale (AVPU) is used:
A Is the child Alert? If not,
V Is the child responding to Voice? If not,
P Is the child responding to Pain?
U The child who is Unresponsive to voice (or being shaken) AND to pain is Unconscious.

A child who is not alert, but responds to voice, is lethargic. An unconscious child may or may not respond to pain. **A child with a coma scale of "P" or "U" will receive emergency treatment for coma as described below.**

3.3.2 Is the Child Convulsing Now?

This assessment depends on your observation of the child and not on the history from the parent. Children who have a history of convulsion, but are alert during triage, need a complete clinical history and investigation, but no emergency treatment for convulsions. The child must be seen to have a convulsion during the triage process or while waiting in the outpatient department. You can recognize a convulsion by the sudden loss of consciousness associated with uncontrolled jerky movements of the limbs and/or the face. There is stiffening of the child's arms and legs and

uncontrolled movements of the limbs. The child may lose control of the bladder, and is unconscious during and after the convulsion. Sometimes, in infants, the jerky movements may be absent, but there may be twitching (abnormal facial movements) and abnormal movements of the eyes, hands or feet. You have to observe the infant carefully.

3.3.3 Treatment of coma and convulsion

Treatment of coma and convulsions are similar and will be described together

COMA	CONVULSION
• Manage the airway • Position the child (if there is a history of trauma, stabilize the neck first) • Check the blood sugar • Give IV glucose	• Manage the airway • Position the child • Check the blood sugar • Give IV glucose • Give IV calcium in young infants • Give anticonvulsant

a. Manage the Airway

Coma

Managing the airway is done in the same way as treating any child with an airway or breathing problem. This has been discussed in earlier. Give oxygen for the emergency setting.

Convulsion

To manage the airway of a convulsing child gentle suction of oropharyngeal secretions should be done & child put in recovery position and oxygen started. Do not try to insert anything in the mouth to keep it open.

b. Put the Child in Recovery Position

Any unconscious child who is breathing and keeping the airway open should be placed in the recovery position. This position helps to reduce the risk of vomit entering the child's lungs. It should only be used in children who have not been subjected to trauma.

If neck trauma is not suspected (Fig 9)

- Turn the child on the side to reduce risk of aspiration
- Keep the neck slightly extended and stabilize by placing the cheek on one hand
- Bend one leg to stabilize the body position

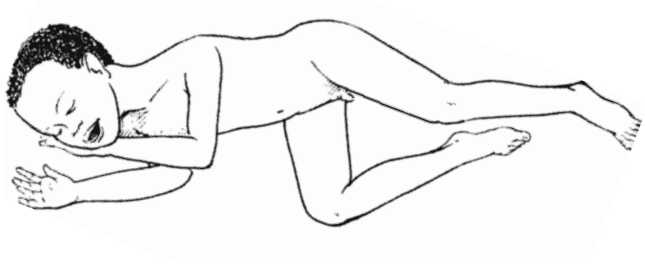


Fig 9: Position of unconscious child (no trauma)

If trauma is suspected (Fig 10)

Stabilize the child while lying on the back. When the patient is not being moved, a sandbag placed on each side or a cervical collar can splint the neck. Use bottles or rolled towels in case sandbags are not available as shown in the figure 10 below.

Fig 10: Position of unconscious child (trauma suspected)

Use the "log roll" technique to turn the child on the side if the child is vomiting (Fig 11).
Move a patient with a suspected cervical spine injury carefully. Avoid rotation and extremes of flexion and extension. One person, usually the most senior attendant, should assume responsibility for the neck. He should stand at the top end of the patient, hold the patient's head, and place the fingers under the angle of the mandible with the palm over the ears and parietal region and maintain gentle traction to keep the neck straight and in line with the body. Patient then can be rolled to one side with the help of two more persons simultaneously moving the torso and lower limbs on instructions from the senior attendant.

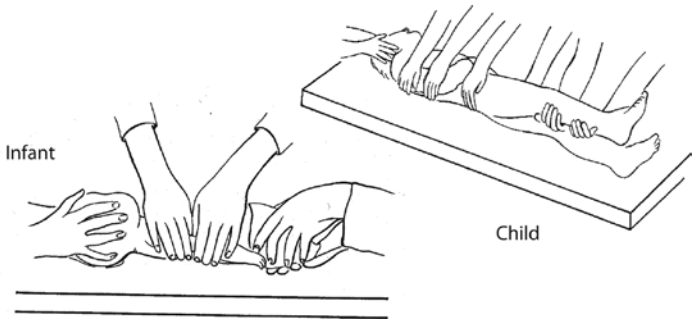


Fig 11: Log roll

c. Insertion of an oropharyngeal (Guedel) airway (Fig 12)

The oropharyngeal or Guedel airway can be used in an unconscious patient to improve airway opening. It may not be tolerated in a patient who is awake and may induce choking or vomiting. Guedel airways come in different sizes (Guedel size 000 to 4). An appropriate sized airway goes from the centre of the teeth (incisors) to the angle of the jaw when laid on the face with the convex side up.

Fig12: Inserting an oropharyngeal airway in an infant: convex side up

- Select an appropriate sized airway
- Position the child to open the airway as described above, taking care not to move the neck if trauma suspected
- Using a tongue depressor, insert the oropharyngeal airway the convex side up.
- Re-check airway opening.
- Use a different sized airway or reposition if necessary.
- Give oxygen

d. How to manage convulsions?

Infant up to 2 weeks of age with seizures:

- Secure IV access
- If blood sugar < 45 mg/dl, give 2 ml/kg 10% dextrose
- If seizures continue: IV 10% Calcium gluconate 2ml/kg over 10 minutes while monitoring heart rate (in young infants).
- If seizures continue: IV phenobarbitone 20 mg/kg over 20 min (Table 1)
- If no control: Repeat phenobarbitone 10 mg/kg till a total of 40 mg/kg
- If seizures continue: Give phenytoin 20 mg/kg over 20 min

Table 1: Dose of Phenobarbitone for young infants

	Inj. Phenobarbitone intravenous dose (200mg/ml)	
Weight of Infant	Initial dose	Repeat dose
2 kg or less	0.2 ml	0.1 ml
2 to 4 kg	0.3 ml	0.15 ml

Caution
Do not use Diazepam for control of convulsions in Neonates < 2 weeks

Managing convulsions beyond 2 weeks of age:

Diazepam is the first drug used to stop convulsions (anticonvulsant), if the child is convulsing in front of you. No drug should be given if the convulsion has stopped. Diazepam can be given by the rectal or intravenous route. Rectal diazepam acts within 2 to 4 minutes. In an emergency it is easier and quicker to give it rectally than intravenously, unless an intravenous line is already running. The dose is 0.5mg/kg (0.1 ml/kg) rectally (Table 2) or 0.25mg/kg (0.05 ml/kg) intravenously. An estimated dose of rectal diazepam is shown below. This is a useful guideline in an emergency situation when you may not have a chance to weigh the child. It may be helpful to put it on the wall in your department.

Table 2: Dosage of diazepam

	Diazepam given rectally 10 mg / 2 ml solution
Age / weight	**Dose 0.1 ml/kg**
2 weeks to 2 months (<4 kg)	0.3 ml
2 - <4 months (4 - <6 kg)	0.5 ml
4 - <12 months (6 - <10 kg)	1.0 ml
1 - <3 years (10 - <14 kg)	1.25 ml
3 - <5 years (14 – 19 kg)	1.5 ml

Base the dose on the weight of the child, where possible. Give 0.5mg/kg diazepam injection solution per rectum by a tuberculin syringe or a catheter. Hold the buttocks together for a few minutes. If you already have intravenous access,

you can give the correct volume of drug directly, but slowly, in at least one full minute. Reassess the child after 10 minutes. If still convulsing, give a second dose of diazepam, rectally, (or diazepam intravenously slowly over 1 minute if an IV infusion is running). If convulsions do not stop after 10 minutes of second dose of diazepam, Inj Phenytoin can be given intravenously if access has been achieved. 15 - 20 mg/kg Phenytoin is diluted in about 20 ml of saline and given slowly (not more than 1 mg/kg Phenytoin per minute). Alternatively phenobarbitone can be used in a dose of 15-20mg/kg IV (in 20 ml 5% dextrose or saline) or IM. At this stage, seek help of a senior or more experienced person, if available. Diazepam can affect the child's breathing, so it is important to reassess the airway and breathing regularly.

If there is high fever:

- Sponge the child with room-temperature water to reduce the fever.
- Do not give oral medication until the convulsion has been controlled (danger of aspiration)

EXERCISE – 3

1. Sunil two-year old boy is carried in by his grandmother. He weighs 12 kg. He is febrile and having a seizure. The child is breathing normally and the CRT is < 3seconds. How would you manage the child?

2. Anil is an 18 month old boy who has fever for two days. His mother has noticed that he has fast breathing. The respiratory rate is 72 /min and temperature is 38° C. He weighs 11 kg. His airway is clear, and he has no chest indrawing. His extremities are warm and there is no history of diarrhoea. However, the boy started to convulse while being examined. List the emergency signs. What are the most appropriate measures?

3. 12 days old infant weighing 3 kg is brought to the facility with generalized tonic seizures with refusal to feed. The child is breathing normally and has warm extremities. Baby's blood sugar is 60 mg/dl. How will you manage this case?

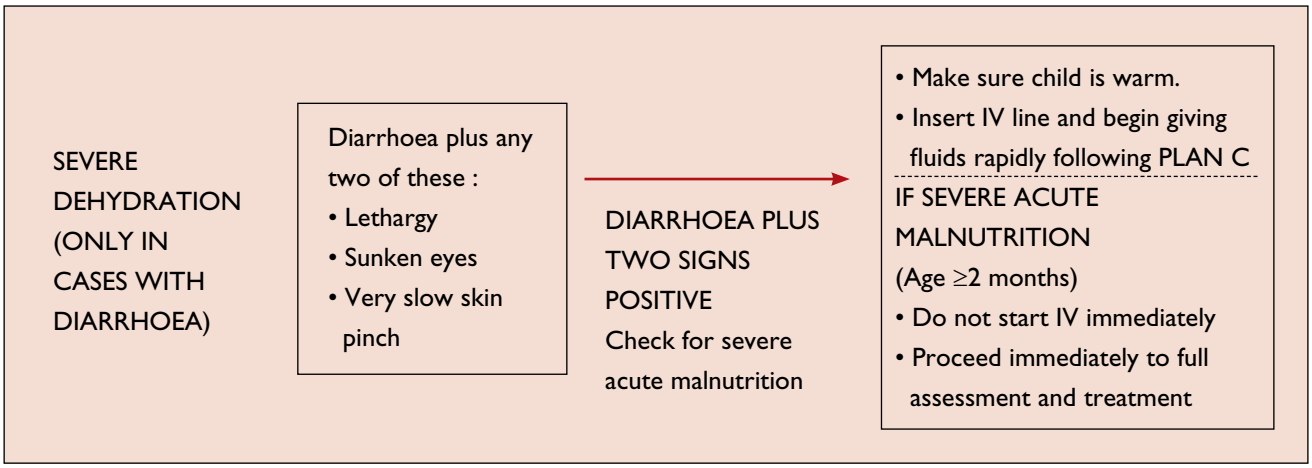
3.4 Dehydration

The letter **D** in the ABCD formula stands for **Dehydration**. In this section we will look at the assessment of severe dehydration in the child with diarrhoea or vomiting. If the child is severely malnourished these signs are not as reliable.

Assess for severe dehydration

To assess if the child is severely dehydrated you need to know:

- Is the child lethargic?
- Does the child have sunken eyes?
- Does a skin pinch take longer than 2 seconds to go back?



3.4.1 Treatment of severe dehydration in an emergency setting

a. Severe dehydration (without severe acute malnutrition)

- Start IV fluid immediately (Table 3). If the child can drink, give ORS by mouth while the drip is set up. Give 100 ml/kg Ringer's lactate solution (or, if not available, normal saline), divided as follows:

Table 3: IV fluids for severe dehydration

AGE	First give 30 ml/kg in	Then give 70 ml/kg in
Infants (under 12 months)	1 hour*	5 hours
Children (12 mo- 5 years)	30 minutes*	21/2 hours

* Repeat once if radial pulse is still very weak or not detectable.

- Reassess the child every 15-30 minutes. If hydration status is not improving, give the IV drip more rapidly.
- Also give ORS (about 5 ml/kg/hour) as soon as the child can drink: usually after 3-4 hours (infants) or 1-2 hours (children).

Table 4: Volume of ORS

Weight	Volume of ORS solution per hour
<4 kg	15 ml
4 - <6 kg	25 ml
6 - <10 kg	40 ml
10 - <14 kg	60 ml
14 – 19 kg	85 ml

If IV treatment not possible, give ORS 20 ml/kg/hour for 6 hours (120 ml/kg) by NG tube

- Reassess an infant after 6 hours and a child after 3 hours. Classify dehydration. Then choose the appropriate plan (A, B, or C) to continue treatment as you have learned in IMNCI.
- Give oral antibiotic for cholera if child 2 years or older.
- If possible, observe the child for at least 6 hours after rehydration to be sure that the mother can maintain hydration by giving the child ORS solution by mouth.

b. Severe dehydration with severe acute malnutrition

- This has been detailed later in the section on SAM.

Video demonstration on ETAT

Proforma for Emergency Triag Assessment and Treatment (ETAT)

Case Recording Form Date

Name---------- Age---------- Sex---------- Wt------- Temp ----------

ASK: What are the infant's problems?

ASSESS (Circle all signs present)	**Emergency treatments** • Check for head/neck trauma before treating child – do not move neck if cervical spine injury possible· • EMERGENCY SIGNS: (If any sign positive: give treatment(s), call for help, draw blood for emergency laboratory investigations (glucose, malaria smear, Hb)
AIRWAY AND BREATHING • Not breathing or gasping or • Central cyanosis or • Severe respiratory distress (Respiratory rate ≥ 70/min, Severe lower chest in-drawing, Grunting, Head nodding, Apnoeic spells, Unable to feed due to respiratory distress, Stridor in a clam child)	
CIRCULATION Cold hands with: • Capillary refill longer than 3 seconds, and • Weak and fast pulse IF POSITIVE Check for severe acute malnutrition	
COMA CONVULSING • Coma (AVPU) or • Convulsing (now)	
SEVERE DEHYDRATION (ONLY IN CHILD WITH DIARRHOEA) Diarrhoea plus any two of these: • Lethargy • Sunken eyes • Very slow skin pinch If two signs positive check for severe acute malnutrition	
PRIORITY SIGNS · • Tiny baby (<2 months) • Respiratory distress (RR>60/min) • Temperature <36.5°C or > 38.5°C • Bleeding • Restless, Continuously irritable, or lethargy • Trauma or other urgent surgical condition • Referral (urgent) • Pallor (severe) • Malnutrition: Visible severe wasting • Oedema of both feet • Poisoning • Burns (major)	

Check temperature if baby is cold to touch, rewarm

MODULE-2

Facility Based Care of Sick Young Infant

PARTICIPANTS MANUAL

INTRODUCTION

Neonatal mortality contributes to over 64% of infant deaths and more than two thirds of these deaths occur during first week of life. Because of its large population and relatively high neonatal mortality rate, India contributes about a quarter of all neonatal deaths in the world. It is well known that majority of neonatal deaths can be prevented with low technology; low cost interventions delivered across two continua of care- the first from pregnancy, birth, through neonatal period and early infancy, and the second from home, through primary health facilities to hospitals. It has been estimated that optimal treatment of neonatal illness can avert up to half of all preventable neonatal deaths.

A health facility in addition to providing care to newborns at birth also receives sick young infants with diverse clinical presentations. Some of them are extremely sick and need emergency life saving treatments. This manual will deal with care of newborns at birth, the first few days of life and sick young infants with important priority conditions which are likely to be encountered in a health facility. The guidelines in this manual are consistent and support the IMNCI (Integrated Management of Neonatal and Young Infanthood Illness) training materials for outpatient management of sick Young Infants. Young infants (up to 2 months) referred with severe classifications based on IMNCI strategy are assessed and investigated based on guidelines given in the manual for making a more precise diagnosis.

Learning Objectives

After completion of this module the participant should be able to-

- Provide care at birth for all newborns
- Manage sick young infants in a health facility
- Understand principles of transporting sick young infants needing referral
- Use essential equipments for providing care to young infants

SECTION. 4
CARE AT BIRTH

Introduction

This section gives guidelines for care of the newborn at the time of birth.

4.0 Learning Objectives

After completion of this section the participant should be able to-

- Prepare newborn corner for providing care at birth
- Provide care at birth for all newborns
- Identify and manage newborns who may need special care

4.1 Why care at birth is important?

This is the critical period of transition from intrautero dependant life to extrautero independant existence. Effective care at birth is needed for anticipation of problems with this transition and to provide support to ensure stabilization.

The four basic needs of **ALL** newborns at the time of birth and for the first few weeks of life are:

1. **To be warm**
2. **To breathe normally**
3. **To be protected (prevent infection)**
4. **To be fed**

4.2 Newborn Care Corner

This is a space within the delivery room for facilitating immediate care of the newborn. This area is mandatory for all health facilities where deliveries take place.

Equipment and supplies that should be available in the corner:

A. Equipment:
- Radiant warmer with bassinet
- Suction equipment
- Weighing machine
- Self inflating resuscitation bag (500 ml) with masks (size 0,1)
- Oxygen source
- Laryngoscope (straight blade, size 0,1)
- Wall Clock
- Room thermometer

B. Supplies:
- Clean baby sheets
- Sterile cord ties
- Sterile Gloves
- Sterile blade/scissors
- Mucus extractors
- Suction catheters (10F, 12F)
- Feeding tube (6F, 8F)
- Endotracheal tubes (3, 3.5 mm)
- IV cannula (24G)
- Drugs (Inj. Epinephrine , Normal saline, Inj.Vitamin K)

4.3 Immediate Newborn Care

The immediate care needed for all babies at birth is outlined in the flow diagram. Most babies would require routine care; 5-10% may need assistance to establish adequate breathing and therefore will need resuscitation.

Immediate Newborn Care

Assess by checking
- Is the baby Term gestation?
- Is the amniotic fluid clear?
- Is the baby Breathing or crying?
- Does the baby have Good muscle tone?

If yes, provide **Routine care**

- Place the baby on the mother's abdomen
- Dry the baby with a warm clean sheet. Do not wipe off vernix.
- Wipe the mouth and nose with a clean cloth
- Clamp the cord after 1-3 min and cut with a sterile instrument. Tie the cord with a sterile tie
- Examine the baby quickly for malformations/birth injury
- Leave the baby between the mother's breasts to start skin-to-skin care.
- Support initiation of breastfeeding
- Cover the baby's head with a cloth. Cover the mother and baby with a warm cloth
- Place an identity label on the baby
- Give Inj Vit K 1mg IM (0.5mg for preterm)
- Record the baby's weight
- Refer if birth weight < 1500g, has major congenital malformations or has severe respiratory distress

If no

Proceed for resuscitation (see Chart 6)

4.3.1 Keeping the baby warm

- Newborn baby's temperature falls within seconds of being born. There are 4 ways by which a baby may loose heat (Figure 13)

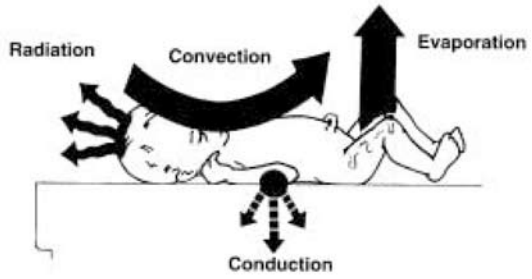


Figure 13: Four ways a newborn may loose heat to the environment

- If the temperature continues to fall the baby will become sick and may even die.

Method of heat loss	Prevention
Evaporation (e.g. Wet baby)	Immediately after birth dry baby with a clean, warm, dry cloth
Conduction (e.g. contact with a cold surface of a weighing scale).	Put the baby on the mother's abdomen or on a warm surface
Convection(e.g exposure to draught)	Provide a warm, draught free room for delivery at ≥ 25°C
Radiation (e.g. Cold surroundings)	Keep the room warm

Keeping a newborn warm after delivery

- Provide a warm, draught free room for delivery at 25-28°C
- Dry the baby immediately after birth with a clean, warm, dry cloth.
- Put the baby on the mother's abdomen.
- Cover the mother and baby with a warm and dry cloth
- Support breast feeding as soon as possible after birth
- Delay the first bath to beyond 24 hr period.

If mother and baby's separation is necessary, do the following.

- Wrap the baby in a clean dry warm cloth and place under a radiant warmer. If warmer is not available ensure warmth by wrapping the baby in a clean dry warm cloth and cover with a blanket. Ensure baby's head, hands and feet are covered.
- Re-start Skin-to-skin contact as soon as mother and baby can be roomed-in

4.3.2 The baby's need to breathe normally

- To 'breathe normally' was identified as one of the baby's immediate and basic 'need'. A baby can die or suffer from hypoxic injury very quickly if breathing does not start soon after birth.
- Oxygen is needed to keep the baby's brain and other vital organs normal. When the umbilical cord is cut the placenta is no longer a source of oxygen and the baby needs to support his oxygenation through the lungs.

Decide: Does the baby need any help with breathing?

The babies who need immediate help to support breathing are those with apnea or gasping respiration. To manage these babies follow guidelines in section 4.4 (resuscitation).

Those who are breathing normally need to be provided routine care.

4.3.3 Immediate Cord Care

- Clamp the cord after 1-3 min of delivery and cut with a sterile instrument
- Tie the cord between 2 to 3 cms from the base and cut the remaining cord.
- Observe for oozing blood. If blood oozes, place a second tie between the skin and first tie.
- Do not apply any medication/substance on the stump.
- Leave stump uncovered and dry.

4.3.4 Care of the eyes

- No routine eye care is required
- Do not instill any medicine in the eyes

4.3.5 Examine the baby quickly for malformations/birth injury

Quick but thorough clinical screening is essential to identify any life threatening congenital anomalies e.g meningomyelocele, omphalocele, anal atresia.

4.3.6 Weighing the baby

Weigh all babies before transfer from the delivery room

4.3.7 Initiate breastfeeding within 1 hour

- Support mother to initiate breast feeding within the first hour.
- The baby's first feed of colostrum is very important because it helps to protect against infections.
- The baby can feed from its mother whether she is lying down or sitting; baby and mother must be comfortable

Do not give artificial teats or pre-lacteal feeds to the newborn e.g. sugar water or local foods or even water.

Even mothers who deliver by Cesarean Section or Assisted delivery should be supported for early breast feeding and should not be separated from their newborns

Group Discussion on Hypothermia

4.4 Neonatal resuscitation

4.4.1 Which babies require resuscitation?

Approximately 10% of newborns require some assistance to begin breathing at birth; about 1% need extensive resuscitative measures to survive.

The "ABCs" of resuscitation are the same for babies as for adults. Ensure that the '**Airway**' is open and clear. Be sure that there is '**Breathing**', whether spontaneous or assisted. Make certain that there is adequate '**Circulation**' of oxygenated blood. Newly born babies are wet following birth and heat loss is great. Therefore, it also important to maintain body temperature during resuscitation.

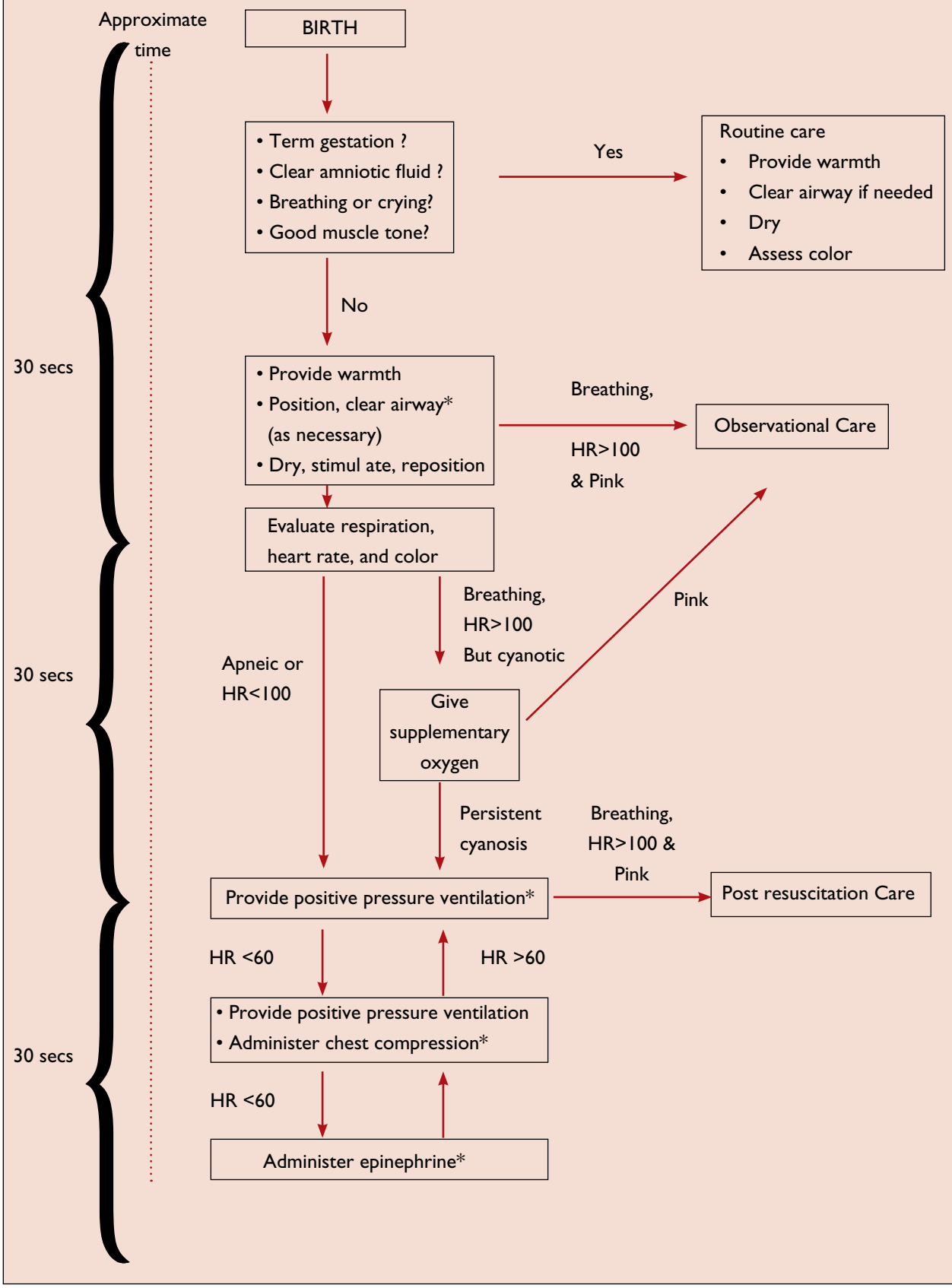
4.4.2 How do you determine whether the baby requires resuscitation?

To decide if the baby needs resuscitation at birth, ask the following 4 questions

- Term gestation?
- Clear of meconium?
- Breathing or crying?
- Good muscle tone?

If answer to any of the above questions is NO, the baby would require resuscitation at birth.

Chart 6: FLOW CHART of Neonatal Resuscitation



* Endotracheal intubation may be considered at several steps

4.4.3 What are the initial steps and how are they administered?

Once you decide that resuscitation is required, all of the initial steps should be initiated within a few seconds. Although they are listed as "initial" and are given in a particular order, they should continue to be applied throughout the resuscitation process.

Initial steps
- Provide warmth
- Position; clear airway (as necessary)
- Dry, stimulate, reposition

• Provide warmth

The baby should be placed under a radiant warmer, where you will have easy access to the baby and the radiant heat will help to reduce heat loss

• Position by slightly extending the neck

The baby should be positioned on the back, with the neck slightly extended in the "sniffing" position. To help maintain the correct position, you may place a rolled cloth/ towel under the shoulders. This will bring the posterior pharynx, larynx, and trachea in line, which will facilitate unrestricted air entry. Care should be taken to prevent hyperextension or flexion of the neck, since either may restrict air entry (Figure 14)

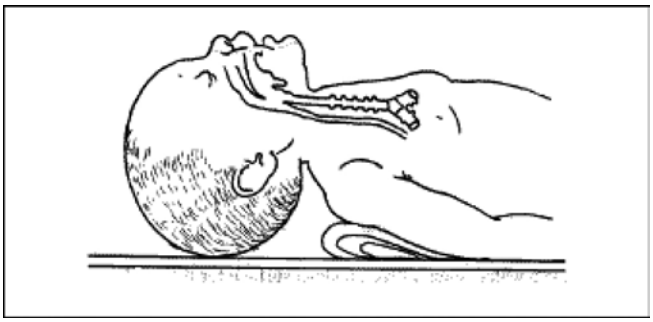


Figure 14: Sniffing Position

• Clear airway (as necessary)

In vigorous babies (a vigorous baby is one who has strong respiratory efforts, heart rate>100 bpm and a good muscle tone), no suctioning of oro-pharynx or the trachea is required.

In all non-vigorous babies suctioning of oro-pharynx needs to be done. If, such babies were also delivered through meconium stained amniotic fluid, oropharyngeal suction would need to be followed by tracheal intubation to clear it of meconium (if skills are available).

How do you clear the airway?

Secretions may be removed from the airway by wiping the nose and mouth with a towel or by suctioning with a mucus extractor or suction catheter. If the newborn has copious secretions coming from the mouth, turn the head to the side. This will allow secretions to collect in the cheek where they can be removed easily.

When using suction from the wall or from a pump, the suction pressure should be set so that when the suction tubing is blocked, the negative pressure (vacuum) reads approximately 100 mm Hg.

The mouth is suctioned before the nose to ensure that there is nothing for the newborn to aspirate if he or she should gasp when the nose is suctioned. If material in the mouth and nose is not removed before the newborn breathes, the material can be aspirated into the trachea and lungs. When this occurs, the respiratory consequences can be serious.

Once the airway is clear, what should be done to stimulate breathing and prevent further heat loss?

• Dry, stimulate to breathe, and reposition

Often, positioning the baby and suctioning secretions will provide enough stimulation to initiate breathing. Drying will also provide stimulation. Drying the body and head will also help to prevent heat loss. If 2 people are present, the second person can be drying the baby while the first person is positioning and clearing the airway.

As part of preparation for resuscitation, you should have several pre-warmed towels. available. The baby initially can be placed on one of these towels, which can be used to dry most of the fluid. This towel should then be discarded, and fresh pre-warmed towels or blankets should be used for continued drying and stimulation.

What other forms of stimulation may help a baby breathe?

Both drying and suctioning stimulate the newborn. For many newborns, these steps are enough to induce respirations. If the newborn does not have adequate respirations, additional tactile stimulation may be provided briefly to stimulate breathing. It is important for you to understand the correct methods of tactile stimulation. Stimulation may be useful not only to encourage a baby to begin breathing during initial steps of resuscitation, but also may be used to stimulate continued breathing after positive-pressure ventilation.

Safe and appropriate methods of providing additional tactile stimulation include.

- Slapping or flicking the soles of the feet.
- Gently rubbing the newborn's back, trunk, or extremities (Figure 15)

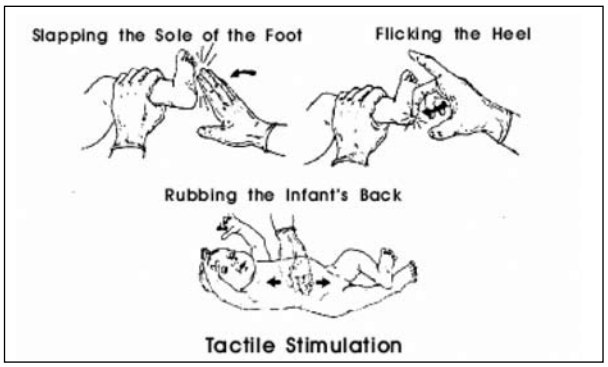


Fig 15: Tactile Stimulation

Certain actions of physical stimulation can harm the baby and should not be used.

Harmful Actions	Consequences
Slapping the back	Bruising
Squeezing the rib cage	Fractures, pneumothorax, death
Holding upside down and shaking	Intraventricular bleeding, brain damage.

4.4.4 What do you do after the initial steps?

Evaluate the baby in the following order:

- **Respiration**. There should be good chest movements, and the rate and depth of respirations should increase after a few seconds of tactile stimulation.
- **Heart rate**. The heart rate should be more than 100 bpm. The easiest and quickest method to determine the heart

rate is to feel for the pulse at the base of the umbilical cord. Counting the heart rate for 6 seconds and multiply by 10 to calculate the heart rate per minute.

- **Colour**. The baby should have pink lips and trunk. There should be no central cyanosis once the baby has good respiration and heart beat that indicates hypoxia.

4.4.5 What do you do if the baby is breathing, but has central cyanosis?

A baby's skin color, changing from blue to pink, can provide the most rapid and visible indicator of adequate breathing and circulation. The baby's skin color is best determined by looking at the central part of the body. Cyanosis caused by too little oxygen in the blood will appear as a blue hue to the lips, tongue and central trunk. Acrocyanosis which is a blue hue to only the hands and feet does not generally indicate that the baby's blood oxygen level is low and should not, by itself, be treated with oxygen. **Only central cyanosis requires intervention**.

If the baby is breathing but appears blue, administration of supplement oxygen is indicated.

- Give free-flow oxygen
  Give a flow of 5 L/min with a tubing by cupped hand or a mask kept closer to the face (Figure 16).

Free-flow oxygen cannot be given reliably by a mask attached to a self-inflating bag.

How do you know when to stop giving oxygen?

When the newborn no longer has central cyanosis, gradually withdraw the supplemental oxygen until the newborn can remain pink while breathing room air, or wean the oxygen as indicated by pulse oximetry.

If cyanosis persists despite administration of free-flow oxygen, the baby may have significant lung disease, and a trial of positive-pressure ventilation may be indicated.

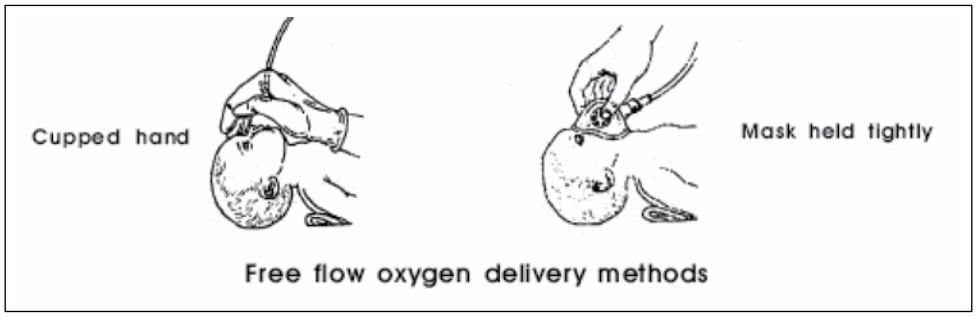


Fig 16: Free flow oxygen delivery methods

Observational Care

Babies improving after initial steps of resuscitation require observational care. This can be provided either with the mother or in a newborn care unit. Assess breathing, heart rate, color and temperature every 15 minutes during the first hour after birth. Continue to provide warmth and initiate breast feeding. If baby is unstable, he will require additional interventions.

Demonstration on Initial Steps

4.4.6 Positive Pressure Ventilation

Indications of Positive pressure Ventilation

- Baby is not breathing or is gasping,
- Heart rate is less than 100 bpm,
- Persistent central cyanosis despite supplemental oxygen

Ventilation of the lungs is the single most important and most effective step in cardiopulmonary resuscitation of the compromised newly born baby.

Use of Self Inflating bag to ventilate newborns

The self-inflating bag, as its name implies, inflates automatically without a compressed gas source (Figure 17). It remains inflated at all times, unless being squeezed. Peak inspiratory pressure (PIP) (or peak inflation pressure) is controlled by how hard the bag is squeezed.

Advantages and disadvantages of Self Inflating Bag

The self-inflating bag is more commonly found in the hospital delivery room and resuscitation cart. It is somewhat easier to learn to use, as it will refill after being squeezed, even if it is not attached to oxygen and even if its mask is not on a patient's face. The disadvantages of this, of course, is that you will be less likely to know if the oxygen line has become disconnected or if you have not achieved a good seal between the mask and the baby's face-both of which are necessary for effective resuscitation.

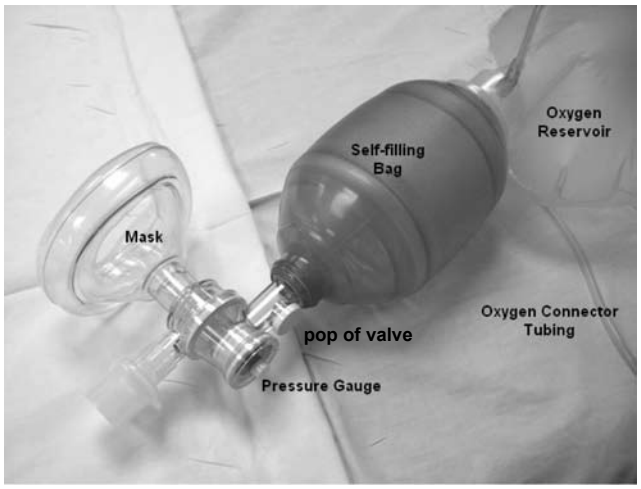


Fig 17: Bag and mask

What are the important characteristics of resuscitation bag used to ventilate newborns?

The equipment is specifically designed for newborns. Consideration should be given to the following:

Appropriately sized masks

A variety of mask sizes, appropriate for babies of different sizes, should be available at every delivery, since it may be difficult to determine the appropriate size before birth. The mask should cover the chin, mouth, and nose, but not the eyes, while still being small enough to create a tight seal on the face.

Capability to deliver a variable oxygen concentration up to 100%

Babies who require positive-pressure ventilation at birth initially be ventilated with high concentration of oxygen. This can be accomplished by attaching a 100% oxygen source to a self-inflating bag with an oxygen reservoir. High oxygen concentration cannot be achieved with a self-inflating bag without a reservoir.

Approximately sized bag

You should use bags for newborns which have volume of 500 mL. Term newborns require only 15 to 25mL with each ventilation (5 to 8mL/Kg). Bags larger than 750mL, which are designed for older children and adults, make it difficult to provide such small volumes. Bags that are too small will not permit long inflation times.

Safety features

To minimize complications resulting from high ventilation pressures, resuscitation devices have certain safety features to prevent or guard against inadvertent use of high pressures. They have a pressure-release valve (**commonly called pop-off valve)** (Figure 17), which generally is set by the manufacturer at 30 to 40 cm H2O. If peak inspiratory pressure greater than 30 to 40 cm H2O are generated, the valve opens, limiting the pressure being transmitted to the newborn.

What characteristics of face masks make them most effective for ventilating newborns?

Masks come in a variety of shapes, sizes and materials. Selection of a mask for use with a particular newborn will depends on how well the mask fits the newborn's face. The correct mask will achieve a tight seal between the mask and the newborn's face.

Masks come in two shapes: round and anatomically shaped. Anatomically shaped masks are shaped to fit the Contours of the face. They are made to be placed on the face with the most pointed part of the mask fitting over the nose.

Masks also come in several sizes. Masks suitable for small premature babies as well as for term babies should be available for use.

For the mask to be of the correct size, the rim will cover the tip of the chin, the mouth, and the nose but not the eyes. (Figure 18).

- Too large-may cause possible eye damage and will not seal well
- Too small-will not cover the mouth and nose and may occlude the nose

Be sure to have various-sized masks available. Effective ventilation of a preterm baby with a term-infant size mask is impossible.

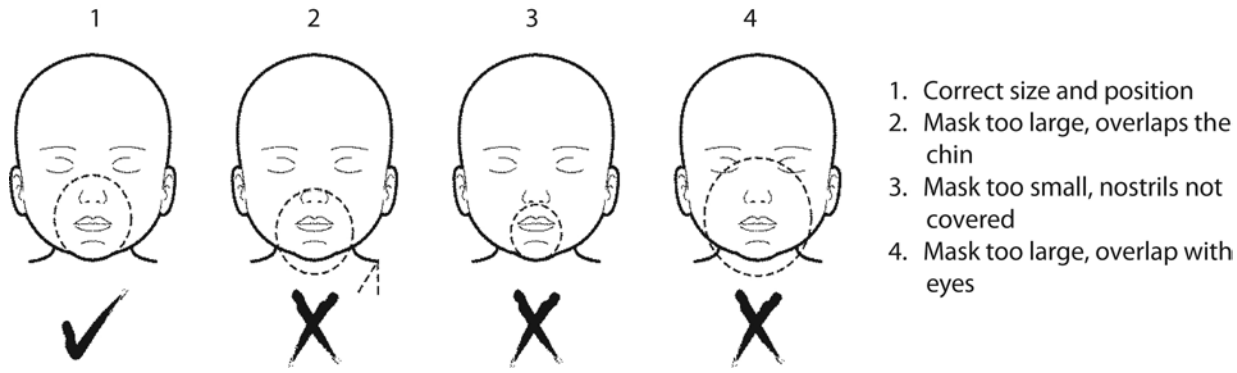


Fig 18: Choosing correct size of the mask

How do you prepare the resuscitation device for an anticipated resuscitation?

Assemble equipment

The positive-pressure ventilation device should be assembled and connected to oxygen so that it can provide the necessary 90% to 100% concentration. Be sure to attach oxygen reservoir when using self inflating bag.

Test the equipment

Once the equipment has been selected and assembled, check the bag and mask to be sure they function properly. Bags that have cracks or tears, valves that stick or leak, or mask that are cracked or deflated must not be used. The equipment should be checked before each delivery. The operator should check it again just before its use.

What do you need to check before beginning positive-pressure ventilation?

Select the appropriate-sized mask. Remember, the mask should cover the mouth, nose, and tip of the chin, but not the eyes (Figure 18)

Be sure there is a clear airway. You may want to suction the mouth and nose one more time to be certain there will be no obstruction to the assisted breaths that you will be delivering.

Position the baby's head. As described in ETAT, the baby's neck should be slightly extended (but not overextended) into the "sniffing position" to maintain an open airway. One way to accomplish this is to place a small roll under the shoulders (Figure 19).

If the baby's position has shifted, reposition the baby before continuing.

Position yourself at the bedside

You also will need to position yourself at the baby's side or head to use a resuscitation device effectively (Figure 19). Both positions leave the chest and abdomen unobstructed for visual monitoring of the baby, for chest compressions, and for vascular access via umbilical cord should these procedures become necessary.

How do you position the bag and mask on the face?

Place the mask on the face so that it covers the nose and mouth, and the tip of the chin rests within the rim of the mask. You may find it helpful to begin by cupping the chin in the mask and then covering the nose (Figure 19).

The mask usually is held on the face with the thumb, index, and/or middle finger encircling much of the rim of the mask, while the ring and fifth bring the chin forward to maintain a patent airway.

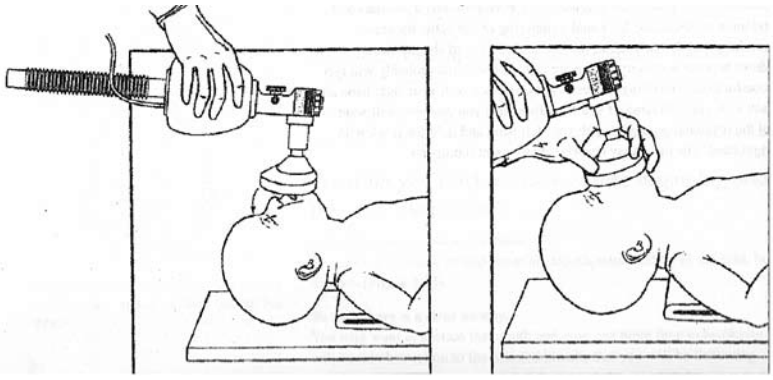


Fig 19: Positing of bag and mask on the face

Why is establishing a seal between the mask and the face so important?

An airtight between the rim of the mask and the face is essential to achieve the positive pressure required to inflate the lungs with the resuscitation devices.

How do you know how much inflation pressure to deliver?

The best indicator that the mask is sealed and the lungs are being adequately inflated is an improvement in heart rate, color, and muscle tone.

Rapid rise in the baby's heart rate and subsequent improvement in color and muscle tone are the best indicators that inflation pressures are adequate. If these signs are not improving, you should look for the presence of chest movements with each positive-pressure breath and have an assistant listen to both sides of the lateral areas of the chest with a stethoscope to assess breath sounds.

How often should you squeeze the bag?

During the initial stages of neonatal resuscitation, breaths should be delivered at a rate of 40 to 60 breaths per minute, or slightly less than once a second.
To help maintain a rate of 40 to 60 breaths per minute, try saying to yourself as you ventilate the newborn:

Breathe……Two……Three……Breathe……..Two……Three……
(squeeze) (release……) (squeeze) (release……)

How do you know if the baby is improving and that you can stop positive pressure ventilation?

Improvement is indicated by the following 4 signs:

- Increasing heart rate
- Improving color
- Spontaneous breathing
- Improving muscle tone

Check the 4 signs for improvement after 30 seconds of administering positive pressure. If the heart rate remains below 60 bpm, you need to proceed to the next step of chest compressions as described in the next lesson. But if the heart rate is above 60 bpm, you should continue to administer positive-pressure ventilation and assess the 4 signs every 30 seconds.

As the heart rate increases towards normal, continue ventilating the baby at a rate of 40 to 60 breaths per minute. With improvement, the baby also should become pink and muscle tone should improve. Monitor the movement of the chest and breath sounds to avoid overinflation or underinflation of the lungs.

When the heart rate stabilizes above 100 bpm, reduce the rate and pressure of assisted ventilation until you see effective spontaneous respirations. When color improves, supplemental oxygen also can be weaned as tolerated.

What do you do if the heart rate, color, and muscle tone do not improve and baby's chest is not moving during positive-pressure ventilation?

If the heart rate, color, and muscle tone do not improve, check to see if the chest is moving with each positive-pressure breath and ask the second person to listen with the stethoscope for breath sounds. If the chest does not expand adequately and there are poor breath sounds, it may be due to one or more of the following reasons.

- The seal is inadequate
- The airway is blocked
- Not enough pressure is being given

Inadequate seal

If you hear or feel air escaping from around the mask, reapply the mask to the face and try to form a better seal. Use a little more pressure on the rim of the mask and lift the jaw a little more forward. Do not press down hard on the baby's face. The most common place for a leak to occur is between the cheek and bridge of the nose.

Blocked airway

Another possible reason for insufficient ventilation of the baby's lungs is a blocked airway. To correct this,

- Check the baby's position and extend the neck a bit farther.
- Check the mouth, oropharynx, and nose for secretions; suction the mouth and nose if necessary.
- Try ventilating with the baby's mouth slightly open (especially helpful in extremely small premature babies with very small nares).

Not enough pressure

You may be providing inadequate inspiratory pressure.

- Increase the pressure. If using a resuscitation device with a pressure gauge, note the amount of pressure required to achieve improvements in heart rate, color, breath sounds, and perceptible chest movements.
- If using a bag with pressure-release valve, increase the pressure until the valve actuates.
- If physiologic improvements still cannot be achieved, endotracheal intubation may be required.

Is there anything else to do if positive-pressure with a mask is to be continued for more than 2 minutes?

Newborns requiring positive-pressure ventilation with a mask for longer than 2 minutes should have an orogastric tube inserted and left in place.

The problems related to gastric/abdominal distention and aspiration of gastric contents can be reduced by inserting an orogastric tube, suctioning gastric contents, and leaving the gastric tube in place and uncapped to act as a vent for stomach gas throughout the remainder of the resuscitation.

Demonstration of PPV and Practice by participants

4.4.7 Chest Compression

What are the indications for beginning chest compressions?

Chest compressions should be started whenever the heart rate remains less than 60 bpm despite 30 seconds of effective positive-pressure ventilation.(Check HR for 6 seconds)

Why perform chest compressions?

Babies who have a heart rate below 60 bpm, despite stimulation and 30 seconds of positive-pressure ventilation, probably have very low blood oxygen levels and significant acidosis. As a result, the myocardium is depressed and unable to contract strongly enough to pump blood to the lungs to pick up the oxygen that you have now ensured is in the lungs. Therefore, you will need to mechanically pump the heart while you simultaneously continue to ventilate the

lungs until the myocardium becomes sufficiently oxygenated to recover adequate spontaneous function. This process also will help to restore oxygen delivery to the brain.

What are chest compressions?

Chest compressions, sometimes referred to as external cardiac massage, consist of rhythmic compressions of the sternum that

- Compress the heart against the spine
- Increase the intrathoracic pressure
- Circulate blood to the vital organs of the body

The heart lies in the chest between the lower third of the sternum and the spine. Compressing the sternum compresses the heart and increases the pressure in the chest, causing blood to be pumped into the arteries. When pressure on the sternum is released, blood enters the heart from the veins.

How many people are needed to administer chest compressions, and where should they stand?

Remember that chest compressions are of little value unless the lungs are also being ventilated with oxygen. Therefore, 2 people are required to administer effective chest compressions-one to compress the chest and one to continue ventilation.

The person performing chest compressions must have access to the chest and be able to position his or her hands correctly. The person assisting ventilation will need to be positioned at the baby's head to achieve an effective mask-face seal (or to stabilize the endotracheal tube) and watch for effective chest movement.

How do you position your hands on the chest to begin chest compressions?

There are two techniques for performing chest compression. These techniques are

- *Thumb technique*, where the 2 thumbs are used to depress the sternum, while the hands encircle the torso and the fingers support the spine (Figure 20).
- *2-finger technique*, where the tips of the middle finger and either the index finger or ring finger of one hand are used to compress the sternum, while the other hand is used to support the baby's back (unless the baby is on a very firm surface) (Figure 21).

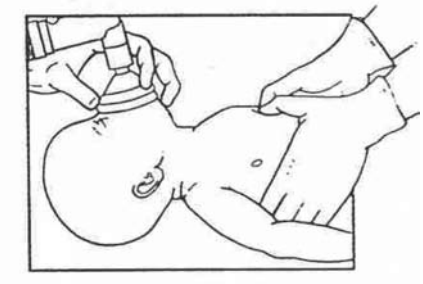


Fig 20: Thumb technique

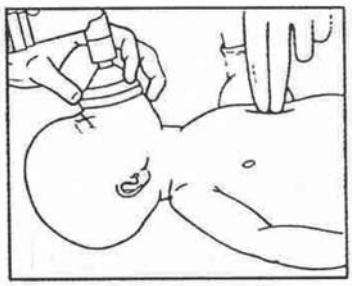


Fig 21: 2-finger technique

What are the advantages of one technique over the other?

The thumb technique is preferred because it usually is less tiring, and you can generally control the depth of compression somewhat better. This technique is superior in generating peak systolic and coronary perfusion pressure. However, the 2-finger technique is more convenient if the baby is large or your hands are small. The 2-finger technique also is preferable to provide access to the umbilicus when medications need to be given by the umbilical route.

Therefore, you should learn both techniques.

The two techniques have the following things in common:

- Position of the baby
  - Firm support for the back
  - Neck slightly extended.

- Compressions
  - Same location, depth, and rate

Where on the chest should you position your thumbs or fingers?

Hands should be positioned on the lower third of the sternum, which lies between the xyphoid and a line drawn between the nipples. You can quickly locate the correct area on the sternum by running your fingers along the lower edge of the ribs until you locate the xiphoid. Then place your thumbs or fingers immediately above the xiphoid. Care must be used to avoid putting pressure directly on the xyphoid.

How do you position your hands using the thumb technique?

The thumb technique is accomplished by encircling torso with both hands and placing the thumbs on the sternum and the fingers under the baby's back supporting the spine (Figure 20).

The thumbs can be placed side by side or, on a small baby, one over the other (Figure 20).

The thumbs will be used to compress the sternum, while your fingers provide the support needed for the back. The thumbs should be flexed at the first joint and pressure applied vertically to compress the heart between the sternum and the spine.

How do you position your hands using the 2-finger technique?

In the 2-finger technique, the tips of the middle finger and either the index or ring finger of one hand are used for compressions (Figure 21). Position the 2-fingers perpendicular to the chest as shown, and press with the fingertips.

As with the thumb technique, apply pressure vertically to compress the heart between the sternum and the spine.

How much pressure do you use to compress the chest?

Controlling the pressure used in compressing the sternum is an important part of the procedure.
With the fingers and hands correctly positioned use enough pressure to depress the sternum to a depth of approximately one third of the anterior posterior diameter of the chest. (Figure 22), and then release the pressure to allow the heart to refill. One compression consists of the downward stroke plus the release. The actual distance compressed will depend on the size of the baby.

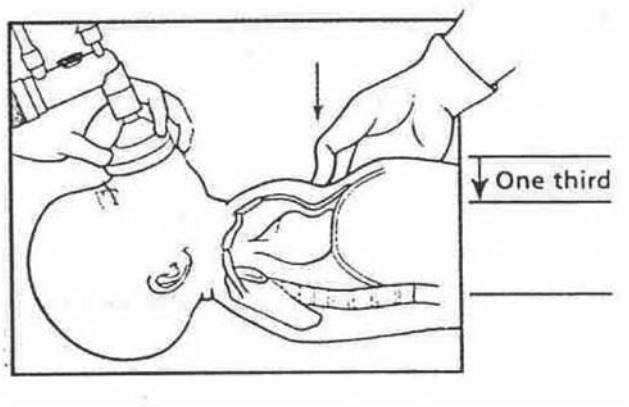


Fig 22 : Depth of chest compression

The thumbs or the tips of fingers should remain in contact with the chest at all times during both compression and release. Allow the chest to fully expand by lifting the thumbs or fingers during the release phase to permit blood to re-enter the heart from the veins. However, do not lift the thumb or fingers completely off the sternum after compression. If the thumbs or fingers are completely off the sternum after compression, then

- Time is wasted in relocating the compression area.
- Control over the depth of compression is lost.
- Compression of the wrong area, may result producing trauma to the chest or underlying organs.

Are there dangers associated with administering chest compressions?

- Chest compressions can cause trauma to the baby.
- Two vital organs lie within the ribcage-the heart and lungs. Pressure applied too low, over the xiphoid, can cause laceration of the liver.
- Also, the ribs are fragile and can easily be broken.

How often do you compress the chest and coordinate compressions with ventilation?

During cardiopulmonary resuscitation, chest compressions must always be accompanied by positive-pressure ventilation. Avoid giving a compression and ventilation simultaneously, because one will decrease the efficacy of the other. Therefore, the 2 activities must be coordinated, with one ventilation interposed after every third compression, for a total of 30 breaths and 90 compressions per minute

One cycle of events will consist of 3 compressions plus one ventilation.

- There should be approximately 120 "events" per 60 seconds (1 minute) – 90 compressions plus 30 breaths.

How can you practice the rhythm of chest compressions with ventilation?

Practice saying the words and compressing the chest.

One-and-Two-and-Three-and-Breathe-and-**One-and-Two-and-Three**-and-Breathe-and-
One-and-Two-and-Three-and-Breathe-and-**One-and-Two-and-Three**-and-Breathe-and
One-and-Two-and-Three-and-Breathe-and
Now time yourself to see if you can say and do these five events in 10 seconds. Remember, squeeze your hand only when you say "Breathe and"

One-and-Two-and-Three-and-**Breathe-and**-One-and-Two-and-Three-and-Breathe-and-
One-and-Two-and-Three-and-**Breathe-and**-One-and-Two-and-Three-and-Breathe-and
One-and-Two-and-Three-and-**Breathe-and**

When do you stop chest compressions?

After approximately 30 seconds of well-coordinated chest compressions and ventilation, stop compressions long enough to determine the heart rate again. Feel the pulse at the base of the cord,

If the heart rate is now above 60 bpm, then

Discontinue chest compressions, but continue positive-pressure ventilation now at a more rapid rate of 40 to 60 breaths per minute.

Once the heart rate rises above 100 bpm and the baby begins to breathe spontaneously, slowly withdraw positive-pressure ventilation and move the baby to the nursery for post-resuscitation care.

Demonstration of Chest compression and practice by participants

If the heart rate is now below 60 bpm, then

Despite good ventilation of the lungs with positive-pressure ventilation and improved cardiac output from chest compressions, a small number of newborns (fewer than 2 per 1,000 births) will still have a heart rate below 60 bpm. These babies would require epinephrine to stimulate the heart.

4.4.8 How should you prepare epinephrine, and how much should you give?

Although epinephrine is available in both 1:1,000 and 1:10,000 concentrations, the 1:10,000 concentrations is recommended for newborns, eliminating the need for dilution.

Epinephrine should be given intravenously, although administration may be delayed by the time required to establish intravenous access. Give 0.1 – 0.3 ml/kg of 1:10,000 solution. Calculate the dose and give in 1 ml syringe intravenously.

Recommended concentration= 1:10,000
Recommended dose=0.1 to 0.3 mL/kg of 1:10,000 solution (consider 0.3 to 1mL/kg if giving endotracheally)
Recommended preparation=1:10,000 solution in 1-mL syringe (or larger syringe if giving endotracheally)
Recommended rate of administration=Rapidly-as quickly as possible

What should you expect to happen after giving epinephrine?

Check the baby's heart rate 30 seconds after administering epinephrine. As you continue positive-pressure ventilation and chest compressions, the heart rate should increase to more than 60 bpm after you give epinephrine.

If this does not happen, you can repeat the dose after 3 to 5 minutes. In addition ensure that

- There is good air exchange as evidenced by adequate chest movement and presence of bilateral breath sounds.
- Chest compressions are given to a depth of one third the diameter of the chest and are well coordinated with ventilations.

What should you do if the baby is in shock, there is evidence of blood loss, and the baby is responding poorly to resuscitation?

Babies in shock appear pale, have delayed capillary refill and have weak pulses. They may have a persistently low heart rate, and circulatory status often does not improve in response to effective ventilation, chest compressions, and epinephrine.

If the baby appears to be in shock and is not responding to resuscitation, administration of a volume expander may be indicated.

What can you give to expand blood volume? How much should you give? How can you give it?

The recommended solution for acutely treating hypovolemia is an isotonic crystalloid solution. Acceptable solutions include

- 0.9% NaCl ("Normal saline")
- Ringer's lactate.

The initial dose is 10 mL/kg. However, if the baby shows minimal improvement after the first dose, you may need to give another dose of 10 mL/kg. In unusual cases of large blood loss additional dose might be considered.

A volume expander must be given into the vascular system. The umbilical vein is usually the most accessible vein in a newborn, although other routes (eg, intraosseous) can be used.

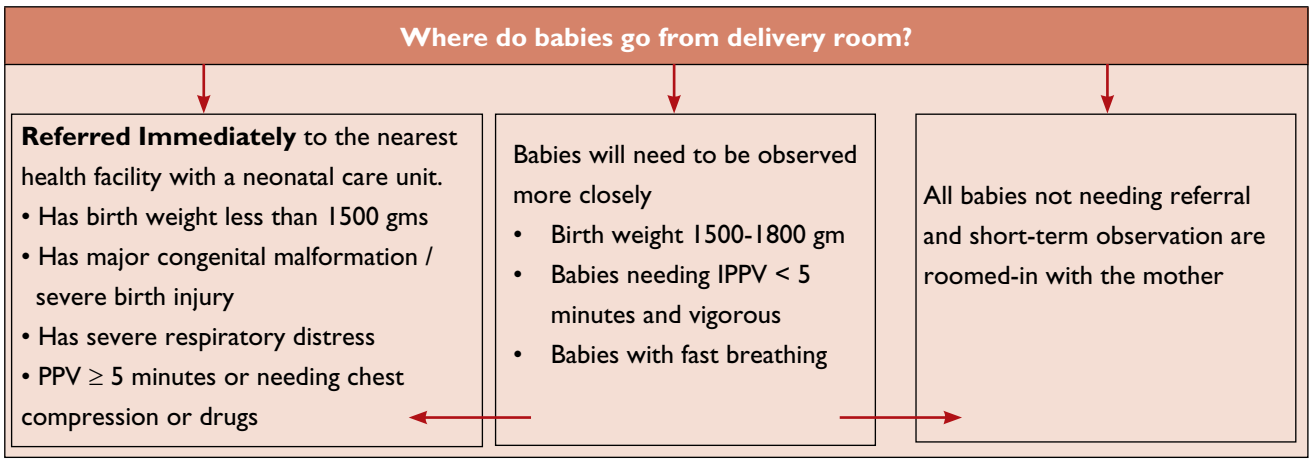
- Sodium bicarbonate should be avoided in labor room

4.4.9 Post Resuscitation Care

Babies requiring positive pressure ventilation, chest compressions or medicatios would require post resuscitation care. Some of these babies need to be transferred to a newborn care unit. They would require ongoing evaluation, monitoring and management (for details see *section* 6.3).

When to terminate resuscitation?

After 10 minutes of continuous and adequate efforts if there are no signs of life (no heart rate and no respiratory effort), discontinue resuscitative efforts. The prognosis of such babies must be discussed with the parents before discontinuing resuscitation. Remember in all so-called 'stillbirths' the resuscitation efforts must be continued for 10 min. The data suggests that in fresh stillbirths prognosis is not all that bad.



SECTION. 5
CARE OF NEWBORN IN POSTNATAL WARD

A large majority of newborns after birth would be transferred to the post-natal wards for rooming-in with their mothers. These babies need to be monitored because they are at continued risk of hypothermia and feeding difficulties during the first few days of life. These babies can also become sick and develop danger signs. The mother-infant pair would need counseling and appropriate treatment when required.

5.0 Learning Objectives

After completion of this section the participant should be able to-

- Examine all newborns to detect any signs of illness
- Identify and manage newborns who need special care

5.1 The postnatal environment

A postnatal room should be kept warm with no draughts from open doors or windows. A temperature of 25°C is required to help keep a baby warm. A mother and her baby should be kept together in the same bed right from birth. This helps the mother to get to know her baby and form an early close loving relationship (bonding), she can also respond quickly when her baby wants to feed, which helps establish breastfeeding and reduces breastfeeding difficulties.

It is important to greet the mother appropriately before starting the examination of the baby. An important reason for this is to open good communication with the mother. Using good communication helps to reassure the mother that her baby will receive good care.

Review labour and birth record

Review the labour and birth record to identify any risk factors or any events during the birth which may be important in the management of the mother and the baby

5.2 Ask the mother

- Does she or the baby have any problems and record what she says
- Has the infant passed stools? Meconium should be passed by 24 hours. Passage after 24 hours is NOT NORMAL and needs investigation
- Has the infant passed urine? Urine is passed by 48 hours. It is NOT NORMAL if not passed by 48 hours.
- Have you started breast feeding the infant?
- Is there any difficulty in feeding the infant?

- Do you have any pain while breast feeding?
- Have you given any other foods or drinks to the infant?
  If Yes, what and how ?

5.3 Examine the baby

- Count the breaths in one minute.
- Look for severe chest indrawing.
- Look and listen for grunting.
- Look at the umbilicus. Is it red or draining pus?
- Look for skin pustules. Are there 10 or more pustules or a big boil?
- Measure axillary temperature (if not possible, feel for fever or low body temperature):
  Normal (36.5-37.4° C)
  Mild hypothermia (36.0-36.4° C/ cold feet)
  Moderate hypothermia (32.0° C – 35.9° C, cold feet and abdomen)
  Severe hypothermia (< 32° C)
  Fever (≥ 37.5° C/ feels hot)
- See if young infant is lethargic
- Look for jaundice. Are the face, abdomen or soles yellow?
- Look for malformations

5.4 Assess Breastfeeding

If infant has not fed in the previous hour, ask the mother to put her infant to the breast. Observe the breastfeed for 4 minutes.

- Is the infant able to attach? To check attachment, look for:
  - Chin touching breast
  - Mouth wide open
  - Lower lip turned outward
  - More areola above than below the mouth

If not well attached, help the mother to position so that the baby attaches well to the breast.

- Is the infant suckling effectively (that is, slow deep sucks, sometimes pausing)?

If not sucking well, then look for:

- ulcers or white patches in the mouth (thrush).

If there is difficulty or pain while feeding, then look for

- Engorged breasts or breast abcess
- Flat or inverted, or sore nipples

Look for Normal Phenomena

There are several phenomena after birth that is normal and mothers only need reassurance.

- There are a few developmental variants which may be present and be of concern to the mother. These include milia, epstein pearls, mongolian spots, enlarged breasts, capillary nevi etc. The mother needs to be reassured.
- Transitional stools is the passage of frequent, loose stools, yellowish-green in color between day 3 and day 14 of life. It needs NO treatment.
- Vaginal white discharge/bleeding in female babies is normal
- Red rashes on the skin may be seen on 2-3 days of life. These are normal
- Weight loss of 6-8% (10-12% in preterms) in the first few days of life is normal and most infants regain their birth weight by 10-14 days.

5.5 Cord Care

Instruct the mother not to apply anything on the cord and keep it dry. Umbilical cord is an important portal of entry for pathogenic organism. Umbilical stump must be inspected after 2-4 hours of clamping. Bleeding may occur at this time due to shrinkage of the cord and loosening of the ligature.

5.6 Skin and Eye Care

Babies are not bathed routinely in the hospital to prevent complications like hypothermia and infection, they may however be sponged with lukewarm water. No routine eye care is required.

5.7 Vitamin K

Give Vitamin K 1.0 mg (0.5 mg in preterms) IM if not already received at birth.

5.8 Counsel the mother

- Warmth.
- Breastfeed frequently.
- Advise mother to wash hands with soap and water after using the toilet and after cleaning the bottom of the baby.
- Advise mother regarding danger signs and care seeking.

Immunization

- The baby should receive
  -BCG
  -OPV-0
  -Hepatitis B (HB-1) - if included in immunization schedule

Follow-up

Schedule a postnatal visit within the first week on day 3 and day 7 of delivery. Also visit on day 14, 21 and 28 if baby is LBW.

In the follow up the baby should be assessed for growth and development and early diagnosis and management of illnesses. In addition, health education of parents should be done. It is preferable that every baby is seen and assessed by a health worker at least once every month for 3 months and subsequently 3 monthly till 1 year.

Group Discussion on care in postnatal ward

SECTION. 6 MANAGEMENT OF A SICK YOUNG INFANT

Sick young infants not only require supportive care but also require specific management for different conditions.

6.0 Learning Objectives

After completion of this section the participant should be able to-

- Provide appropriate fluid therapy
- Manage specific conditions – Hypoglycemia, post-asphyxial state, sepsis (including pneumonia and meningitis), tetanus neonatorum and jaundice
- Monitor sick newborn
- Provide follow up care after discharge

6.1 Fluid management

Encourage the mother to breastfeed frequently to prevent hypoglycemia. If unable to feed, give expressed breast milk by nasogastric tube.

- Withhold oral feeding in the acute phase in babies who are lethargic or unconscious, having frequent convulsions, apnea, shock or having moderate to severe respiratory distress.
- Withhold oral feeding if there is bowel obstruction, necrotising enterocolitis or the feeds are not tolerated, e.g. indicated by increasing abdominal distension or vomiting everything.

Give IV fluids

Intravenous fluids

The fluid requirements of neonates are summarized in Table 5.

Table 5 : Fluid requirement of neonates (ml/per kg body weight)		
Day of Life	Birth Weight	
	≥1500 g	<1500 g
1	60	80
2	75	95
3	90	110
4	105	125
5	120	140
6	135	150
7	150	150

Type of fluid

- First 2 days : 10% dextrose in water
- After 2 days: Use either commercially available pediatric maintenance fluid containing 25mmol/L of sodium (e.g. Isolyte-P) otherwise prepare the fluid by adding 20 ml NS + 1ml Kcl+79 mL of 10% dextrose to make 100ml fluid.

Monitor the IV infusion very carefully.

- Use a monitoring sheet
- Calculate drip rate
- Check drip rate and volume infused every hour
- Check for edema/puffiness of eyes (could indicate volume overload)
- Weigh baby daily to detect excessive weight gain (excess fluid) or loss (insufficient fluid); adjust IV fluids appropriately.
- Adjust daily IV maintenance fluids appropriately if baby is receiving dopamine or any other infusions.

Introduce milk feeding by orogastric tube or breastfeeding as soon as it is safe to do so. Reduce the IV fluid rates as the volume of milk feeds increases in infants on orogastric feeds. Discontinue IV fluids once oral intake reaches 2/3rd total requirement. For babies who are able to breastfeed well, stop IV fluids.

6.2 Hypoglycemia

Check for blood glucose in all sick young infants

- If hypoglycaemia detected (defined as < 45 mg/dl for young infants), give 2 ml/kg IV bolus dose of 10% dextrose.
- Start infusion of glucose at the daily maintenance volume according to the baby's age so as to provide 6 mg/kg/min of glucose in all cases of neonatal hypoglycemia as given in Table 6.
- Recheck the blood glucose in 30 minutes. If it is still low, repeat the bolus of glucose (above) and increase infusion rate of glucose to 8 mg/kg/min. If blood sugar still remains low, then increase to 10 mg/kg/min. Once normal, monitor blood sugar every 4-6 hourly. Table 6 depicts the volume of 10% and 25% dextrose to be added to get appropriate glucose concentration. Do not discontinue the glucose infusion abruptly. It can cause rebound hypoglycemia.
- Glucose infusion rates ≥ 10mg/kg/min can result in glucose concentration > 13% in the infused fluid. Under such circumstances infusion through peripheral veins is not recommended. It would require infusion through umbilical vein. If you cannot cannulate the umbilical vein refer the baby to a higher health facility.
- After the blood sugar has been stabilized step down the concentration of glucose by 2 mg/kg/min every 4-6 hourly ensuring that blood sugar remains normal. Allow the baby to begin breastfeeding. If the baby cannot be breastfed, give expressed breast milk using an alternative feeding method.

- As the baby's ability to feed improves, slowly decrease (over 6 to 12 hours) the volume of IV glucose if the baby remains euglycaemic while increasing the volume of oral feeds. **Do not discontinue the glucose infusion abruptly to prevent rebound hypoglycemia.**

Table 6 : Achieving appropriate glucose infusion rates using a mixture of D10 & D25 (Babies > 1500 gm)						
Volume (ml/ kg/d)	Glucose infusion rate					
	6 mg/kg/min		8 mg/kg/min		10 mg/kg/min	
	D10 (ml/kg/d)	D25 (ml/kg/d)	D10 (ml/kg/d)	D25 (ml/kg/d)	D10 (ml/kg/d)	D25 (ml/kg/d)
60	42	18	24	36	5	55
75	68	7	49	26	30	45
90	90	-	74	16	55	35
105	85*	-	99	6	80	25
120	100*	-	120	-	97	18

Note: *Add 20ml/kg of Normal saline to provide 3 meq/kg of sodium

- If hypoglycemia is persisting at 10 mg/kg/min of glucose infusion, give one dose of Hydrocortisone: 5 mg/kg and refer to a higher health facility for further management of persistent hypoglycemia.
- To provide a higher/lower glucose infusion rate, you would have to make a fresh solution with the desirable glucose composition

Group Discussion on Hypoglycaemia management

Now we will learn through the following example to calculate glucose infusion rate.

Example: Calculating glucose infusion rate for treating hypoglycemia

A two day old 2 kg hypoglycemic infant requires 6 mg/kg/min of glucose infusion and daily fluid volume at 75 ml/kg.

Step 1: Total fluid needed on day 2 of life: 75 (ml/kg) x 2 (kg) = 150 ml
Step 2: Look at Table 6 to check composition of fluid
For 75 ml/kg/d @ 6mg/kg/min we need 68ml/kg of D10 and 7 ml/kg of D25.
Amount of D10 needed/day: 68 ml x 2 = 136 ml
Amount of D25 needed/day: 7 ml x 2 = 14 ml
Step 3: Writing fluid order
50 ml (5ml D25 + 45 ml D10) in 8 hours @ 6-7 micro-drops/min*

* In Micro infusion burette set 1 ml = 60 drops; so drops/min = ml/hr of fluid

6.3 Post Resuscitation care of Asphyxiated newborn

Lack of oxygen supply to organs before, during or immediately after birth results in asphyxia which is recognized by either delayed onset of breathing/cry with/without need for assisted ventilation.

Clinical features that these babies could manifest with during the first 2-3 days of life include irritability or coma, hypotonia or hypertonia, convulsions, apnea, poor suck and feeding difficulty.

Additional problems that these newborns may have include hypoglycemia, shock, renal failure.

Management

1. Check for emergency signs and provide emergency care (see *chart* 2).
2. Place these babies under radiant warmer to maintain normal temperature as they usually have difficulty in maintaining normal body temperature.
3. Check blood sugar and if hypoglycemia is detected, treat it (*see section* 6.2).
4. If convulsions are present, then follow management guidelines in Module 1, *section* 3.3. If the baby needed an anticonvulsant drug (ACD) to control convulsions review the baby after 72 hrs.

   When to stop anticonvulsant medication?
   If the baby has been free of convulsions and is neurologically normal after 72 hrs, then stop the ACD.
   If at 72 hrs, the baby has hypertonia, continue ACD and refer for assesment.
5. Fluids: In a baby with emergency signs (breathing difficulty, shock, coma or convulsions), provide maintenance intravenous fluids according to age (see *section* 6.1) after initial stabilization of emergency signs.
   After 24 hrs of hospitalization, if the baby has not lost weight or has gained weight, then restrict maintenance fluid to 60% of requirement.
6. Feeding: If the baby has no emergency signs or abdominal distension, consider enteral feeding. If the baby is sucking well, initiate breast feeding or else initiate gavage feeding with breast milk in those with poor/no sucking. Initiate feeding with 15 ml/kg/day and increase by 15 ml/kg/day for next few days while gradually tapering off IV fluids.

6.4 Septicemia

Common systemic bacterial infections in young infants include sepsis, pneumonia and meningitis and all these may present alike.

Bacterial sepsis in a young infant is usually suspected by the presence of one or more of the following signs:

- Unable to feed
- Convulsions
- Fast breathing (60 breaths per minute or more)
- Severe chest indrawing
- Nasal flaring
- Grunting
- Bulging fontanelle
- Axillary temperature 37.5°C or above (or feels hot to touch) or temperature less than 35.5°C (or feels cold to touch)
- Lethargic or unconscious,
- Less than normal movements

Many of these symptoms may be present in other neonatal conditions eg perinatal asphyxia, hypoglycemia or hypothermia. In such situations take the help of risk factors and sepsis screen.

More specific localizing signs of infection which indicate serious bacterial infection include

- Painful joints, joint swelling, reduced movement, and irritability if these parts are handled
- Many skin pustules/big boil (abscess)
- Umbilical redness extending to the periumbilical skin or umbilicus draining pus

Treatment of Septicemia

- Admit to hospital.
- Where blood cultures are available, obtain blood cultures before starting antibiotics.
- Provide supportive care and monitoring for the sick neonate as described in Table 7.
- Start antibiotics; give Injection ampicillin and gentamicin. Refer to Table 8 for dose, duration and frequency.
- Give cloxacillin (if available) instead of ampicillin if extensive skin pustules or abscesses as these might be signs of Staphylococcus infection.
- Most bacterial infections in neonates should be treated with antibiotics for at least 7-10 days except meningitis. arthritis, deep abscesses and staphylococcal infections which would require 2-3weeks of therapy.
- If not improving in 2–3 days the antibiotic treatment may need to be changed, preferably as per microbial culture reports.

Table 7 : Supportive care of a septic neonate

1. Provide warmth, ensure consistently normal temperature
2. Provide bag and mask ventilation with oxygen if breathing is inadequate.
3. Start oxygen by hood or mask, if cyanosed or grunting.
4. Provide gentle physical stimulation, if apneic.
5. Start intravenous line.
6. Infuse glucose (10 percent) 2 ml/kg stat.
7. If perfusion is poor as evidenced by capillary refill time (CRT) of more than 3 seconds, manage shock as described earlier.
8. Inject Vitamin K 1 mg intramuscularly.
9. Consider use of dopamine if perfusion is persistently poor.
10. Avoid enteral feed if very sick, give maintenance fluids intravenously

Table 8 : Antibiotic therapy of sepsis

Antibiotic	Each Dose	Frequency		Route	Duration
	(mg/kg/dose)	<7days age	≥ 7days age		(Days)
Inj. Ampicillin or	50	12 hrly	8 hrly	IV, IM	7-10
Inj. Cloxacillin	50	12 hrly	8 hrly	IV	7-10
AND					
Inj. Gentamicin or	5	24 hrly	24 hrly	IV, IM	7-10
Inj. Amikacin	15	24 hrly	24 hrly	IV, IM	7-10

6.4.1 Meningitis

Suspect meningitis in an infant of septicemia if any one of the following signs are present:

- Drowsiness, lethargy or unconscious
- Persistent irritability
- High pitched cry
- Apnoeic episodes
- Convulsion
- Bulging fontanelle

To confirm the diagnosis of meningitis a lumbar puncture should be done immediately unless the young infant is convulsing actively or is hemodynamically unstable.

Treat meningitis

Give antibiotics

- Give ampicillin and gentamicin or a combination of an aminoglycoside with third generation cephalosporin, such as ceftriaxone (50 mg/kg every 12 hours (use with caution in infants with jaundice) or cefotaxime (50 mg/kg every 8-12 hours) for 3 weeks. The dose, frequency and duration to be used is as shown in table 9.

Table 9 : Antibiotic therapy of meningitis

Antibiotic	Each Dose	Frequency		Route	Duration
	(mg/kg/dose)	<7days	≥7days		(Weeks)
Inj. Ampicillin and Gentamicin	100	12 hrly	8 hrly	IV	3 weeks
	5	24 hrly	24 hrly	IV	3 weeks
OR					
Inj. Cefotaxime and Inj. Gentamicin	50	12 hrly	8 hrly	IV	3 weeks
	5	24 hrly	24 hrly	IV	3 weeks

Manage convulsions and provide supportive care for the sick young infant with meningitis as discussed earlier.

6.4.2 Maternal risk factors for sepsis

The various risk factors for early bacterial sepsis are:

- Maternal fever (temperature >37.9°C) before delivery or during labour
- Membranes ruptured more than 24 hours before delivery
- Foul smelling amniotic fluid

The babies born to mothers with these risk factors may be symptomatic or aspymptomatic. If symptomatic they should be treated as septicaemia (*section* 6.4)

In asymptomatic babies, presence of two or more risk factors warrants the institution of antibiotic therapy. A sepsis screen should be done in such infants. If the sepsis screen is negative and the infant remains asymptomatic at 48-72 hrs, antibiotics may be discontinued.

- Sepsis screen: A positive "sepsis screen" takes into account two or more positive tests as given below:
  - TLC <5000 or > 20,000/cumm (age > 72hrs)
  - Neutropenia (Absolute Neutrophil Count < 1800/cmm)
  - Immature neutrophil(band cells) to total neutrophil (I/T) ratio > 0.2
  - Micro ESR (ESR> 15mm 1st hour)
  - C-Reactive Protein–positive

6.4.3 Diarrhea

Diarrhea is uncommon in breastfed babies and is usually seen in babies who are not breastfed. The normally frequent or loose stools of a breastfed baby are not diarrhoea. If the stools have changed from usual pattern and are many and watery, then it is to be labeled as diarrhoea. Diarrhoea may be a sign of systemic sepsis or UTI.

Assess for:

- Signs of dehydration
- Duration of diarrhoea
- Blood in the stool

While management of diarrhea has been discussed earlier in IMNCI as per *annexue* I, young infants with blood in stool may signify a serious illness.

Approach to a young infant with blood in stool

Blood in stool in a young infant may be because of dysentery but is often due to surgical cause, necrotizing enterocolitis (NEC) or a bleeding diathesis.

Assess	Signs	Treat
Loose stools with blood	• Active baby • 1st week of age • No signs of sepsis	• Manage as hemorrhagic disease of newborn. Give Inj. Vit K 1 mg
	• Signs of possible sepsis	• Manage as sepsis / NEC
	• Abdominal mass • Attacks of crying with pallor	• Urgent surgical referral

Severe persistent diarrhoea

If the young infant has diarrhoea for 14 days or more, manage as case of severe persistent diarrhoea.

Treat severe persistent diarrhoea

- Admit the young infant.
- Manage dehydration if present.
- Investigate and treat for sepsis: Start Inj. ampicillin & gentamicin (Table 8).
- Encourage exclusive breastfeeding. Help mothers who are not breastfeeding to re-establish lactation. If only animal milk must be given, give a breast milk substitute that is low in lactose.
- Give supplement vitamins and minerals for at least 2 weeks.

6.4.4 Tetanus Neonatorum

Tetanus Neonatorum occurs in a baby whose mother is not completely immunized during the pregnancy along with a history of unclean cord cutting practice at birth.

Diagnosis

Neonatal tetanus is diagnosed by the presence of:

- Onset at 3-14 days
- Difficulty in breast feeding
- Trismus
- Spasms which are provoked by external stimuli eg. touch

Treatment

Tetanus immunoglobulin (TIG)

TIG is given to neutralize the circulating toxin. A single dose of 500 units IM is given at admission.

Antibiotics

Crystalline penicillin is given in dose of 100,000 unit/kg/day 12 hourly IV to eliminate the source of toxin i.e. Clostridium tetani. An alternative antibiotic is oral erythromycin (by nasogastric tube) in a dose of 40 mg/kg/day 12 hourly. Antibiotic therapy is given for 7-10 days.

Control of Spasms

This is the most important part of management as most deaths occur due to uncontrolled spasms resulting in hypoxic damage. Diazepam is the drug of choice initiated at a dose of 0.1-0. 2 mg/kg/dose given every 3-6 hours. Initially it is given IV intermittently and later as the spasms are controlled it can be given orally. If spasms are not controlled then the dose of diazepam can be increased up to 0.4 -0.6 mg/kg/dose.

Chlorpromazine can also be added at a dose of 1-2mg/kg/day in 4 divided doses orally by NG tube. Once spasms are controlled, diazepam is decreased by 10% of its dose every third day.

Ensure appropriate supportive care including temperature maintenance, care of airway, breathing, circulation, fluids and nutrition. Provide a quiet and comfortable environment for the baby as stimulation by light, sound and touch induce spasms.

Immunization: The neonate at discharge should be advised the standard immunization schedule.

6.5 Management of Jaundice

More than 50% of normal newborns and 80% of preterm infants have some jaundice. Jaundice can be physiological or pathological.

If newborn is jaundiced , the progression of skin staining is from head to toe and the level of bilirubin can be clinically assessed by extent of skin staining (Fig 23).

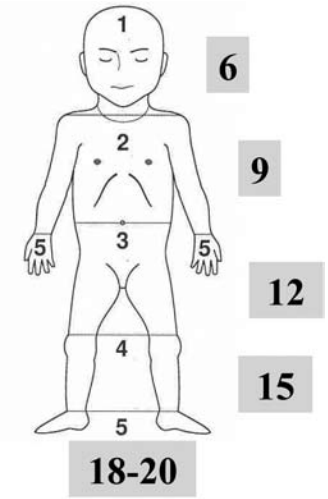


Fig 23. Assessment of jaundice clinically

Check if

- Onset of jaundice is within 24 hrs of life
- Clinical assessment: Jaundice beyond abdomen
- Baby is more than 14 days of age

If any one of the above is 'yes' then do the following investigations:

- Serum bilirubin (total/direct)
- Hemoglobin/hematocrit
- Blood groups of baby and mother

(other investigations that may be required in some babies with suggestive history and relevant examination findings include sepsis screen, thyroid function test, LFTs, Ultrasonography of abdomen etc.)

Treatment

Treatment of pathological jaundice is usually phototherapy or an exchange transfusion. Fig 24 and 25 provides guidelines for initiating phototherapy and exchange transfusion in babies ≥ 35 weeks. Table 10 provides guidelines for initiating phototherapy and exchange transfusion in LBW babies.

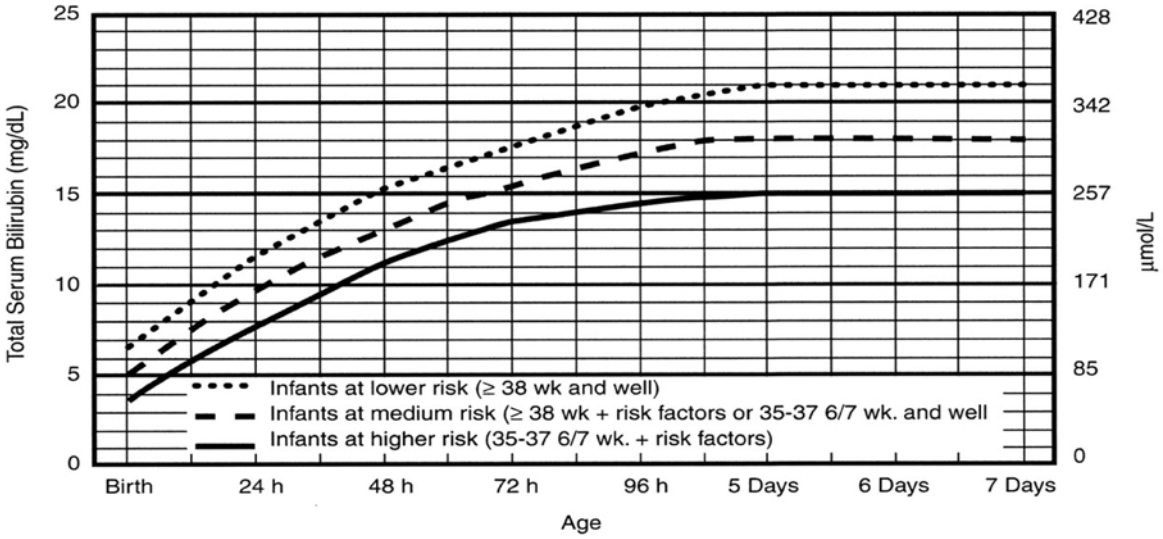
Table 10 : Guidelines for phototherapy and Exchange transfusion in Low birth weight infants

Birth Weight (Gm)	Total serum bilirubin (mg/dl)	
	Phototherapy	ExchangeTransfusion
500-750	5-8	12-15
750-1000	6-10	>15
1000-1250	8-10	15-18
1250-1500	10-12	17-20
1500-2500	15-18	20-25

Note: Lower bilirubin values in the range applies to lower birth weight values in the range

6.5.1 Guidelines for initiating Phototherapy:

Fig 24 provides guidelines on how to initiate phototherapy in newborns.



- Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin.
- Risk factors = isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis, or albumin < 3.0g/dL (if measured)
- For well infants 35-37 6/7 wk can adjust TSB levels for intervention around the medium risk line. It is an option to intervene at lower TSB levels for infants closer to 35 wks and at higher TSB levels for those closer to 37 6/7 wk.

Fig. 24: Guidelines for initiating Phototherapy in Neonatal Hyperbilirubinemia for neonates (> 35 weeks)(AAP,2004)

How do you use the chart?

- First plot the baby's total serum bilirubin against the baby's age in hours.
- Next decide whether the (i) baby is > 38 weeks and well, (ii) baby is > 38 weeks with risk factors or 35-37 weeks and well, or (iii) 35-37 weeks with risk factors and select the appropriate intervention line.
- If the plotted bilirubin value is above the selected intervention line, the baby requires to be started on phototherapy. *In such babies also check the Exchange transfusion chart (Fig. 25)because some of these babies may need exchange transfusion*. If below the intervention line, observe and monitor bilirubin 12-24 hrly.

Monitoring baby on phototherapy: Follow guidelines provided in Fig 24 on initiating and monitoring the baby on phototherapy. Besides estimate bilirubin 12-24 hrly and plot values on the chart to decide on when to stop phototherapy.

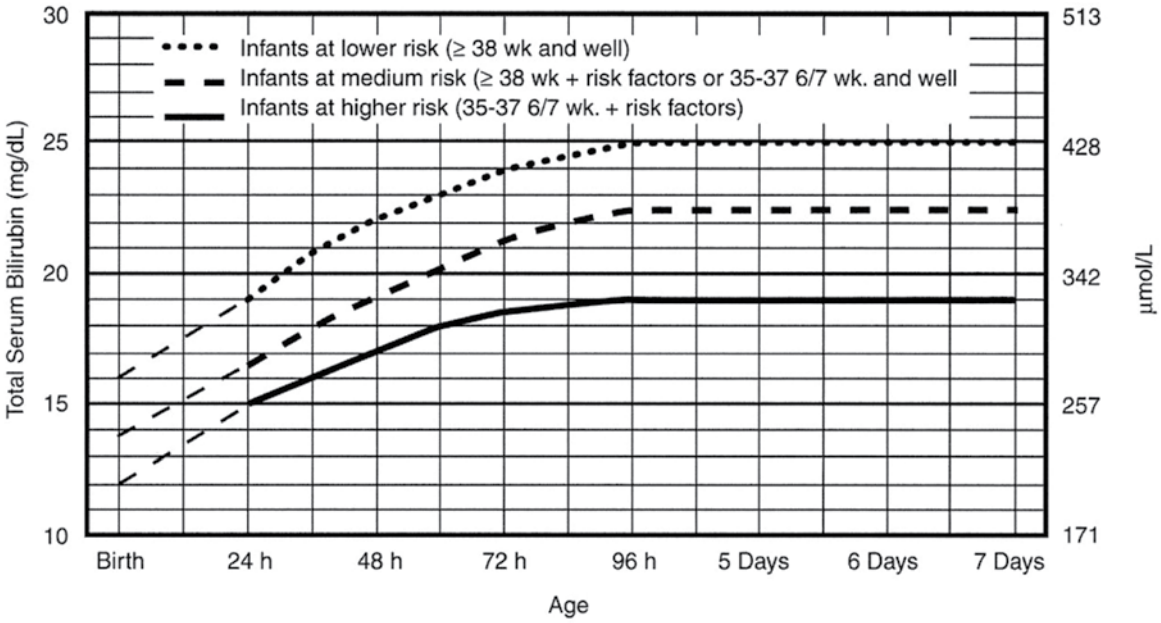
6.5.2 Guidelines for Exchange transfusion:

Fig 25 provides guidelines on how to decide when a baby needs exchange transfusion.

How do you use the chart?

It is similar to the process described in *section* 6.5.1.

Exchange transfusion is not described in this manual. These serum bilirubin levels are included in case exchange transfusion is possible or in case the baby can be transferred quickly and safely to another facility where exchange transfusion can be performed.



- The dashed lines for the first 24 hours indicate uncertainty due to a wide range of clinical circumstances and a range of responses to phototherapy.
- Immediate exchange transfusion is recommended if infant shows signs of acute bilirubin encephalopathy (hypertonia, arching, retrocollis, opisthotonos, fever, high pitched cry) or if TSB is ≥5 mg/dL (85 µmol/L) above these lines.
- Risk factors - isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis.
- Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin
- If infant is well and 35-37 6/7 wk (median risk) can individualize TSB levels for exchange based on actual gestational age.

Fig. 25: Guidelines for Exchange transfusion in Neonatal Hyperbilirubinemia for neonates (≥ 35 weeks)(AAP,2004)

Prolonged Jaundice

Jaundice lasting longer than 14 days in term or 21 days in preterm infants is abnormal. If the baby's stools are pale or the urine is dark, refer the baby to a specialized centre for further evaluation and management

Group Discussion on jaundice management

6.6 Monitoring of sick young infant

All sick young infants should be regularly monitored to detect improvement or worsening. The table given below provides a checklist for monitoring. The record should mention the parameters to be monitored, frequency of monitoring, with date & time.

Table 11 : Checklist for monitoring sick young infant			
(Mnemonic for monitoring: T.A.B.C.F.M.F.M.C.F.)			
SNO	CHECKLIST	ASSESSMENT	ACTION
1	Temperature	Mild hypothermia	Rewarm by KMC
		Hypothermia (Moderate/Severe)	Rapid Rewarming byradiant warmer
		Fever (temperature ≥ 37.5°C	Removal of excess clothing, change environment, Sepsis screening
2	Airway	Obstructed	Open the airway (Position and suction)
3	Breathing	Apnoea/Gasping	PPV with Bag and Mask
		Respiratory Distress	Oxygen
4	Circulation	Shock	• Give 20 ml/Kg Normal saline/RL in 30 min • Oxygen
5	Fluids	No Shock	Maintenance Fluid
6	Medication & Other Management	Suspected sepsis, Jaundice	Antibiotics, phototherapy
7	Feeding	As per wt & age guidelines	
8	Monitor	Temperature, Respiration, Colour, Heart Rate, CRT,Danger Signs	
9	Communication		**For Home care:** • Exclusive Breast Feeding • Maintain Temperature • Cord & Eye Care • Danger Signs • Maternal Health **For care during referral**
10	Follow Up		• 2 weekly for initial 2-3 visits, every month thereafter • Check weight, feeding, problems • Immunization

6.7 Discharge from the hospital

Careful monitoring of the infant's overall response to treatment and correct planning of discharge from the hospital are just as important as making the diagnosis and initiating the treatment. The discharge process for all sick infants should include:

- Correct timing of discharge from the hospital
- Counseling the mother on correct treatment and feeding of the infant at home
- Ensuring the infant's immunization status and record card are up-to-date
- Communication with the health personnel who referred the infant or who will be responsible for follow-up care (discharge card or a referral note, this will lead to more appropriate referrals to hospital and better relationship between hospital and community health workers)
- Instructions on when to return for follow-up care and signs indicating the need to return immediately

6.8 Providing follow-up care

1. Infants who are discharged from the hospital should return for follow-up care for checking the Young Infant's condition in relation to the present problem

2. Mother should be advised to return immediately if the Young Infant develops any of the following signs:
   - Breastfeeding or drinking poorly
   - Becomes sicker
   - Develops a fever or feels cold to touch
   - Fast breathing, Difficult breathing
   - Diarrhoea with blood in stool
   - Yellow palms & soles

3. Remind the mother of the Young Infant's next immunization visit

EXERCISE - 4

1. A 7day old infant is brought to emergency room with decreased activity and poor feeding for 1 day. On examination the infant is lethargic, temperature 35.5°C, cold extremities, CFT 5 secs, weak pulses, heart rate 170/min and bulging fontanelle.

a. List the emergency signs in this baby on triaging

b. Write the most likely diagnosis

c. List the investigations you would perform

d. Write the steps of treatment for this baby in the order in which they should be undertaken

2. A term baby weighing 3 kg presents at 72 hrs age with history of jaundice. The baby has yellow staining of extending upto legs and is active and feeding well. The serum bilirubin is 17 mg/dl.

a. What investigations would you do other than serum bilirubin?

b. Decide what intervention this baby will require

3. A 5 day term neonate weighing 3 kg was admitted with respiratory distress. The baby started improving and is started on 5 ml EBM 3 hourly by NG tube on day 7 of life.

a. How will you adjust the IV fluids for this baby (write the volume, composition and infusion rate)

SECTION. 7
MANAGEMENT OF LOW BIRTH WEIGHT BABIES

A neonate who weights less than 2500 gm is a low birth weight baby. In India, over 30 percent infants born are LBW.

Nearly 75 percent neonatal deaths and 50 percent infant deaths occur among the low birth weight neonates. Even after recovering from neonatal complications, some LBW babies may remain more prone to malnutrition, recurrent infections, and neurodevelopment handicaps. Low birth weight, therefore, is a key risk factor of adverse outcome in early life.

7.0 Learning Objectives:

The participant after completing this section should be able to:-

1) Enumerate problems of Preterm & LBW.
2) Chart intravenous fluid requirements for a sick LBW neonate as per the baby's birth weight.
3) Enumerate modes of enteral feeding for a LBW neonate as per the baby's birthweight.

Type of LBW

A newborn baby can be LBW because of two reasons. First, the baby may be preterm. A preterm baby has not yet completed 37 weeks of gestation. Since fetal size and weight are directly linked to gestation, it is obvious that if the delivery takes place prematurely, the baby is likely to have less weight. The second situation that leads to low birth weight is intrauterine growth retardation or IUGR. This condition is similar to malnutrition. Here, gestation may be full term or preterm, but the baby is undernourished, undersized and therefore, low birth weight. Such a baby is also called a small-for-date or SFD neonate. Two thirds of our LBW neonates fall in this category. At times, a LBW neonate may be both preterm as well as small for-dates.

How to recognize preterm and SFD infants?

It is desirable and of practical relevance to make clinical distinction between the two types of LBW babies. Preterm baby is diagnosed on the basis of period of gestation, If it is less than 37 completed weeks, the baby in question is preterm. Preterm babies have distinct physical features that help in their recognition. If you examine their soles, you notice that the deep skin creases on them are present only on the anterior one third. The external ear or the pinna is soft and devoid of cartilage. Hence, it does not recoil back promptly on being folded. The breast areola is poorly pigmented and the breast nodule is usually absent or < 5mm in diameter. In males, the scrotum does not have rugae and testes are not descended into the scrotum. In female infants, the labia are widely separated, not covering the labia minora, resulting in the prominent appearance of the clitoris. The back of the preterm babies has abundant growth of fine hair called lanugo.

7.1 Problems of LBW neonates

Problems of pre-term

- Asphyxia
- Hypothermia
- Inability To Breast Feed
- Respiratory Distress Syndrome
- Apneic Spells.
- Intra-Ventricular Hemorrhage.
- Metabolic Problems like Hypoglycemia, Metabolic Acidosis and Hyperblirubinemia.
- Infection
- Retinopathy of Prematurity.

Problems of Small for Date babies.

- Fetal Distress, Meconium Aspiration syndrome
- Asphyxia,
- Hypothermia.
- Hypoglycemia
- Sepsis
- Malformations

7.2 Management

Delivery of low birth weight babies

Ideally, the delivery of an anticipated LBW baby should be conducted in hospital. Premature labor as well as intrauterine growth retardation is indications for referral of the pregnant mother to a well-equipped facility. This in-utero transfer of a low weight fetus is far more desirable, convenient and safe than the transport of a low weight baby after birth. Delivery should be conducted by trained health professionals, at least one of them should be well-versed with a the art of neonatal resuscitation. The standard procedure of resuscitation should be followed efficiently.

Deciding the place where a LBW baby should be managed

The mother and the family under the supervision of a health worker or family physician can manage an otherwise healthy LBW newborn with a birthweight of 1800 gm or above at home. The indications for hospitalization of a neonate include the following.

(a) Birth weight less than 1800 gm

(b) Neonate who is unable to feed from the breast or by katori-sopon

(c) A sick neonate

7.2.1 Keeping LBW babies warm

At home

Baby should be provided skin to skin contact care (KMC). If not possible baby should be nursed next to the mother, as the mother herself is a good source of warmth for the baby. Further, the room where a LBW baby is nursed should be kept rather warm.

The baby should be clothed well. Two or three layers of clothes are generally required. If the room is not warm enough, woolen sweater should also be put on. Feet should be covered with sock, hands with mittens and head with a cap. Besides, a blanket should be used to cover the baby.

In the hospital

Apart from the above methods, overhead radiant warmer or incubator may be used to keep the baby warm. Regular monitoring of axillary temperature should be carried out in all hospitalized babies

If a child is maintaining normal body temperature, the trunk feels warm to touch while the soles and the palms are pink and warm. In early stages of hypothermia, the trunk is warm but the soles and palms are cold to touch. This condition, cold stress is not normal and baby requires additional warmth immediately.

7.2.2 Nutrition and fluids

Mode for providing fluids and feeds

Birthweight, gestation, presence or absence of sickness and individual feeding effort of the baby determine the decision as to how a LBW neonate should be provided fluids and nutrition (Table 12). Breast milk is the ideal feed for the low birth weight babies. Those unable to feed directly on the breast can be given Expressed Breast Milk (EBM) by gavage or katori-spoon.

Ultimate goal is to meet both these needs from direct and exclusive breastfeeding.
Neonates weighing less than 1200 g, or those having sickness should receive intravenous fluid initially. Enteral feeds should be introduced gradually by gavage as the baby's acute problem begins to settle. In due course, the baby shifted to katori-spoon feeds, and then to direct breast-feeds. Infants weighing 1200-1800 g and not having significant illness should be put on gavage feeds initially. In a couple of days, it should be possible to shift them to katori-spoon feeds, and then gradually to breast feeds.

In order to promote lactation and enable the baby to learn sucking, all babies on gavage or katori-spoon feds should be put on the breasts before each feed for 5 to 10 minutes. With improvement in their overall condition, the infants would start meeting part and, later, all of their nutritional needs from direct breastfeeding. Breast milk is the best milk for LBW baby.

Table 12: Guidelines for the modes of providing fluids and feeding

Age	Categories of neonates		
Birth weight (gm) Gestation (weeks)	<1200 <30	1200-1800 30-34	>1800 >34
Initial	-IV fluids -Triage -Gavage feeds if not sick	Gavage feeds	- Breast feeds - If unsatisfactory, give cup-spoon feeds
After 1-3 days	Gavage feeds	Cup-spoon feeds	Breast feeds
Later (1-3 wks)	Cup-spoon feeds	Breast feeds	Breast feeds
After some time (4-6 wks)	Breast feeds	Breast feeds	Breast feeds

Note:

1. Baby may be fed by gavage or cup-spoon feeds. Ensure use of expressed breast milk (see *annexure*-3 for technique of expressing breast milk). Start with small volume, and gradually build up.
2. When the baby is on gavage or cup-spoon feeds, it is important that he is put on the breast before every feed. Although the baby may not obtain much milk, it will help promote lactaion and enable the baby to learn how to suck.

3. When shifting a baby from one mode of feeding to another, be very careful. Introduce in new mode for only some of the feeds to begin with.
4. The feeding of every baby should be individualized. The above recommendations should only serve as broad guidelines.

Most LBW babies weighing more than 1800 g are able to feed directly from the breast. However, some of them may not be able to suck satisfactorily during the first few days of life. During this period, the feeds may be provided by cup-spoon.

Your Facilitator will now conduct a DRILL ON MODE OF FEEDING

Enteral feeds

Amount and scheduling of enteral feeds

For infants on gavage or cup-spoon feeds, total daily requirements can be estimated from the table 13 on the fluid requirements. In a stable, growing LBW baby daily intake of feeds should be gradually built upto 180-200 ml/kg. LBW babies should be fed every 2-3 hours starting at 2 hours of age. Two hourly feeds are also applicable to LBW receiving direct breast feeding. LBW babies may take longer on the breast as compared to their normal weight counterparts.

Table 13: Feeding volumes and rate of increments in LBW

Age (days)	Feed volume (ml/kg/day)
1	60
2	90
3	120
4	150
5	180
6	180

Techniques of methods of feeding

(a) Gavage feeds

For gavage feeding; size Fr 5 feeding catheter is required for nasogastric or orogastric placement. For nasogastric insertion, the catheter is measured from the external nares to the tragus of the ear, and from there to the ansifrom cartilage, and marked. This length of the tube should be inserted through the nose. For the orogastric catheter the distance between angle of mouth to tragus and then to the ansiform cartilage is used for insertion. During nasogastric or orogastric insertion, the head is slightly raised and a wet (not lubricated) catheter is gently passed through the nose (nasogastric) or mouth (orogastric) down through esophagus to the stomach. Its position is verified by aspirating the gastric contents, and by injecting air and auscultating over the epigastric region. At the time of feeding, the outer and end of the tube is attached to a 10/20 ml syringe (without plunger) and milk is allowed to trickle by gravity. The baby should be placed in the right lateral position for 15 to 20 minutes to avoid regurgitation. There is no need to burp a gavage-fed baby. The nasogastric or orogastric tube may be inserted before every feed or left in situ for upto 7 days. While pulling out a feeding tube, it must be kept pinched and pulled out gently.

Gavage feeding may be risky in very small babies. They have small stomach capacity and the gut may not be ready to tolerate feeds. Stasis may also result from paralytic ileus due to several conditions. Thus, gavage-fed babies are candidates for regurgitation and aspiration. It is important therefore to take precautions. Before every feeed, the abdominal girth (just above the umbilical stump) should be measured. If the abdominal girth increases by more than 2 cm from the baseline, then perform pre-feed aspirate. If the aspirate is more than 25 percent of the last feed, the baby should be evaluated for any illness. The feeds may have to be suspended till the abdominal distension improves.

(b) Cup-spoon feeds

Feeding with a spoon (or a similar device such as 'paladai') and cup has been found to be safe in LBW babies. This mode of feeding is a bridge between gavage feeding and direct breast feeding. It is based on the experience that neonates with a gestation of 30-32 weeks or more are in a position to swallow the feeds satisfactorily even though they may not be good at sucking or coordinated sucking and swallowing. Use a medium sized cup and a small (1-2 ml size) spoon. Both utensils must be washed and cleaned. Take the required amount of expressed breast milk in the cup. Place the baby in an upright posture with a napkin around the neck to mop up the spillage. Fill the spoon with milk, a little short of the brim, place it at the lips of the baby in the corner of mouth and let the milk flow into the bay's mouth slowly avoiding the spill. The baby will actively swallow the milk. Repeat the process till the required amount has been fed. While estimating the intake, account for the spilled milk weighing the napkin will provide exact amount of milk spilled. Baby may also feed directly by cup.

If the baby does not actively accept and swallow the feed, try gentle stimulation. If he is still sluggish, do not insist on this method. It is better to switch back to gavage feeds till the baby is ready.

Judging adequacy of nutrition

The key measure of optimal feeding is the weight pattern of the baby. A preterm LBW baby loses upto 1 to 2 percent weight every day amounting to 10 percent cumulative weight loss during the first week of life. Birth weight is regained by the14th day. SFD-LBW babies who are otherwise healthy should not have any appreciable weight loss at all and they should start gaining weight early. It is desirable to weigh all LBW babies at 2 weeks (to check regaining of the birth weight), 4 weeks (to ascertain a weight gain of at least 200-300g) and then every month. Hospitalized LBW babies should be weighed every day on the same weighing machine.
Excessive weight loss, or inadequate weight gain indicates inadequate feeding, cold stress, excessive insensible water loss or systemic illness (like anemia, sepsis, late metabolic acidosis etc).

Your Facilitator will show you a VIDEO on gavage feeding, cup-spoon feeding and expression of breastmilk

7.2.3 Vitamin supplements

All LBW babies should receive intramuscular vitamin K at birth.

All preterms < 2000g should receive oral vitamin and mineral supplement in doses shown below:

- Multivitamin preparation 0.3-0.6 ml (5-10 drops) /day (which usually provides vitamin A of 1000 IU/day and vitamin D 400 IU/day)
- Calcium 80-100 mg/kg/day
- Phosphorous 40-50 mg/kg/day

All these supplements to be given till atleast 6 months of age

- Iron should be started at a dose of 1 mg/kg/day at 4 weeks of age and provided till 12 months of age.

7.3 Vaccinations in LBW babies

If the LBW baby is not sick, the vaccinations schedule is the same for as the normal babies A sick LBW baby however, should receive these vaccines only on recovery.

7.4 Discharge and Follow up

LBW babies can be discharged when:

- They are feeding from breast or breast and cup
- Gaining weight for 3 consecutive days
- No signs of illness
- Are able to maintain normal body temperature when roomed-in with mother
- Mother is confident of taking care of the baby

7.5 Counselling at Discharge

Mother and family must be provided counselling for care of LBW at home. They should be informed about

- Providing exclusive breast milk to the baby
- How to keep baby warm at home
- Identifying 'Danger signs" for seeking medical help
- Scheduled visits for assessing growth, monitoring illness and providing immunization. These visits should be at weekly intervals till the infant reaches 2.5kg
- Mother must be informed about her nutrition and health

EXERCISE - 5

1. A term baby weighing 1.6 kg is brought to the health facility on day 3 of life with poor sucking. On examination the baby is lethargic, temperature of 36°C, CFT 3 sec with normal pulses, with poor sucking on breast. The blood sugar was 30 mg/dl.

a. What is (are) the likely diagnosis?

b. List the plan of treatment that is immediately required and over the next 24 hours.

On the following day after your treatment, the baby has a temperature of 36.8°C with blood sugar of 60 mg/dl. However, the baby is sucking ineffectively on the breast.

c. How would you plan the baby's feeding?

SECTION. 8
NEONATAL TRANSPORT

If the baby needs to be transferred to a special care neonatal unit, ensure a safe and timely transfer. It is important to prepare the baby for transfer, communicate with the receiving facility, and provide care during transfer.

8.0 Learning Objectives

After completion of this module, you should be able to:

- Identify babies who need referral
- Provide counseling and family support
- To prepare and organize referral
- To provide pre-referral stabilization and advice enroute

8.1 Indications of transfer to neonatal care unit

- Babies with birth weight <1500g
- Babies needing mechanical ventilation
- Shock not responding to fluid challenge and vasopressors
- Jaundice needing exchange transfusion
- Major congenital malformations e.g. Tracheo-esophageal fistula, diaphragmatic hernia, meningomyelocele etc.
- Refractory seizures
- Abdominal distension with bilious vomiting

8.2 Components of neonatal transport

1. **Assess**
   Make careful assessment of the baby. Make sure that there is a genuine indication for referral.

2. **Stabilize the neonate**
   Stabilize with respect to temperature, airway, breathing, circulation and blood sugar. Give first dose of antibiotics Injection ampicillin and gentamycin.

3. **Write a note**
   Write a precise note for the providers at the referral facility providing details of the baby's condition, reasons for referral and treatment given to the baby.

4. **Encourage mother to accompany**
   Mother should accompany the baby for breast feeding and for providing supportive care to the baby on the way and in the hospital. In case she cannot accompany the baby immediately, she should be encouraged to reach the facility at the earliest.

5. **Arrange a provider to accompany**
   A doctor/nurse/health worker should accompany the baby, if feasible, to provide care to the baby en route, and to facilitate transferral to the referral facility.

8.3 Communication and family support

One of the most important and often very difficult aspects of transport is the need for emotional support of parents and family. Hospitalization and the need for transport of a newborn can precipitate a crisis for the entire family. Accepting emotional outbursts calmly and reassuring the parent that their child is being cared for can reduce parental anxiety. The common influencing factors are Socioeconomic status/ Poor education / Traditions and lack of support systems. Interventions to reduce the stress and support the grief response must be incorporated into the transport process.

1. Allow parents to see and touch their child prior to transport.
2. Thorough explanation ought to be given of the clinical problems and anticipated transport care. Explain where to go and indicate whom to contact.
3. Ensure communication with the referral facility and request for feedback
4. Consider maternal transfer whenever possible

8.4 Ensure warm transport

Use one of the following approaches to keep the baby warm during transportation:

1. **Skin to skin care:** This is probably the most effective, safe and convenient method.
   - Baby is wearing a cap and a napkin
   - Baby is placed facing the mother in skin to skin contact between breasts
   - Baby's back is covered by tying the blouse or with a fold of gown/ 'chunari'

   [The skin to skin contact can also be provided by another woman/man /father].

2. **Cover the baby:** Cover the baby fully with clothes including the head and the limbs. Nurse the baby next to the mother or another adult during transport.

3. **Improvised containers:** Use of thermocol box, basket, padded pouch, polythene covering can be used for ensuring temperature stability during transport. If available, you may use one of these methods.

The use of rubber hot water bottle is fraught with considerable danger due to accidental burns to the baby if the bottle is not wrapped properly or remains in contact with baby's body. It is therefore best avoided. If no other means of providing warmth is available, this method may be employed, but with utmost caution. The accompanying members of the team should be explained care of the bottle.

8.5 Provide other care during transportation

The accompanying person should be explained to ensure the following:

1. **Ensure warm feet**
   - Whatever method of keeping the baby warm is employed, make sure that the baby's feet are warm to touch. Warm feet means that the baby is not in cold stress.
   - If the baby passes urine or stool, dry him promptly. He should not remain wet, otherwise he will loose heat.
2. **Ensure an open airway**
   - Keep the neck of the baby in slight extension
   - Do not cover the baby's mouth and nose
   - Suction mouth and nose if required.
3. **Check breathing:** Watch baby's breathing. If the baby stops breathing, provide tactile stimulation to the soles to restore breathing. If breathing not established, initiate bag and mask ventilation.
4. **Provide feeds:** Breast feed if baby is active. If the baby is able to feed but the mother is unable to accompany and breastfeed the baby, the baby must be fed using an alternative feeding method. Insert a gastric tube if necessary.

EXERCISE - 6

1. Which are the babies who need referral to a tertiary care centre?'

2. What are the components of organization of Neonatal transport?

Now you will do the Case Studies and discuss with your facilitator

Case Study - 1

1. A baby is delivered at full term at your hospital. The baby cries while he is being handed over to you. What type of care will you provide this baby?.

2. List the components of the type of care you have decided for this baby

3. You visit the baby at 24 hrs of age. The mother complaints that she has very little breast milk. How would you proceed?

Case Study -2

1. A 1600 gms 33 weeks gestation, infant is born vaginally at home. There was no birth asphyxia. The baby was brought to you at 1 hour of age and the axillary temperature was 35 degree C.

   - What is your assessment?

   - What immediate measures will you take to manage this baby?

2. At 3 hrs, the temperature was normal. There was no respiratory distress, baby was active but did not suck well at the breast, nor did he accept feed with spoon. How would you provide fluids & nutrition to this baby ?

3. On day 3 the baby weighed 1550 gms, cup spoon were tried and the baby accepted them well but sucking at the breast was poor. How will you feed the baby, how much and how frequently.

4. What advice should be given to the mother to ensure lactation.

5. When would you discharge this baby?

6. The baby is being discharged on Day 10 with a weight of 1600 gms. What advice would you give to the mother.

7. The baby returns for follow up on day 28. The weight of the baby is 1650 gm. How would you manage.

Case Study –3

1. A 2 day old infant with a weight of 2 kg, temperature of 36.9°C is brought with complaints of refusal to feed and poor cry. The blood sugar is 20 mg/dl. What is the most likely diagnosis? List the steps for treating this infant.

2. After 12 hrs, the baby's blood sugar is 60 mg/dl and the baby is active. How will you proceed to manage this infant?

Case Study - 4

A Term baby who was feeding well at the breast developed discharge from the umbilicus on the 5th day of life, followed by refusal of feed and lethargy the next day. He vomited twice, had a feeble cry and on way to the hospital had a convulsion.
At the hospital-
Weight was 2400 gm
Temperature was 37°C
Drowsy
RR-56/mim, no retractions, no grunt
CRT-2 secs.
Abdominal distension and poor bowel sound with a normal fontanelle.

1. What is your likely diagnosis?
2. How will you manage this baby?

ANNEXURE-I

Diarrhea

The normally frequent or loose stools of a breastfed baby are not diarrhoea. If the stools have changed from usual pattern and are many and watery, it is diarrhoea. Diarrhea is uncommon in breastfed babies and is seen in formula feed babies with poor hygiene.

Assess for:

- Signs of dehydration
- Duration of diarrhoea
- Blood in the stool

Dehydration assessment

Assess for signs of dehydration and choose the appropriate plan of management. Also assess for signs of possible sepsis and also determine if the young infant is low weight for age.

Severe dehydration	Two of the following signs: • Lethargic or unconscious • Sunken eyes • Skin pinch very slow	• Manage severe dehydration (Plan C) • Start antibiotics· • Admit or refer
Some dehydration	• Two of the following signs: • Restless, irritable • Sunken eyes • Skin pinch slow	• Manage dehydration (Plan B) • Start antibiotics if signs of sepsis or low weight • Admit or refer
No dehydration	Not enough signs to classify as severe or some dehydration	• Plan A (Home care) • Advise mother when to return immediately • Follow up in 5 days if not improving

Treatment of severe dehydration: A young infant with severe dehydration needs IV rehydration as described in Plan C. Start Inj Ampicillin and Gentamicin as for cases of sepsis, as diarrhoea is generally a manifestation of systemic infection.

How to treat severe dehydration in an emergency setting

(Plan C)

- Start IV fluid immediately. If the child can drink, give ORS by mouth while the drip is set up. Give 100 ml/kg Ringer's lactate solution (or, if not available, normal saline), divided as follows:

Age	First give 30 ml/kg in	Then give 70 ml/kg in
Infants (under 12 months)	1 hour*	5 hours

* Repeat once if radial pulse is still very weak or not detectable.

- Reassess the infant every 15-30 minutes. If hydration status is not improving, give the IV drip more rapidly.
- Also give ORS (about 5 ml/kg/hour) as soon as the child can drink: usually after 3-4 hours.

Weight	Volume of ORS solution per hour
<4 kg	15 ml
4 - <6 kg	25 ml
6 - <10 kg	40 ml
10 - <14 kg	60 ml
14 – 19 kg	85 ml

- If IV treatment not possible, give ORS 20 ml/kg/hour for 6 hours(120 ml/kg) by NG tube
- Reassess an infant after 6 hours. Classify dehydration. Then choose the appropriate plan (A, B, or C) to continue treatment.

If possible, observe the infant for at least 6 hours after rehydration to be sure that the mother can maintain hydration by giving the child ORS solution by mouth.

Treatment of some dehydration: Manage dehydration as Plan B. In addition to ORS, encourage the mother to breastfeed during first 4 hours of dehydration. If baby has low weight or signs of sepsis, give antibiotics as for cases of sepsis.

Diarrhoea Treatment Plan B: Treat Some Dehydration with ORS

GIVE RECOMMENDED AMOUNT OF ORS IN CLINIC OVER 4-HOUR PERIOD

- Determine amount of ORS to give during first 4 hours.

The approximate amount of ORS required (in ml) can also be calculated by multiplying the child's weight (in Kg) by 75.

- If the child wants more ORS than shown, give more.

- **Show the mother how to give ORS solution :**
  - Give frequent small sips from a cup.
  - If the child vomits, wait 10 minutes. Then continue, but more slowly.
  - Continue breastfeeding but stop other feeding.

- **After 4 hours :**
  - Reassess the child and classify the child for dehydration.
  - Select the appropriate plan to continue treatment.
  - Begin feeding the child in clinic.

- **If the mother must leave before completing treatment :**
  - Show her how to prepare ORS solution at home.
  - Show her how much ORS to give to finish 4-hour treatment
  - Give her enough ORS packets to complete rehydration. Also give 2 packets as recommended in Plan A.
  - Explain the 3 Rules of Home Treatment :

1. Give extra fluid
2. Continue feeding
3. When to return

} Plan A

Treatment of no dehydration: Tell the mother to continue breastfeeding and teach the mother danger signs to return immediately.

ANNEXURE-2

Examine the breasts and observe breast-feeding

- Assess breast feeding in all newborns
- Ask mother if the infant has breastfed in the previous hour?
- If infant has not fed in the previous hour, ask the mother to put her infant to the breast. Observe the breastfeed for 4 minutes.

Check attachment of baby on mother's breast

Signs of Good Attachment
1. Baby's mouth is wide open
2. Lower lip is turned outwards
3. Baby's chin touches mother's breast
4. More areola visible above than below

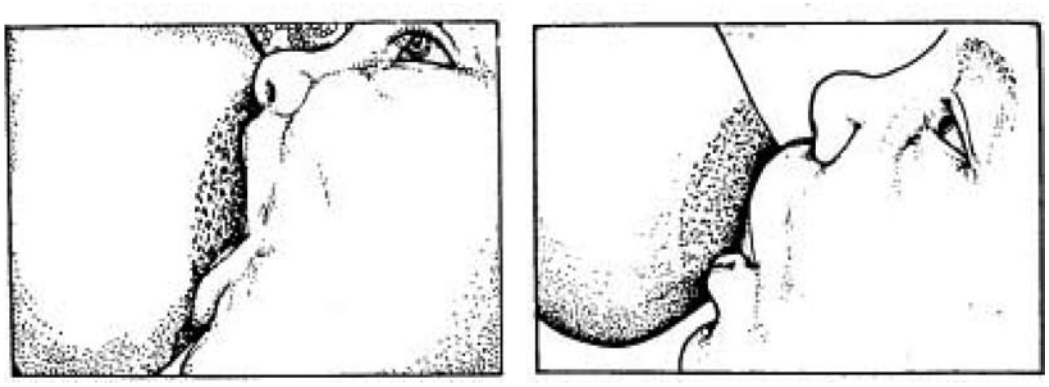


Fig 26: Good (left) and poor (right) attachment of infant to the mothers breast

It is very important to ensure good attachment because poor attachment results in

- Pain or damage to nipple leading to sore nipple.
- Breast milk not removed effectively thus causing breast engorgement
- Poor milk supply hence baby is not satisfied and irritable after feeding.
- Breast produces less milk resulting in frustrated baby who refuses to suck. This leads to poor weight gain.

If attachment is not good: Check for correct positioning

Signs of proper position of the baby while breast-feeding are:

Signs of Good Position

1. Baby's body is well supported.

2. The head, neck and the body of the baby are kept in the same plane.

3. Entire body of the baby faces the mother.

4. Baby's abdomen touches mother's abdomen

Fig 27:Baby's body close, facing breast

Fig 28:Baby's body away from mother, neck twisted

Check for baby's sucking

Effective sucking is when the infant shows slow deep sucks, sometimes pausing

- If not sucking well, then look for ulcers or white patches in the mouth (thrush).

ANNEXURE-3

Breast Milk Expression

It is useful for all mothers to know how to express and store their milk.

Expression of breast milk is required in the following situations:

- To maintain milk production and for feeding the baby who is premature, low birth weight or sick and can not breast feed for sometime.
- Working mothers, who plan to return to work can express the milk in advance and store it for exclusively breastfed babies.
- To relieve breast problem e.g. engorgement.

Technique of expression – Teach her to:

- Wash her hands with soap and water thoroughly before expression.
- Sit or stand comfortably, and hold the clean container near her breast.
- Put the thumb on her breast above the nipple and areola, and her first finger on the breast below the nipple and areola, opposite the thumb. She supports the breast with her other fingers.
- Press her thumb and first finger slightly inwards towards the chest wall.
- Press her breast behind the nipple and areola between her finger and thumb. She must press on the lactiferous sinuses beneath the areola. Sometimes in a lactating breast it is possible to feel the sinuses. They are like peanuts. If she can feel them, she can press on them, Press and release, press and release.
  This should not hurt – if it hurts the technique is wrong. At first no milk may come, but after pressing a few times, milk starts to drip out.
- Press the areola in the same way from the sides, to make sure that milk is expressed from all segments of the breast.
- Avoid rubbing or sliding her fingers along the skin. The movements of the fingers should be more like rolling.
- Avoid squeezing the nipple itself. Pressing or pulling the nipple can not express milk.
- Express one breast for at least 3-5 minutes until the flow slows; then express the other side; and then repeat both sides. She can use either hand for either breast.

a. Place finger and thumb each side of the areola and press inwards towards the chest wall.
b. Press behind the nipple and areola between your finger and thumb.
c. Press from the sides to empty all segments.

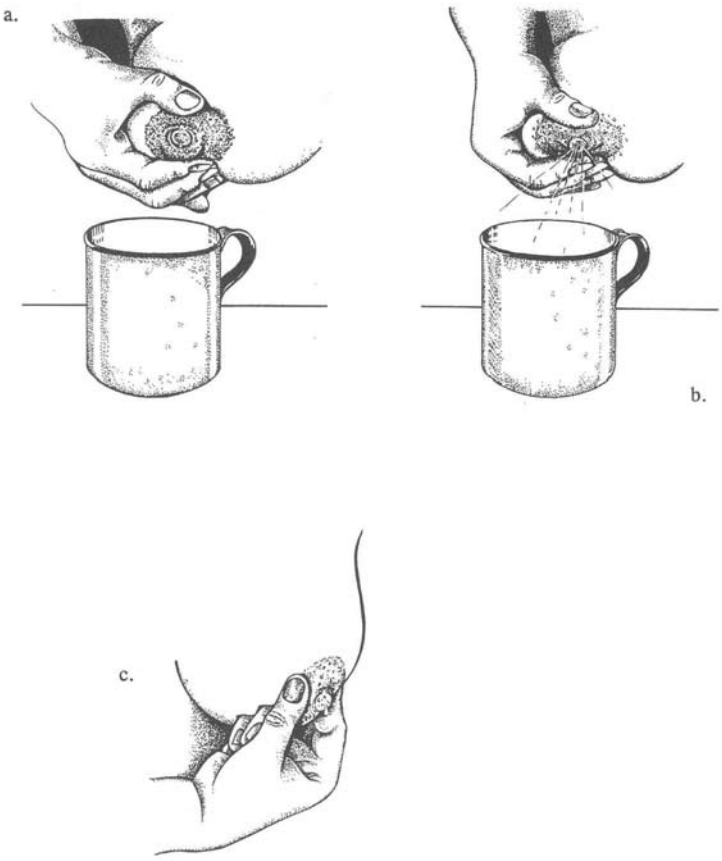


Fig 29: Technique to express breast milk by hand

- Explain that to express breast milk adequately may take 20-30 minutes. Having the baby close or handling the baby before milk expression may help the mother to have a good let-down reflex. It is important not to try to express in a shorter time. To stimulate and maintain milk production one should express milk frequently – at least 8 times in 24 hours.

Storing expressed breast milk

- Wash the container thoroughly with soap and water.
- Cover the container of expressed breast milk (EBM) with a clean cloth or a lid.
- EBM can be kept at room temperature for 8 hours, or in the refrigerator for 24 hours or in the deep freeze at -20°C for 3 months.
- EBM stays in good condition longer than animal milk because of the protective substances it contains. It is not advisable to boil the EBM. If it needs to be warmed, place the container in a bowl of warm water.
- Gently shake the container to recombine the separated fat globules with the rest of the milk before feeding.
- Feed with cup or spoon or paladai, never feed with bottle.

ANNEXURE-4

CLINICAL SKILLS

1. TEMPRATURE RECORDING & THERMAL CONTROL

OBJECTIVE

Upon completion of this session each participant

i) Should be able to record axillary temperature in a newborn
ii) Should be able to clinically asses hypothermia, cold stress and normal temperature.
iii) Should be well versed with ways to achieve thermal control during domiciliary care, institutional care & transport.

REQUIREMENTS

i) Low reading/Normal thermometer
ii) A mankin/newborn
iii) Cotton Swabs
iv) Cotton sheet
v) A wrist watch
vi) Mother or other caregiver to demonstrate kangaroo care

RATIONALE

Temperature recording is a simple bedside tool to assess the baby's temperature and ascertain the degree of hypothermia

ACTIVITIES

i) Drying
ii) Wrapping & covering the baby
iii) Recording temperature
iv) Tactile assessment of temperature (Cold stress assessment)
v) Kangaroo care

PROCEDURE

i) Dry baby from head to toe, on the back, front , axillae & groin and discard wet linen.

ii) Wrap the baby using a sheet spread the sheet fold one corner on itself- place baby's head on the infolded corner so as to cover the head till the hairline on forehead. Cover over the right shoulder & tuck on left side. Fold from the foot end & tuck beneath the chin & finally cover over the left shoulder and tuck on the right side.

iii) Record temperature

- Place the baby supine or on the side
- Ensure dry arm pit
- Abduct arm at shoulder. Place the bulb of the thermo meter in the apex of the axilla
- Hold arm in adduction at shoulder & flexion at the elbow for five minutes.
- Remove thermometer & read temperature

iv) Tactile assessment

- Wash hands
- Rub them to dry
- Rub together & warm them
- Touch the baby's soles & palms the dorsum of your hands
- Now touch the baby's chest using the dorsum of your hands
- If both are warm-normothermic, if periphery is cold but chest is warm – cold stress, if both are cold – hypothermic baby.

v) Kangaroo Care

- Ask mother or caretaker to wear a loose shirt or blouse
- Unbutton top 2-3 button & slip baby with only the napkin on, into the shirt.
- Ensure skin to skin contact b/w baby & care taker
- Tie a belt or string at the belt level prevent the baby from slipping down
- Cover the mother baby duo with a woolen shawl or sheet
- Encourage frequent breast feeding.

2. INFECTION PREVENTION

OBJECTIVE

Upon completion of this session each participant

i) Should be able to demonstrate steps of hand washing

ii) Should be able to clean and disinfect newborn care equipment and environment.

iii) Should be able to provide routine eyes & cord care and be able to advise mother regarding maternal & baby hygiene.

REQUIREMENTS

i) Soap

ii) Running water

iii) Hand washing chart

iv) Disposable delivery kit

v) Cord tie

vi) Cord stump

vii) Spirit

viii)Sterile Cotton

ix) Sterile blade

x) Manikin
xi) Disinfectant solution
xii) Newborn care equipments
- Bag & mask
- Laryngoscope
- Thermometer
- Oxygen hood
- Skin probe
- Cots/mattresses
- Sheet
- Suction machine

RATIONALE

Prevention of infection in newborns is easily achievable by simple measure like hand-washing and keeping baby's environment clean. Prevention is much more rewarding as therapy for neonatal sepsis is not always successful.

ACTIVITIES

i) Hand Washing
ii) Equipment disinfection
iii) Eye & cord care

PROCEDURE

i) **Hand washing**
- Wet hands
- Apply soap
- Rub hands, first palms & fingers
- Then back of hands
- Followed by rubbing of thumbs
- Finally rub finger tips in the palms & lastly
- The wrists
- Keep elbows dependent & wash in the same order

ii) **Resuscitation bag & mask**

Face mask (Disinfect daily and sterilize weekly)
- Clean with detergent daily and after each use
- Immerse in 2% gluteraldehyde
- Rinse with clean water and dry with sterile linen (washed and sun dried)
- Resuscitation bag (Disinfect daily and sterilize weekly)
- Dismantle parts
- Clean with Detergent
- Immerse in 2 % glutaraldehyde
- Rinse with clean water and dry with sterilize linen
- Reassemble the parts

iii) **Laryngoscope**

- Wipe blade with 70% isopropyl alcohol after use.

iv) **Thermometer**

- Ideal to have separate for each baby
- Wipe with alcohol after use
- Store in bottle containing dry cotton

v) **Oxygen hood**

- Clean every day or after use each use with detergent

vi) **Cots and mattresses**

- Clean everyday with 3% phenol or 5% Lysol
- Replace mattresses whenever surface covering is broken

vii) **Suction apparatus**

- Suction bottle should contain 3% phenol or 5% Lysol
- Suction bottle should be cleaned with detergent and changed daily
- Change tube connected to bottle daily. Flush with water and dry
- Soak for disinfection in 2 % gluteraldehyde
- Ideally suction for catheter should be for single use

viii) **Feeding utensils**

- Cup, spoon and paladai should be boiled for at least for 15 min before use.
- Feeding tubes should be preferably disposable.

ix) **Care of Cord & eyes**

Cord
- Keep cord dry
- Clean cord base dry
- Do not apply anything

Eyes
- Clean eyes from medial to lateral side separate sterile saline Soked cotton swabs for each eye.

3. BREAST FEEDING/ASSISTED FEEDING:

OBJECTIVE

Upon completion of this session each participant

i) Should be able to advise mother on manual expression of breast milk.
ii) Should be able to provide gavage feeds to the baby
iii) Should be able to provide katori spoon feeding to the baby
iv) Should be able to advise mother regarding therapy for retracted nipples.
v) Should be able to allay all fears & anxiety of a lactating mother regarding adequacy & superiority of breast milk.

REQUIREMENTS

i) Lactating mother
ii) Katori/cup

iii) Spoon/paladay
iv) 6 fr & 8 fr feeding tubes
v) 10 ml 7 5 ml syringes
vi) Adhesive tape
vii) Manikin
viii)Blade

RATIONALE

Advantages of breast milk are may fold and this mode of feeding id the ideal for all neonates.

ACTIVITIES

i) Manual Expression of breast milk
ii) Gavage feeding
iii) Katori spoon feeding
iv) Treatment for retracted nipples

PROCEDURE

i) Manual expression of Breast Milk
   - Ask mother to sit comfortably, lean forward and support the breast over a bowl using both hands
   - Position the thumb and the forefinger at the margin of areola on both sides & press the breast tissue into the ribcage
   - Maintaining the backward pressure start bringing the thumb & the forefinger of each hand towards the nipple
   - Repeat the same several times till not further milk can be expressed out.

ii) Gavage feeding
   - Take 6 fr or 8 fr catheter depending on the gestation and weight
   - Measure length from angle of mouth to tragus to xiphisternum
   - Insert the tube from mouth till the desired length has been introduced
   - Check position using a syringe & a stethoscope to auscultate the gush of air
   - Tape the tube & close outer end after removing the syringe
   - To instill feed-Take a 10 ml syringe barrel without the plunger and insert nozzle into the open end of the feeding tube.
   - Check residue at next feeding session & proceed to feed

iii) Cup spoon feeding
   - Take baby in the lap hold the baby semi upright with head well supported.
   - Stimulate the angle of the mouth and rest the spoon with 1-2 ml milk at the angle of the mouth.
   - Pour milk slowly into open mouth & watch for swallowing. Gently stroke behind the ear or on the sole.
   - Continue feeding in this manner till the desired amount has been fed.
   - Burp the baby
   - Place in right lateral position with head supported a little higher than the rest of the body.

iv) **Treatment of Retracted nipples**

Antenatal

- Teach mother to roll out nipple between thumb and forefinger several times a day.

Postnatal

- Take a 10 ml syringe, cut the nozzle end transversely using a new blade. Take care that the syringe barrel's cut margin is not ragged.
- Insert plunger into the barrel from the cut nozzle end
- Place the barrel's open end on the areola including the nipple in the barrel & pull back the plunger as far as possible.
- Repeat this several times & follow putting the baby to the breast to encourage suckling.

4. ASSESSING CRT & VENOUS ACCESS:

OBJECTIVE

Upon completion of this session each participant

i) Should be able to assess perfusion by using CRT method
ii) Should be able to catheterize the umbilical vein
iii) Should be able to demonstrate peripheral venous access on an improvised model.

REQUIREMENTS

i) Stop watch/wrist watch
ii) Umbilical cord 1 ft
iii) Blade
iv) Forceps
v) Normal saline
vi) 2ml/5ml syringe
vii) 5fr. Feeding tube or umb. venous canula.
viii) Straw, Splint , Tongue depressor
ix) Polythene sheet
x) Spirit
xi) Iodine
xii) Gloves
xiii) Soap & Water
xiv) Sticking tape
xv) Splint

RATIONALE

i) CRT-CRT is simple sign to assess perfusion (BP of the Baby) of a baby. A CRT of >3 seconds denotes poor peripheral perfusion. This can also be prolonged in hypothermia due to peripheral vaso constriction. If the baby is hypothermic, CRT should be reassessed after temperature improvement.
   - Umbilical. Venous access – It is a quick IV access for infusing volume expanders & drugs during resuscitation.
   - IV access: To provide parental fluids & medications

ACTIVITIES

i) CRT assessment
ii) Umbilical Venous cannulation on a cord stump.
iii) Peripheral IV access on an improvised model.

PROCEDURE

i) **CRT assessment**

- Wash and dry hands
- Press the forehead or sternum using index finger /thumb for 5 sec, release and look at the blanched area for return of color. Note the time taken for return of color. Note the time taken for return of the color. Normal CRT is upto 3 sec
- CRT>3 secs indicates poor perfusion, however in presence of of hypothermia interpretation may be fallacious.

ii) **Umbilical Venous Cannulation**

- Wash hands & dry.
- Wear gloves
- Connect syringe to the catheter, flush the catheter with saline & keep ready
- Take a small piece (about 10 cm long) of fresh umbilical cord in a kidney tray
- Hold or mount cord
- Cut the umb. Cord transversely clean with a sterlile blade.
- Identify 2 arteries & 1 vein – the umb. Vein is a thin walled patulous large opening in contrast to the arteries which are thick walled and much smaller in caliber. (In the normal position the Umb. Vein is a t 11-12 'O' lock position)
- Insert the saline filled catheter gently into the vein (Black flow of blood can be appreciated in a live baby by pulling at the plunger)
- In actual situation the length of the catheter to be inserted is usually 1-2 cm below the skin till there is a free flow of blood.
- Inject the drug or volume
- Pinch the catheter & remove.
- Press the cord to prevent bleeding.

iii) **IV Access**

- Select the vein (dorsum of hand/foot)
- Wash hands and dry
- Wear gloves
- Prepare skin- betadine, spirit, let dry between applications
- Hold the limb proximally to make the vein prominent
- Pierce skin distal to the intended 'site of puncture
- Insert needle into the vein (feeling of give way)
- Ensure free flow; thread the needle further up into the teeth
- Secure the scalp vein needle by adhesive tape
- Secure splint
- Inject fluid/medications
- Check distal limb for adequacy of circulation

ANNEXURE-5

EQUIPMENT DEMONSTRATION

1. RADIANT WARMER

OBJECTIVE

Upon completion of this section the participant should

i) Know the parts of a warmer

ii) Be able to demonstrate the working of the warmer.

iii) Know the dangers associated with its usage and should be able to manage minor equipments maintenance.

PARTS

i) Bassinet

ii) Quartz rod

iii) Skin probe

iv) Air probe

v) Control panel

vi) Heater output

WORKING

i) Connect to mains

ii) For prewarming keep heater output to maximum.

iii) Place baby

iv) Connect probe

v) Read temperature on display

vi) Adjust heater output

- If below 36°C- High
- If between 36-36.5°C-Medium
- If between 36.5-37.5°C-Low
- If >37.5°C-Remove baby/Switch off warmer.

vii) Measure temperature 1/ 2 hourly X 2 hours & then 2 hourly.

CLEANING & DISINFECTION

i) Glutaraldehyde 2 %
ii) Soap/detergent } Once daily

DOS & DONTS

i) Check temperature ½ hourly/2 hourly
ii) Ensure warm feet
iii) Ensure probe is connected
iv) Do not leave baby unattended.
v) Ensure side walls are fastened up
vi) Ensure adequate clothing in case of electricity failure

TROUBLE SHOOTING

i) Check fuse
ii) Check plug
iii) Check cords

SIDE EFFECTS & DANGERS

i) Increased insenable water loss
ii) Fluid intake must be tailored to meet demands
iii) Hyperthernia
iv) Hypothermia

MAINTENACE

i) Calibration
ii) Annual maintenance Contract

2. PHOTOTHERAPY UNIT

OBJECTIVE

Upon completion this section the participant should
i) Know the parts of a phototherapy unit.
ii) Be able of understand the functioning and demonstrate the working of a phototherapy unit
iii) Be able to place a baby under phototherapy unit

PARTS

Tubes	-	Number	-	6
		Color	-	White
		Watt	-	20
		Irradiance	-	4-8uw/cm2/nm
		Duration	-	3 months
		Wavelength	-	420-460nm
		Distance	-	45 cms

WORKING

i) Connect to mains.
ii) Switch on the unit & check that all tubelights are working
iii) Place baby naked only with the napkin on
iv) Cover the eyes
v) Change position frequently
vi) Increase fluid intake
- Breast feed frequently
- Spoon/Gavage/IV – by 20 ml/kg/day

vii) Provide continuous phototherapy

CLEANING

Glutaraldehyde 2%
- Soap/Detergent

DOS & DONTS

i) Cover eyes
ii) Check temperature- prevent hypo/hyperthermia
iii) Check weight daily
iv) Frequent breast feeding/increasing allowance for fluid
v) Reassess frequently.

TROUBLE SHOOTING

i) Check fuse
ii) Check plug
iii) Check Cord
iv) Change tube if flickering or ends are blackened

INEFFECTIVE PHOTOTHERAPY

i) Baby covered
ii) All tubes not working
iii) Flickering light
iv) Tube ends have black circles

SIDE EFFECTS AND DANGERS

i) Hyperthermia/Hypothermia
ii) Increased insensible water loss
iii) Tailor fluid intake to meet demands

MAINTENANCE

i) Change tubes - if ends black or
- every three minutes

ii) Check flux(if possible)
iv) Annual Maintenance contract

3. SUCTION MACHINE

OBJECTIVE

Upon completion of this section the participant should

i) Know the parts of a suction machine
ii) Know how to use a suction machine and
iii) Know its sterilization

PARTS

i) Suction Catheter
ii) Suction tubing
iii) Suction bottles

TYPE

i) Dee Lee's suction trap
ii) Foot operated
iii) Electric (if available)

WORKING

i) Connect to main
ii) Switch on the unit and occlude distal end to check the pressure. Ensure it does not exceed 100cm of water
iii) Take disposable suction catheter
iv) Connect to suction tubing
v) Perform suction gently
vi) Switch off the suction machine.

CLEANING & DISINFECTION

i) Wash suction bottle with soap & bottle
ii) Change bottle solution every day

Dos & DONTs

i) Suction gently
ii) Do not do vigorous & deep suction
iii) Use only disposable suction catheters
iv) Check adequacy of suction pressure

TROUBLESHOOTING

i) Check fuse
ii) Check cord
iii) Check earthing
iv) Check for leakages in the bottle/tubing

SIDE EFFECTS & DANGERS

i) Local trauma
ii) Bradycardia

iii) Apnea
iv) Infection

MAINTENANCE

i) Check for adequacy of suction pressure
ii) Change tubing if leaky or broken
iii) Annual maintenance Contract

4. BAG & MASK

OBJECTIVE

Upon completion of this section the participant should
i) Know the parts of a bag & types of masks
ii) Be able to demonstrate the use of a bag
iii) Know how to clean a bag & mask

PARTS

i) Body of the bag
ii) Oxygen inlet
iii) Air inlet
iv) Safety valve/pressure release valve.
v) Patient outlet
vi) Valve assembly
vii) Ensure adequate seal
viii) Perform PPV-Check for chest rise.

WORKING

i) Assemble bag
ii) Check bag
iii) Connect to oxygen source
iv) Attach reservoir
v) Fix appropriate size mask
vi) Apply mask on manikin

INDICATION

i) Apnea or gasping respiration
ii) HR<100/min
iii) Central cyanosis despite free flow oxygen

CONTRA INDICATION

i) Congenital diaphragmatic hernia
ii) Thick meconium stained liquor

CLEANING & DISINFECTION

i) Wash with soap and water daily
ii) Soak in glutaraldehyde 2% for 6 hrs once a week
iii) Clean mask with sprint between patient use

DOs & DONTs

i) Check bag prior to use
iii) Choose appropriate size mask
iv) Use enough pressure to obtain easy chest rise
v) Do not Perform overzealous PPV
vi) Check for adequacy of ventilation
- Chest rise, Increase in HR, Improvement in color
- Appearance of spontaneous respiratory effort

vii) Check and maintain adequate seal

TROUBLE SHOOTING

i) Change bag
ii) Check for oxygen source
iii) Remedicals actions for no chest rise

MAINTENANCE

i) Clean and disinfect as per protocol
ii) Replace if damaged or leaky

5. WEIGHING MACHINE

OBJECTIVE

Upon completion of this section the participant should be
i) Know how to calibrate the weighing machine
ii) Be able to demonstrate the use of the weighing machine
iii) Be able to classify newborns by weights as NBW/LBW/VLBW & ELBW

PARTS

i) Pan or baby tray
ii) Weight scale dial
iii) Machine proper

WORKING

i) Wipe clean the weighing pan
ii) Check for and adjust zero error
iii) Calibrate using a known weight
iv) Place baby with sheet
v) Note weight (a)
vi) Remove baby
vii) Weigh the sheet above (b)

viii)Subtract b from a (a-b)

ix) Record weight

CLEANING AND DISINFECTION

i) Clean with soap and water

ii) Wipe with spirit swab b/w patient use

DOs & DONTs

i) Always look for and adjust zero error

ii) Always calibrate using a known weight

iii) Do not weigh baby naked

iv) Remove excessive clothing

v) Do not stack up line or other objects on the weighing pan when not in use

vi) Record weight only when needle is stationary & not oscillating.

TROUBLESHOOTING

i) Place on a flat firm surface

ii) Caliberate before each use

iii) Record zero error if it can not be corrected and account for it

MAINTENANCE

i) Calibration

ii) Annual maintenance contract

RECORDING FORM

Assessment of the newborn in Postnatal Wards

Name: _____ Date and time of Birth _____ Sex: M/F Birth Weight:_____

Mode of Delivery: Vaginal/Forceps/ Cesarian section Resuscitation at birth Yes/No

ASK: Does the mother or infant have any problem? _____

ASK THE MOTHER		D1	D2	
• Has the infant passed stools? • Has the infant passed urine? • Have you started breast feeding the infant? If Yes, how many times in 24 hours. • Have you given any other foods or drinks to theinfant? If Yes, what and how ?				
EXAMINE THE INFANT				
• Count the breaths in one minute. _____breaths per minute Repeat if elevated _____ Fast breathing? • Look for severe chest indrawing. • Look and listen for grunting. • Look at the umbilicus. Is it red or draining pus? • Look for skin pustules. Are there 10 or more pustules or a big boil? • Measure axillary temperature (if not possible, feel for fever or low body temperature): Normal (36.5-37.4° C) Mild hypothermia (36.0-36.4° C/ cold feet) Moderate hypothermia (32.0° C – 35.9° C, cold feet and abdomen) Severe hypothermia (< 32° C) Fever (> 37.5° C/ feels hot) • See if young infant is lethargic • Look for jaundice. Are the face, abdomen or soles yellow? • Look for malformations				
ASSESS BREASTFEEDING:· • Has the infant breastfed in the previous hour? • Is there difficulty or pain while feeding?	If infant has not fed in the previous hour, ask the mother to put her infant to the breast. Observe the breastfeed for 4 minutes.· Is the infant able to attach? To check attachment, look for:- Chin touching breast Yes ___ No ___- Mouth wide open Yes ___ No ___- Lower lip turned outward Yes ___ No ___- More areola above than below the mouth Yes___ No___ no attachment at all not well attached good attachment· Is the infant suckling effectively (that is, slow deep sucks, sometimes pausing)? not suckling at all not suckling effectively suckling effectively If not sucking well, then look for:· ulcers or white patches in the mouth (thrush). Look for • Engorged breasts or breast abcess • Flat or inverted, or sore nipples			
HAS THE YOUNG INFANT RECIEVED • Vitamin K • BCG ,OPV 0 , HEP-B 1				
Any other problems:				

RECORDING FORM

Assessment of Sick Young Infant in Health facility

Name _____ Age _____ (days) Sex_____ Reg. No._____

Date of Birth _____ Time of Birth ____ Birth Weight _____ g

Presenting Complaints:

Antenatal History

Maternal Illness: Anemia / PIH / Diabetes / Others (specify)

Leaking PV: Present / Absent ; Duration _____(hrs)

If Leaking > 24 hr - Ask For: Fever / Foul smelling liquor

TT Immunization: Yes / No

Delivery History

Place of Delivery: Institution / Home

Type of Delivery: Vaginal/Foreceps/Cesarean

Presentation: Vertex/breech / other

Person conducting delivery: TBA /ANM /Nurse /Doctor / Others

Did the baby cry at birth? Yes / No

Did the baby need resuscitation? Yes / No (if yes, provide details)

Infant Immunization

BCG OPV0 DPT1 OPV1 HEPB1

Examination

Weight:_____g severely underweight/moderately underweight/not low weight for age

Gestation: Term / Preterm Temperature _____

Heart Rate_____ CRT ≤ 3 sec / > 3 sec

Respiratory rate:_____ Nasal flaring/ grunting/ apnea/ cyanosis

- Bulging anterior Fontanelle
- Pustules: less than 10, more than 10 or big boils
- Umbilical Discharge / Redness: Present / Absent
- Ear Discharge: Present / Absent
- Pallor: Present / Absent
- Jaundice: Present / Absent If present: Face / Chest / Abdomen / Soles
- Abdominal distension: Present / Absent
- Activity: lethargy / irritable
- Abnormal movement: seizure / jitteriness
- Bleeding from any site

If Diarrhoea present, Assess for dehydration
- Sunken eyes
- Skin pinch immediate / slowly / very slowly

Assess For feeding

Ask Mother
- Is there any difficulty in feeding the infant?
- Is she breast feeding the infant?
- If yes, how many times a day?_____
- Has the infant received any other foods or drinks?
  If Yes, what and how ? _____

If there is difficulty in feeding or feeding less than 8 times/day or receiving other foods/fluids or low or very low weight then assess breaqst feeding

If infant has not fed in the previous hour, ask the mother to put her infant to the breast. Observe the breastfeed for 4 minutes.

- Is the infant able to attach? To check attachment, look for:
  - Chin touching breast Yes ___ No ___
  - Mouth wide open Yes ___ No ___
  - Lower lip turned outward Yes ___ No ___
  - More areola above than below the mouth Yes ___ No ___

  no attachment at all not well attached good attachment

- Is the infant suckling effectively (that is, slow deep sucks, sometimes pausing)?
  not suckling at all not suckling effectively suckling effectively
  If not sucking well, then look for:
- ulcers or white patches in the mouth (thrush).

Any Other Examination:

Provisional Diagnosis

_____

Plan of Management:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Monitoring

MODULE-3

Facility Based Care of Sick Child

PARTICIPANTS MANUAL

INTRODUCTION

A referral unit receives sick children with diverse clinical presentations. Some of them are extremely sick and need emergency life saving treatment. The triage process and how to provide emergency treatment has already been discussed. After the triage and providing the emergency care if required, the child should be assessed (history and examination) in detail for identifying the problems and for appropriate management.

Learning Objectives

- Management of common problems of sick children (2 months up to 5 years of age).
- Management of severe acute malnutrition in children in a small hospital.

Problems of sick children including Severe Acute Malnutrition (SAM)

Sections 9-13 provide guidance for the management of problems in children from 2 months up to 5 years of age. These include case management of children presenting with the following:

- Cough or difficult breathing
- Diarrhoea
- Fever
- Management of severe anemia
- Management of severe acute malnutrition in a hospital.

Drug tables for commonly used drugs are included in *Annexure* 7.

SECTION. 9
CASE MANAGEMENT OF CHILDREN PRESENTING WITH COUGH OR DIFFICULT BREATHING

9.0 Learning objectives

After completion of this section the participant should be able to:

- Manage all cases of pneumonia.
- Understand approach to a child presenting with wheeze.
- Manage acute asthma.
- Understand approach to a child presenting with stridor.

9.1 Diagnosing pneumonia

The IMNCI algorithm classifies children with cough and rapid breathing as pneumonia and further grades it as severe or very severe depending upon chest in-drawing and other features of respiratory distress. However, at a first referral facility this should be further refined as rapid breathing can be due to a variety of causes, as listed in Table 14.

Table 14: Differential diagnoses of a child presenting with acute onset difficult breathing

A. Respiratory Causes

1. Pneumonia
2. Asthma
3. Bronchiolitis
4. Effusion and Empyema
5. Pneumothorax
6. Viral croup
7. Foreign body in the airways

B. Non-respiratory Causes

1. Congestive heart failure
2. Raised intra-cranial tension, e.g. Meningitis
3. Metabolic acidosis, e.g. Diabetic Ketoacidosis, Renal Failure

While children with distress due to respiratory causes will have cough as an important symptom, children in respiratory distress due to other causes usually do not have significant cough. Yet, one important clinical confounder to rule-out is a child with acyanotic congenital heart disease, who often presents with recurrent pneumonia. The respiratory distress

in such a situation can also be due to congestive heart failure. A very careful evaluation of cardiovascular system for a murmur is required and you should seek help from a more experienced person, when in doubt.

Pneumonia is usually identified on the basis of fever, cough, fast breathing and signs of respiratory distress. You should use history, examination and the clinical setting to arrive at the diagnosis of pneumonia. As young children can also have rapid breathing and wheeze with respiratory infections, it is important to differentiate cases with rapid breathing due to pneumonia from those with asthma or wheeze due to lower respiratory infections.

Children with wheeze and fast breathing and/or chest indrawing, particularly those with a past history of similar attacks should, therefore, be given a trial of rapid acting inhaled bronchodilator (up to 3 cycles).

Give the rapid-acting bronchodilator by one of the following methods:
- Nebulized salbutamol, or
- Salbutamol by a metered dose inhaler with spacer device.

In such a situation treat as pneumonia with antibiotics, only if there is no response to bronchodilators (persistence of fast breathing).

Also consider the possibility of tuberculosis in a child with cough and difficult breathing if:

- Child has fever and cough for more than 2 weeks, and
- Is not responding to appropriate antibiotic therapy.

The patient should be investigated for paediatric TB using chest radiograph, sputum or gastric aspirate for AFB and Tuberculin test. The RNTCP guidelines for managing paediatric tuberculosis are given in the *Annexure* 7. You may seek the help of an expert/ specialist, where needed.

Radiology of the chest is not indicated routinely to establish diagnosis in all cases of pneumonia.

Indications for chest x-ray
a) Very severe pneumonia. b) Where complications are suspected. c) The patient fails to respond to the antibiotic therapy. d) If the diagnosis is not clear. e) If child has SAM or Post-measles state.

9.2 Treatment of childhood community-acquired pneumonia

The management of pneumonia is guided by the severity of the disease as listed in Table 15:

Sign or symptom	Classification	Treatment
• Central cyanosis • Severe respiratory distress • Not able to drink due to respiratory distress.	**Very severe pneumonia**	• Admit to hospital • Manage the airway • Give oxygen • Give recommended antibiotic • Treat high fever if present
• Chest indrawing	**Severe pneumonia**	• Admit to hospital • Give recommended antibiotic • Treat high fever if present
• Fast breathing 2 months upto 12 months: ≥ 50 breaths/min 12 months upto 5 years : ≥ 40 breaths/min • Definite crackles on auscultation	**Pneumonia**	• Give appropriate antibiotic for 5 days • Soothe the throat and relieve cough with a safe remedy • Treat high fever if present

9.3 Treatment of very severe pneumonia

- **Admit the child in hospital**
- **Obtain a radiograph** of the chest if facilities are available for the same. Radiography in very severe pneumonia is required at admission to assess the extent of disease and to rule out presence of puemothorax or effusion In case of severe distress, stabilize and oxygenate the child before sending for radiograph.
- **Give antibiotics**
  - Give Injectable Ampicillin (50 mg/kg IM/IV every 6 hours) and Gentamicin (7.5 mg/kg IM/IV once a day). If the child responds well, discharge after 5 days to continue treatment at home with oral Amoxicillin (15 mg/kg per dose three times a day) plus IM Gentamicin once daily for a further 5 days.
  - Alternatively, give Injectable Chloramphenicol (25 mg/kg IM or IV every 8 hours) until the child has improved. Then continue the same drug orally in the same dose for 3 times a day for a total course of 10 days.
  - If the child does not improve by 48 hours to any one of these treatments, reassess for complications and switch to Injection Ceftriaxone (80 mg/kg IM or I/V once daily) for 10 days.
  - Staphylococcal pneumonia is suspected if:

  (a) there is a rapid progression of the disease, or
  (b) there is pneumatocoele, or pneumothorax, or effusion on chest X-ray, or
  (c) child has large skin boils or abscess or infected scabies, or
  (d) post-measles pneumonia which is not responding within 48 hours to the initial therapy.

  If staphylococcal pneumonia is suspected, add Inj Cloxacilin (50mg/kg/dose, every 6 hourly) to any of the above choice of antibiotics.

  When the child improves, continue Cloxacillin orally 4 times a day for a total course of 3 weeks at least. Children with complicated pneumonia (Empyema) need longer therapy for 4-6 weeks.

- **Give Oxygen**
  - Where pulse oximetry is available, use oxygen saturation of the blood (SaO2) to guide oxygen therapy. Maintain SaO2 ≥ 92%. Continue with oxygen until the signs of hypoxia (such as severe lower chest wall in-drawing or breathing rate of ≥ 70/min) are no longer present.
- **Give supportive care**
  - Ensure that the child receives daily maintenance fluids appropriate to child's age. Encourage breastfeeding and oral fluids once the distress settles and the child is able to feed.
  - If the child has fever (≥38.5°C) which appears to be causing distress, give oral Paracetamol (15mg/kg/dose).
  - If wheeze is present, give a rapid-acting bronchodilator (as described in the next section).
  - Remove any thick secretions in the nose/throat, which the child cannot clear, by gentle suction.
- **Monitor the child**
  - The child should be checked by nurses at least every 3 hours and by a doctor at least twice a day. Monitor for signs of improvement. A patient who is improving on treatment should have:
  - An improvement in the respiratory rate.
  - Less indrawing of the lower chest wall.
  - Less fever; and/or
  - Improved ability to eat and drink.
- **Watch for complications**
  - If the child has not improved after two days, or if the child's condition has worsened, look for complications or other diagnoses. If possible, obtain a repeat chest X-ray. Consider transfer to a higher facility in case of poor response or deterioration despite second-line therapy.

9.4 Severe pneumonia

A child diagnosed to have pneumonia is considered to have severe disease when the child also has chest in-drawing. A chest radiograph rarely gives information which will change the management of severe pneumonia and is, therefore, routinely not needed. **However, a radiograph is indicated if the diagnosis is not clear or child has SAM, post-measles state and suspicion of empyema and / or pneumothorax.**

9.4.1 Treat severe pneumonia

- Admit the child to hospital.
- Give antibiotics
  - Give Benzylpenicillin (50 000 units/kg) or Ampicillin (50 mg/kg) IM or I/V every 6 hourly) for at least 3 days after hospitalization.
  - When the child improves, switch to oral amoxicillin (15 mg/kg/dose; q8h). The total course of treatment is at least 5 days.
  - If the child does not improve within 48 hours, or deteriorates, look for complications and treat accordingly. If there are no apparent complications, switch to Chloramphenicol (25 mg/kg/dose every 8 hours IM or I/V) until the child has improved. Then continue orally for a total course of 10 days.
- **Give Oxygen** in children with suspected hypoxia (clinical signs or pulse oximetry).
- **Provide supportive care** as for very severe pneumonia.

9.4.2 Monitoring

The child should be checked by nurses at least every 6 hours and by a doctor at least once a day. Monitor for signs of improvement as discussed above.

9.5 Pleural effusion and empyema

A child with severe or very severe pneumonia should be suspected to have pleural effusion or empyema if any one of the following is present:

(a) Evidence of staph infection in form of boils, impetigo, abscesses, etc.
(b) H/o pain chest.
(c) Clinical examination suggestive, eg dull on percussion and decreased breath sounds
(d) Fever persists despite antibiotics more than 48 hours.

An x-ray is to be done to confirm the presence of fluid in the chest along with diagnostic pleural tap. Frank pus (thick or thin) is aspirated in cases of empyema. Always send the fluid specimen for Grams staining and culture.

9.5.1 Treating empyema

a. Chest drainage

All empyemas should be treated by drainage of the pleural cavity by chest tube thoracotomy with under water seal. If the disease is bilateral and significant, both sides shall need to be drained. A surgical help may be taken for placing the inter-costal chest tube drain and its subsequent management.

b. Give antibiotics

Staphylococcus aureus is a common causative organism of empyema. Give Cloxacillin (dose: 50 mg/kg IM or I/V every 6 hourly) and Gentamicin (dose: 7.5 mg/kg IM or I/V once a day) as anti-staphylococcal drugs. Usually, intravenous antibiotic therapy shall be needed for 7-10 days. Unlike pneumonia the fever comes down little later by 5-7 days. When the child improves, continue with Cloxacillin orally, 4 times a day. Continue treatment for a minimum of 3 weeks.

c. Supportive therapy

Every child should receive oxygen and other supportive therapy as discussed above under "very severe pneumonia", *Section* 9.3.

Failure to improve

If fever and other signs of illness continue beyond 5-7 days, despite adequate chest drainage and antimicrobial therapy, assess for reasons for non-response like phlebitis, metastatic pus lesion elsewhere in the body or less commonly tuberculosis. Consider referring such cases for specialist (paediatric) opinion.

9.6 Child presenting with wheeze

In the first 2 years of life, wheezing is mostly caused by acute viral respiratory infections such as bronchiolitis. After first 2 years of age, wheezing is usually due to asthma. Sometimes children with pneumonia present with wheeze. It is important to consider pneumonia as an alternative diagnosis, particularly in the first 2 years of life. The differential diagnosis of wheezing in a child is detailed in Table 16.

Table 16: Differential diagnosis of the child presenting with wheeze	
Diagnosis	In favour
Asthma	• History of recurrent wheeze, some unrelated to coughs and colds • Family or personal history of asthma/eczema/hay fever • Hyperinflation of the chest • Prolonged expiration • Reduced air entry (if very severe airway obstruction) • Good response to bronchodilators
Bronchiolitis	• First episode of wheeze in a child aged <2 years • Wheeze episode at time of seasonal bronchiolitis • Hyperinflation of the chest • Prolonged expiration • Reduced air entry (if very severe, airway obstruction) • Poor / no response to bronchodilators
Wheeze associated with lower respiratory cough or cold	• Wheeze always related to coughs and colds • No family or personal history of asthma/eczema/hay fever • Prolonged expiration • Good response to bronchodilators
Foreign body	• History of sudden onset of choking or wheezing • Wheeze may be unilateral • Air trapping with hyper-resonance and mediastinal shift • Signs of lung collapse: reduced air entry and impaired percussion note • No response to bronchodilators
Pneumonia	• Fever • Cough with fast breathing • Lower chest wall indrawing • Crackles/crepitations on auscultation

9.7 Asthma

Asthma is a chronic inflammatory condition of the airways associated with variable airflow obstruction that is often reversible. It is characterized by recurrent episodes of wheezing, cough, and difficulty in breathing, which respond to treatment with bronchodilators and anti-inflammatory drugs. Any child with more than 3 episodes of wheezing is likely to have asthma particularly in the presence of personal or family history of atopy.

9.7.1 Treatment of acute asthma

Mainstay of drug therapy is bronchodilators and steroids.

The types of drug used, their doses are largely governed by the severity of the attack (*Annexure* 9).

a. Mild attack – (Alert child with no signs of severe respiratory distress)

- Rapid-acting bronchodilators:
  - Nebulised Salbutamol 3 doses at 20 min interval.

OR

  - Salbutamol by metered dose inhaler (MDI) with spacer: Give 4-5 puffs, spacing out each at 2-3 min interval. This becomes equivalent to a single nebulized dose. Repeat 4-5 puff course as before every 20 min, three times, in this hour.

OR

  - Injection Adrenaline subcutaneously every 20 min three times.
- Reassess the child after 1 hour:
  - If the respiratory distress has resolved completely, and there are occasional or no rhonchi on auscultation, this is considered as a good response. Keep this child under observation for the next 4 hrs to see that the response is sustained. If the child continues to stay well and does not have fast breathing, advise the mother on home care with inhaled or oral salbutamol.
  - If the response is partial, but the child is stable and able to take orally, start oral steroids (Prednisone 1-2 mg/kg/ day in 2-3 divided doses). Keep this child under observation for the next 4 hours to see that there is no further deterioration. Such patients can then be sent home on oral steroids and oral/inhaled salbutamol.
  - Patients with deterioration are treated as moderate to severe attack.

b. Moderate to severe attack (Presence of severe respiratory distress or cyanosis)

- Admit the patient
  - Give free flow oxygen to keep saturations ≥ 92%
  - Rapid-acting bronchodilators:
    - Nebulised Salbutamol 3 doses at 20 min interval;

OR

    - Salbutamol by MDI with spacer: Give 4-5 puffs, spacing out each at 2-3 min interval. This becomes equivalent to a single nebulized dose. Repeat 4-5 puff course as before every 20 min, three times, in this hour.

OR

    - Injection Adrenaline subcutaneously every 20 min three times. This is preferred when there is very severe wheeze as in a silent chest.
  - First dose of steroids (oral Prednisolone 1mg/kg) should be given promptly, if not started so far.
- Continuous monitoring of the sensorium, respiratory rate, oxygenation, chest finding is very important in this potentially life-threatening situation. Reassess after every 20-30 min initially and every 1-2 hrs after the patient starts responding. Nebulized beta agonists and systemic steroids are the mainstay of treatment and other drugs are added if only the response is poor or ill sustained.
- If on reassessment, the response is partial or poor:
  - Continue inhaled Salbutamol as before for another hour.
  - If available, also add inhaled Ipratropium bromide. This can be mixed with Salbutamol nebulized solution. Give 3 doses at 20 min interval.
  - Continue systemic steroids.
- If the child starts improving or is stable, continue Salbutamol inhalations 1 or 2 or 4 hourly depending upon the time for which the response to initial treatment is sustained. Ipratropium bromide should be continued at 8 hourly intervals.

Once good response is seen, stop Ipratropium inhalation and then gradually increase the interval between Salbutamol inhalations every 6 hrs or so and plan discharge.

- In case of poor or no response after initial treatment with Salbutamol and Ipratropium:
  - Take 0.05-0.1ml/ kg body weight of 50% Magnesium Sulphate with a 1ml syringe and add to about 30-50 ml of normal saline. This solution is then given as intravenous infusion over 30 min or so.
  - Reassess frequently at intervals every 30 min to 1 hr.
- Reassess and if the response is still not good; add Injection Aminophylline loading dose (5-6 mg/kg up to a maximum of 300 mg) followed by maintenance infusion in a dose of 5 mg/kg every 6 hrs.
- Continue monitoring intensively. Plan and arrange transfer to a higher facility continuing the current level of treatment in case of any deterioration or if no response is seen in next 4-6 hours.
- Whenever patient shows good response and response is sustained for 4-6 hours, medications can be decreased. Follow the "last in-first out" principle to withdraw medications. Aminophylline infusion is usually stopped in 24 hours followed by Ipratropium inhalation in next 24 hours. Then gradually decrease frequency of Salbutamol inhalation to 4-6 hourly.

9.7.2 Antibiotics

Antibiotics should not be given routinely for acute asthma. Antimicrobial treatment is indicated, however, when there is persistent fever and other signs of pneumonia such as bronchial breathing. Mere presence of crackles is not an evidence of pneumonia and does not warrant antibiotics.

9.7.3 Supportive care

Ensure that the child receives daily maintenance fluids appropriate for his / her age. Encourage adequate feeding for the child, as soon as food can be taken.

9.7.4 Monitor the child

A hospitalized child should be assessed by a nurse every 3 hrs, or every 6 hrs as the child shows improvement (i.e, decreased breathing rate and less respiratory distress), and by a doctor at least twice a day. Record the respiratory rate and watch for signs of impending respiratory failure. Monitor oxygen therapy.

9.7.5 Plan discharge when

- the patient is able to take medication orally,
- does not need oxygen therapy, and
- is on 4-6 hrly salbutamol inhalations.

9.7.6 Give follow-up care

Asthma is a chronic and recurrent condition. A long-term treatment plan should be made based on the frequency and severity of symptoms.

Any child with persistent symptoms or frequent episodes (>1 / month) or symptoms of cough and breathlessness following exercise should be referred because this child will require evaluation / long-term preventive therapy [inhaled corticosteroids]

Management algorithm for treating acute asthma in a hospital

Initial assessment and grade severity of attack History, physical examination

MILD ATTACK

Initial Treatment
- Salbutamol inhalation 2.5 mg/dose (5 mg/ml solution), by nebulizer every 20 minutes x 3

or

- Salbutamol inhalation by MDI-spacer 4 puffs (100mcg/puff) at 2-3 min interval. This course is repeated every 20 minutes x 3

or

- Inj Adrenaline 0.01 ml/kg (max of 0.3 ml) of 1:1000 solution subcutaneous every 20 min x 3

Good response:
Home treatment
- Continue inhaled or oral salbutamol 6 hrly

Incomplete or poor response:
- Add steroids
- Observe for 4 hrs
- Continue Salbutamol 4-6 hrly inhalation
- Discharge if improvement seen

Home treatment:
- Continue inhaled or oral Salbutamol 6 hrly
- Short course steroids for 3-5 days; can be stopped without tapering.

MODERATE TO SEVERE ATTACK

Initial Treatment
- Salbutamol inhalation 2.5 mg/dose (5 mg/ml solution), by nebulizer every 20 min x 3

or

- Salbutamol inhalation by MDI-spacer 4 puffs (100mcg/ puff) at 2-3 min interval. This course is repeated every 20 min x 3

or

- Inj Adrenaline 0.01 ml/kg (maximum of 0.3 ml) of 1:1000 solution subcutaneous every 20 min x 3
- Oxygen
- Start steroids; Prednisolone 1mg/kg or Hydrocortisone 10mg/kg I/V stat

Reassess every 60 min

Poor response:
- Repeat initial treatment as before, and
- Add Ipratropium bromide inhalation (may mix or alternate with salbutamol)
- Oxygen
- Oral Prednisolone (1-2mg/Kg)

Reassess every 60 min

Poor response:
- Continue bronchodilator 1-2 hrly and Ipratropium 8 hrly; Continue steroids
- Give one dose of Mag. Sulph /aminophylline

Reassess every 60 min

Poor response:
- Give one dose of Mag. Sulph, aminophylline choosing what was not used in the previous step

Or
- REFER

Good response at any stage:
Follow the principle of "Last in – First out"
- Omit aminophylline infusion in 12- 24 hours, if used
- Omit ipratropium inhalation in next 12-24 hrs
- Reduce the salbutomal inhalation to 4-6 hourly
- Plan discharge

9.7.7 How to give asthma medications

(a) Nebulized Salbutamol

- The driving source for the nebulizer must deliver air or oxygen at least 6–8 l/min. When using an air pump, give oxygen simultaneously through nasal cannula.
- Place the bronchodilator solution and add sterile saline in the nebulizer chamber to make a volume more than the minimal fill volume of the chamber (usually 3-4 ml). Nebulize until the liquid is almost all used up. The dose of Salbutamol is 2.5 mg (i.e. 0.5 ml of the 5 mg/ml nebulizer solution). This can be given 1-4-hrly initially, reducing to 6-8 hrly once the child's condition improves. If necessary in severe cases, it can be given more frequently.

(b) Salbutamol by metered-dose inhaler with a spacer device

Spacer devices with a volume of 250-750 ml are commercially available. Home made spacers using plastic bottles can also be used.

- Remove the cap and shake the metered-dose inhaler (MDI).
- Place the child's mouth over the opening in the spacer. In a younger child one may attach a face mask to the spacer. The child's neck should be supported in slight extension.
- Release a puff (100 micrograms of Salbutamol) into the spacer chamber after attaching the MDI to the other end of the spacer.
- Allow normal breathing for 3-5 breaths. A slow deep breath is preferred but may not be feasible if the child is not earlier trained. If the child is crying, the drug delivery may be severely compromised.
- Give Salbutamol inhalation by MDI-spacer 4 puffs (100mcg/puff) at 2-3 min interval.

(c) Subcutaneous epinephrine (adrenaline)

Subcutaneous injection of Epinephrine (Adrenaline – 0.01 ml/kg of 1:1000 solution (up to a maximum of 0.3 ml), measured accurately with a 1 ml syringe is given subcutaneously (for injection technique, see *Annexure* 8).

(d) Ipratropium bromide

Inhaled Ipratropium Bromide may add to the bronchodilator benefits seen with inhaled Salbutamol but is less effective when used alone. The dose is 250 mcg. Give it mixed with or alternate with Salbutamol inhalation up to 24-48 hrs. When Ipratropium and Salbutamol are mixed together, the final fill volume is still kept the same (3-4 ml).

(e) Oral bronchodilators

Once the child has improved sufficiently to be discharged home, then oral Salbutamol (in syrup or tablets) can be given. The dose for children aged 1–5 years: 2 mg 6-8 hrly. It is unnecessary to teach or provide inhalation drugs at home to those with intermittent wheezing.

(f) Steroids

If a child has a severe acute attack of wheezing and a history of recurrent wheezing, give oral prednisolone, 1-2 mg/ kg. If the child remains very sick, continue the treatment until improvement is seen. Parenteral steroids do not confer any advantage in an outpatient setting but may be used in hospitalized children who are severely distressed, drowsy or unable to retain oral medication. Give Inj. Hydrocortisone 10mg/kg I/V stat followed by 5mg/kg every 6 hrly. Steroids are used for 3-5 days and no tapering of dose is necessary.

(g) Magnesium Sulphate

Injection Magnesium Sulphate as an infusion may be useful as an additive therapy if the initial treatment to rapid acting beta 2 agonists and Ipratropium fails. Usually 0.05-0.1ml/ kg body weight of 50% Magnesium Sulphate is measured with a

1ml syringe and this is added to about 30-50 ml of normal saline. This solution is then given as intravenous infusion over 30 min or so. Rapid infusion can cause hypotension and striated muscle relaxation.

(h) Aminophylline

Inj I/V aminophylline – initial dose of 5-6 mg/kg (up to a maximum of 300 mg) diluted in 50 ml of maintenance fluids over 30 min, followed by a maintenance dose of 0.9 mg/kg/hr added to 6 hrly maintenance fluid.
Intravenous Aminophylline can be dangerous in an overdose or when given too rapidly. Omit the initial dose if the child has already received any form of Aminophylline in the previous 24 hours. Stop giving it immediately, if (a) the child starts to vomit, or (b) has a pulse rate >180 / min, or (c) develops a headache, or (e) has a convulsion.

9.8 Conditions presenting with stridor

Stridor is a harsh noise during inspiration, which is due to narrowing of the air passage in the oropharynx, sub glottis or trachea. If the obstruction is severe, stridor may also occur during expiration. The major causes of severe stridor are viral croup (caused by measles or other viruses), foreign body, diphtheria, retropharyngeal abscess, and trauma to the larynx (see *annexure 6*).

9.8.1 Viral croup

Croup causes obstruction in the upper airway which, when severe, can be life threatening. Most severe episodes occur in infants. This section deals with croup caused by various respiratory viruses.

Type	Diagnosis	Treatment
Mild croup	• A hoarse voice • A barking or hacking cough • Stridor that is heard only when the child is agitated.	• Home care (fluid, feeding, when to return)
Moderate to Severe croup	• Stridor when the child is calm • Rapid breathing and in-drawing of the lower chest wall.	• Admit to hospital • Steroid – Single dose of Inj Dexamethasone (0.6 mg/kg) I/M or oral Prednisolone (1-2 mg/kg). • Epinephrine (adrenaline) – Nebulized Epinephrine (1:1000 solution) 2ml in 2 ml of normal saline. • Antibiotics are not recommended. • Oxygen therapy • Intubation or Tracheostomy in children with incipient obstruction.

Consider intubation and tracheostomy

- If there are signs of incipient airway obstruction, such as severe indrawing of the lower chest wall and restlessness, consider intubating the child with an endo-tracheal tube one size smaller than the appropriate size; if expertise is available. This is preferred over tracheostomy, when feasible.

- If this is not possible, transfer the child urgently to a hospital where intubation or emergency tracheostomy can be done.

Intubation or tracheostomy should only be done by experienced staff.

EXERCISE 7

1. Manoj is 4 years old and weighs 15 kg. He comes to the health facility with cough and fast breathing. On examination he is alert, temp of 37.4°C and respiratory rate of 46/min with no chest indrawing. On auscultation ronchi are audible on both sides of chest. His mother says he had 3 similar attacks in the past one year.

a. What is your diagnosis?

b. Write the initial treatment plan.

2. Satish, a 2-year-old child weighing 8 kg, reports to the health facility. He has cough and respiratory distress for 2 days. His respiratory rate is 70/min; temperature is 39°C and is unable to feed and has chest indrawing. On further examination, a large boil on the thigh is detected and crackles are heard on auscultation.

a) What is your diagnosis?
b) What is the likely etiological agent?
c) Outline the management plan along with the drug doses in this child.

SECTION. 10
CASE MANAGEMENT OF CHILDREN PRESENTING WITH DIARRHOEA

10.0 Learning objectives

After completion of this section the participant should be able to:

- Manage cases of diarrhoea with severe dehydration
- Manage cases of dysentery.
- Assess and manage cases of persistent diarrhoea.
- Facilitate setting up of an ORT corner in the facility.

Diarrhoea is common in children especially in those between 6 months and 2 years of age. Exclusive breast feeding up to 6 months protects children against diarrhoea. It is often seen in those who are not on breastfeeding and more so if they are bottle-fed. Most diarrhoeas which cause dehydration are loose or watery. If an episode of diarrhoea lasts less than 14 days, it is **acute diarrhoea**. Acute watery diarrhoea causes dehydration and contributes to malnutrition. The death of an infant with acute diarrhoea is usually due to dehydration.

If the diarrhoea lasts 14 days or more, it is **persistent diarrhoea**. Up to 20% of episodes of diarrhoea become persistent. Persistent diarrhoea often causes nutritional problems and contributes to deaths in children.

Diarrhoea with blood in the stool, with or without mucus, is called **dysentery**. The most common cause of dysentery is Shigella bacteria. Amoebic dysentery is not common in young children.

You have already learned the assessment and management of acute and persistent diarrhoea in the IMNCI module. Most children with diarrhoea can be managed at out patient level. However, some of these children will be referred to the health facility for further assessment and management. The principles of management in the facility are similar to those which you have already learned in the IMNCI module.

Indications for hospitalization:

1. Children with severe dehydration.
2. Children with severe acute malnutrition.
3. Children with associated co-morbid conditions.

The assessment and classification of dehydration is described in Table 17.

Table 17: Assessment and classification of dehydration		
Classification	**Signs or symptoms**	**Treatment**
Severe dehydration	Two or more of the following signs: • Lethargy / unconsciousness • Sunken eyes • Unable to drink or drinks poorly • Skin pinch goes back very slowly (> 2 seconds)	• Give fluids for severe dehydration (Plan C)
Some dehydration	Two or more of the following signs:· • Restlessness, irritability· • Sunken eyes· • Drinks eagerly, thirsty· • Skin pinch goes back slowly	• Give fluids for some dehydration (Plan B) • After rehydration, advise mother on home care • Follow up in 5 days if not improving
No dehydration	Not enough signs to classify as some or severe dehydration	• Give fluids, zinc supplements and food and advise to continue ORS at home (Plan A)· • Advise mother when to return immediately.· • Follow up in 5 days if not improving.

For management of some and no dehydration, see *Annexure 6*,

10.1 Severe dehydration (without severe acute malnutrition)

Children with severe dehydration require rapid I/V rehydration with close monitoring, which is followed by oral rehydration once the child starts to improve sufficiently. You have already learnt this process. In areas where cholera is endemic, give an antibiotic effective against cholera (Doxycycline is the first line recommended drug) to children above 2 years. The dose of doxycycline is 100 mg tab between 4-5 yrs and 50 mg (1/2 tab) between 2-4 yrs, single dose.

Management of severe dehydration with severe acute malnutrition is detailed later in section on SAM.

Note: Ringer's lactate solution is the preferred I/V solution. If it is not available, normal saline can be used. 5% dextrose solution is not effective and should not be used. In addition all patients should start to receive ORS solution at the rate of 5ml/kg/hr when they can drink. This provides some base and potassium which may not be adequately supplied by I/V fluid.

Start I/V fluid immediately. If the child can drink, give ORS (5ml/kg/hr) by mouth while the drip is set up. Give 100 ml/kg Ringer's lactate solution (or if not available, normal saline), divided as follows:

AGE	First give 30 ml/kg in	Then give 70 ml/kg in
Infants (under 12 months)	1 hour*	5 hours
Children (12 months up to 5 years)	30 minutes*	2½ hours

* Repeat once if radial pulse is still very weak or not detectable.

- Reassess the child every 15-30 minutes. If hydration status is not improving, give the I/V drip more rapidly.
  - Also give ORS (about 5 ml/kg/hr) as soon as the child can drink: usually after 3-4 hrs (infants) or 1-2 hrs (children).
  - If I/V treatment not possible, give ORS 20 ml/kg/hr for 6 hrs (120 ml/kg) by NG tube.
- Assess an infant after 6 hrs and a child after 3 hrs. Classify dehydration again. Then choose the appropriate plan (A, B, or C) to continue treatment. (Refer to *Annexure 6*)
- Give oral antibiotic for cholera if child 2 years or older.
- If possible, observe the child for at least 6 hrs after rehydration to be sure that the mother can maintain hydration by giving the child ORS solution by mouth.

10.2 Dysentery

Dysentery is diarrhoea presenting with loose frequent stools containing visible blood. It is usually associated with fever, abdominal cramps and rectal pain. Most episodes in children are due to Shigella but can be caused by Salmonella, E.coli, C.jejuni and infrequently by E.histolytica.

Treat dysentery

Indications for admission

- Children with severe malnutrition and dysentery
- Children who are toxic, lethargic, have abdominal distension and tenderness or convulsions.

- In admitted children IM/IV Ceftriaxone (100 mg/kg) once daily for 5 days may be used. For non-admitted/discharged children give an oral antibiotic effective for Shigella (e.g. Ciprofloxacin, Cefixime).
- Prescribe a zinc supplement as done for children with watery diarrhoea.

Provide supportive care

Supportive care includes the prevention or correction of dehydration and continued feeding. Never give drugs for symptomatic relief of abdominal pain and rectal pain, or to reduce the frequency of stools, as they can increase the severity of the illness.

Treat dehydration

Assess the child for signs of dehydration and give fluids according to Treatment Plan A, B or C.

Nutritional management

Ensuring a good diet is very important as dysentery has a marked adverse effect on nutritional status.

Manage complications

- Potassium depletion: This can be prevented by giving ORS solution (when indicated) or potassium-rich foods such as bananas, coconut water or dark green leafy vegetables.
- High fever: If the child has high fever (≥ 39°C or ≥ 102.2°F) which appears to be causing distress, give Paracetamol.
- Rectal prolapse: Gently push back the rectal prolapse using a surgical glove or a wet cloth. Alternatively, prepare a warm solution of saturated magnesium sulphate and apply compresses with this solution to reduce the prolapse by decreasing the oedema.
- Convulsions: A single episode of convulsion may occur in these children. However, if this is prolonged or is repeated, give anticonvulsant treatment. Avoid giving rectal diazepam.
- Haemolytic-uraemic syndrome: Where laboratory tests are not possible, suspect haemolytic-uraemic syndrome (HUS) in patients with easy bruising, pallor, altered consciousness, and low or no urine output, and refer these cases.

10.3 Persistent diarrhoea

Admit child with persistent diarrhoea if:

- Dehydrated (severe persistent diarrhoea), or
- Has associated severe malnutrition or severe illness, or
- Fails to routine OPD management for persistent diarrhoea.

Assess

1. Assess dehydration.
2. Screen for non-intestinal infections: Pneumonia, UTI, Sepsis, Otitis media and Oral thrush.
3. Screen for intestinal infections: Stool routine and culture if facility is available.
4. In areas where HIV is highly prevalent, suspect HIV if there are other clinical signs or risk factors.

Treat severe persistent diarrhoea

1. Manage dehydration as Plan B or C.

2. Give antimicrobial therapy if:

- Associated systemic infection: Combination of parenteral Ampicillin and aminoglycosides is usually appropriate.
- Associated severe malnutrition: Use combination of Ampicillin and an aminoglycoside as for associated systemic infection even if uncertain whether there is systemic infection.
- Presence of gross blood in stools: Give IM/IV Ceftriaxone (100 mg/kg) once daily or an oral antibiotic effective for Shigella (eg. Ciprofloxacin) for 5 days.
- Amoebiasis: Give oral Metronidazole 10 mg/kg, 3 times a day for 5 days only if
  - Microscopic examination of fresh faeces carried out in a reliable laboratory reveals trophozoites of E. histolytica with red blood cells, or
  - Two different antibiotics, which are usually effective for Shigella locally, have been given without clinical improvement.
- Giardiasis: Give oral metronidazole 5 mg/kg, 3 times a day, for 5 days if trophozoites of Giardia lamblia are seen in the faeces.

3. Give zinc supplements for 14 days (Tablet Zinc Sulphate 20 mg)

Zinc : Up to 6 months = 10 mg
: ≥ 6 months = 20 mg

4. Feeding

Children treated in hospital require special diets and the goal is to give a daily intake of at least 110 kcal/kg. Breastfeeding should be continued.

- Up to 6 months
  - Encourage exclusive breastfeeding. Help mothers who are not breastfeeding exclusively to do so.
  - If child is not breastfeeding give a breast milk substitute that is low in lactose such as yoghurt or lactose free commercial formula. Use a spoon or cup; do not use a feeding bottle. Once the child improves, help the mother to re-establish lactation.

- 6 months or older

Feeding should be restarted as soon as the child can eat. Reduced lactose diet should be given 6 times a day to achieve a total intake of at least 110 calories/kg/day (annexure-6). Many sick children will eat poorly, until any serious infection has been treated for 24–48 hrs. Such children may require nasogastric feeding initially.

Recommended diets for persistent diarrhoea

Given in *Annexure 6* are three diets recommended for children and infants aged >6 months with severe persistent diarrhoea. If there are signs of dietary failure or if the child is not improving after 7 days of treatment, stop the first diet and give the next diet for 7 days.

The most important criterion is weight gain. Ensure at least three successive days of increasing weight before you conclude that weight gain is occurring.

Give additional banana and well-cooked vegetables to children who are responding well. After recovery, resume an appropriate diet for their age, including milk, which provides at least 110 calories/kg/day. Children may then return home, but follow them up regularly to ensure continued weight gain and compliance with feeding advice.

5. Give supplementary multivitamins and minerals

Give supplement vitamins and minerals, twice the RDA for at least 2 weeks. Introduce iron supplements only after the diarrhoea has ceased. If such preparations are not available, provide vitamin A (single large dose) if he has not received as pre-referral treatment. In addition to zinc, iron and vitamin A, children with persistent diarrhoea also require supplementation with other multivitamins and minerals such as folate, copper and magnesium.

- Vitamin A (Single dose) : 6 - 12 months = 100,000 IU
  >12 months = 200,000 IU

One RDA for a child aged 1 year is:
• Folate 50 micrograms • Zinc 10 mg • Vitamin A 400 micrograms • Iron 10 mg • Copper 1 mg • Magnesium 80 mg

6. Monitoring

Check the following daily

- Body weight
- Temperature
- Food intake
- Number of diarrhoea stools

10.4 ORT Corner

An ORT corner is an area in a health facility available for oral rehydration therapy (ORT). This area is needed because mothers and their children who need ORS solution will have to stay at the clinic for several hours.

When there are no diarrhoea patients using the ORT corner, the area can be used for treating other problems. Then the space is not wasted. When there are dehydrated patients, this conveniently located and adequately equipped ORT corner will help the staff to manage the patients easily.

The ORT corner should be:

- Located in an area where staff frequently pass by but not in a passageway. The staff can observe the child's progress and encourage the mother.
- Near a water source.
- Near a toilet and washing facilities.
- Pleasant and well-ventilated.

The ORT corner should have the following furniture.

- Table for mixing ORS solution and holding supplies.
- Shelves to hold supplies.
- Bench or chairs with a back where the mother can sit comfortably while holding the child.
- Small table where the mother can conveniently rest the cup of ORS solution.

The ORT corner should have the following supplies. These supplies are for a clinic that receives 25-30 diarrhoea cases in a week.

- ORS packets (a supply of at least 300 packets per month).
- 6 bottles that will hold the correct amount of water for mixing the ORS packet, including some containers like those that mother will have at home.
- 6 cups.
- 6 spoons.
- 2 droppers (may be easier to use than spoons for small infants).

- Cards or pamphlets (such as a Mother's Card) that remind mothers how to care for a child with diarrhoea. A card is given to each mother to take home.
- Soap (for handwashing).
- Wastebasket.
- Food available (so that children may be offered food or eat at regular meal times).

The ORT corner is a good place to display informative posters. Since mothers sit in the ORT corner for a long time, they will have a good opportunity to learn about health prevention from the posters.

Mothers are interested in posters about the treatment and prevention of diarrhoea and dehydration. The posters should contain information about ORT, use of clean water, breastfeeding, weaning foods, handwashing, the use of latrines, and when to take the child to the clinic. Other health messages should include information on immunizations.

Posters alone are not adequate for informing mothers. Doctors should also counsel mothers in person, using a Mother's Card if there is one available.

EXERCISE – 8

1. Sonu is 8 months old and weighs 6.0 kg. He has had diarrhoea for 20 days. He has some dehydration. He has been referred with classification of severe persistent diarrhoea, low weight for age and anaemia. His diet includes animal milk, cooked cereal, and some mashed vegetables.

   a) Should Sonu be admitted?

   b) In which situation will you start antimicrobial therapy in Sonu?

   c) What diet should Sonu be taking?

SECTION. 11
CASE MANAGEMENT OF CHILDREN PRESENTING WITH FEVER

11.0 Learning objectives

After completion of this section the participant should be able to:

- Identify causes of fever.
- Manage cases of severe malaria.
- Manage cases of bacterial meningitis.
- Manage cases of severe dengue.

11.1 Child presenting with fever

There are three major categories of children presenting with fever:

- Fever due to infection without localized signs (no rash)(Table 18).
- Fever due to infection with localized signs (no rash)(Table 19).
- Fever with rash (Table 20).

Some causes of fever are only found in certain regions (e.g. dengue haemorrhagic fever, relapsing fever). Other fevers are seasonal (e.g. malaria, meningococcal meningitis) or can occur in epidemics (measles, meningococcal meningitis).

It is important to remember that majority of the children with fever do not require hospitalization. As many of these are respiratory tract infections which are viral in origin and there can be mild variant of malaria, typhoid fever, or other disease entities which have been elucidated in the IMNCI module. Following are the indications for children with fever who would require admission in the health facility:

- If any emergency signs
- Toxic child.
- Sometimes prolonged fever not responding to conventional treatment.

Table 18: Differential diagnosis of fever without localizing signs	
Diagnosis of Fever	**In Favour**
Malaria (only in children exposed to malaria transmission)	• Sudden onset of fever with rigors followed by sweating • Febrile paroxysms occur every alternate day • Blood film positive • Rapid diagnostic test positive • Severe anaemia • Enlarged spleen
Septicaemia	• Seriously and obviously ill with no apparent cause • Purpura, petechiae • Shock or hypothermia in severely malnourished
Typhoid	• Seriously and obviously ill with no apparent cause • Abdominal tenderness • Shock • Confusion
Urinary tract infection	• Costo-vertebral angle or supra pubic tenderness· • Crying on passing urine • Passing urine more frequently than usual • Incontinence in previously continent child • White blood cells and/or bacteria in urine on microscopy

Table 19: Differential diagnosis of fever with localized signs	
Diagnosis of Fever	**In Favour**
Meningitis	• Fever with headache, vomiting • Convulsions • Stiff neck • Bulging fontanelle • Meningococcal rash (petechial or purpuric)
Otitis media	• Red immobile ear-drum on otoscopy • Pus draining from ear • Ear pain
Mastoiditis	• Tender swelling above or behind ear
Osteomyelitis	• Local tenderness • Refusal to move the affected limb • Refusal to bear weight on leg
Septic arthritis	• Joint hot, tender, swollen
Pneumonia	• Cough with fast breathing • Lower chest wall indrawing • Fever • Coarse crackles • Nasal flaring • Grunting
Viral upper respiratory tract infection	• Symptoms of cough/cold • No systemic upset

Table 20: Differential diagnosis of fever with rash	
Diagnosis of Fever	**In Favour**
Measles	• Typical rash (maculopapular) • Cough, runny nose, red eyes • Recent exposure to a measles case • No documented measles immunization
Viral infections	• Mild systemic upset • Transient non-specific rash
Meningococcal infection	• Petechial or purpuric rash • Bruising • Shock • Stiff neck (if meningitis)
Dengue haemorrhagic fever	• Abdominal tenderness • Skin petechiae • Bleeding from nose or gums, or GI bleed • Shock

11.2 Severe malaria

Malaria is a major health problem in India. Plasmodium vivax and P. falciparum are responsible for most cases. Use of appropriate anti-malarial drugs is very important to save lives in malaria cases. The National Malaria Policy 2008 recommends doing microscopy and Rapid Diagnostic Test (RDT) in all clinically suspected malaria cases in high risk areas and microscopy in low risk areas. The Policy also recommends using standardized full course of treatment to prevent emergence of resistant cases.

What is severe malaria?

Presence of any of the following features in a child with microscopy or RDT positive for malaria indicates severe malaria:

- Altered consciousness
- Severe anaemia (haematocrit < 15% or haemoglobin < 5g/dl)
- Hypoglycaemia
- Respiratory distress
- Jaundice

Severe malaria, which is most commonly due to P. falciparum is a life-threatening condition. The illness starts with high grade fever, headache, restlessness and often vomiting. Children can deteriorate rapidly over 1–2 days, going into coma (cerebral malaria) or shock, or manifesting convulsions, severe anaemia and acidosis.

It is observed that P. falciparum infection may lead to complications in 0.5% to 2% of cases. Mortality may result in about 30% of such cases if timely treatment is not given. Use of appropriate anti-malarial drugs is very important not only to save lives in such cases but also to contain the spread of this species.

Emergency measures: to be taken within the first hour

- Check and correct hypoglycaemia.
- Treat convulsions.
- Manage shock, if present.
- If the child is unconscious, minimize the risk of aspiration pneumonia (insert a nasogastric tube and remove the gastric contents).
- Treat severe anaemia, if present.
- Antimalarial treatment.
- Provide supportive care if child is unconscious.

Also give treatment for bacterial meningitis if it cannot be excluded.

Antimalarial treatment

Severe malaria is an emergency and treatment should be given as per severity and associated complications. Parenteral quinine or artemisinin derivatives should be used irrespective of Chloroquine resistance status of the area.

Quinine for severe malaria

Table 21: Quinine dose for severe malaria

Age or Weight	Intravenous* or Intramuscular Quinine (2 ml ampoules) 10 mg/kg		Oral Quinine sulfate tablet	
	150mg/ml**	300mg/ml**	200mg **	300mg**
2 – <4 months (4 – <6 kg)	0.4ml	0.2 ml	¼	-
4 – <12 months (6 – <10 kg)	0.6 ml	0.3 ml	½	-
1 – < 2 years (10 – < 12 kg)	0.8 ml	0.4 ml	¾	½
2 – <3 years (10 – <14 kg)	1.0 ml	0.5 ml	¾	½
3 – <5 years (14 – 19 kg)	1.2 ml	0.6 ml	1	½

* Loading dose is double the maintenance dose given above

**Quinine salt

- **I/V Quinine**: Give a loading dose of 20 mg/kg of quinine dihydrochloride in 10 ml/kg of I/V fluid, 5% dextrose saline over 4 hrs followed by maintenance dose of 10mg/kg, 8 hrly; infusion rate should not exceed 5 mg salt/kg of body weight per hour. It is essential that I/V quinine is given only if there is close nursing supervision of the infusion and control of the infusion rate. If this is not possible, it is safer to give I/M quinine.
- **I/M Quinine**: Give 10 mg of quinine salt per kg I/M and repeat after 4 hrs. Then, give every 8 hrs until the malaria is no longer severe. The parenteral solution should be diluted before use because it is better absorbed and less painful.
- The parenteral treatment should be given for minimum of 48 hrs and once the child tolerates oral therapy, quinine 10 mg/kg bw three times a day with clindamycin (20 mg/kg/day in 2 divided doses for 7 days) should be given to complete seven days of treatment. Give single gametocidal dose of primaquine (0.75 mg/kg) to prevent transmission in the community.

OR

- **IM Artemether**: Give 3.2 mg/kg on admission then 1.6 mg/kg daily for a minimum of three days until the child can take oral treatment.
- **IV or IM Artesunate**: Give 2.4 mg/kg on admission, followed by 2.4 mg/kg after 12 hours and 24 hrs, then once a day for a minimum of 3 days or until the child can take oral treatment.
- Complete treatment following parenteral artemisin derivatives by giving a full course of artemisin based combination therapy (ACT). (*See Annexure* 8 for drug policy).
- **Arteether** is not recommended in children.

Provide supportive care of an unconscious child

- Care of an unconscious child: position the child and take care of airway, breathing, and circulation as you have learnt in the section ETAT.
- Take the following precautions in the delivery of fluids:
  - Check for dehydration and treat appropriately.
  - During rehydration, examine frequently for signs of fluid overload. The most reliable sign of overhydration is an enlarged liver. Additional signs are gallop rhythm, fine crackles at lung bases and/or fullness of neck veins when upright. Eyelid oedema is a useful sign in infants.
  - In children with no dehydration, ensure that they receive their daily fluid requirements but take care not to exceed the recommended limits. Be particularly careful in monitoring I/V fluids.

Monitor the child

The child should be checked by nurses at least every 3 hrs and by a doctor at least twice a day. Monitor temperature, pulse rate, respiratory rate and blood pressure every 6 hrs, for at least the first 48 hrs:

- Check blood sugar every 3 hrly until the child is conscious.
- Monitor the rate of I/V infusions.
- Fluid intake and output.

11.3 Meningitis

This section covers management of meningitis in children and infants over 2 months old.
Suspect meningitis if child has fever, vomiting, headache, irritability, inability to feed and seizures. Children with meningitis have neck stiffness with photophobia. Anterior fontanelle if open may be bulging.

Early diagnosis is essential for effective treatment.

The diagnosis is confirmed with a lumbar puncture and examination of the CSF (Table 22). However, start the treatment immediately even if lumbar puncture is not possible or lumbar puncture cannot be done because the child has signs of raised intracranial pressure.

Table 22: CSF findings in various types of meningitis				
	Appearance	**Cells**	**Proteins**	**Glucose**
Normal	Crystal clear	<6, all mononuclear	< 40 mg/dl	50-80 mg/dl> 2/3 of blood glucose
Bacterial, untreated	Cloudy or purulent*	100s to 1000s, all polymorphonuclear	Increased, upto 100 mg/dl	Decreased or none
Bacterial, partially treated	Clear or slightly clouded	Increased, mostly polymorphonuclear, later mononuclear	Increased	Decreased or normal
Viral	Clear or slightly opalescent	0 to few hundred, mononuclear	20-125 mg/dl	Normal
Tubercular	Straw coloured or slightly cloudy	250-500 mononuclear	45-500 mg/dl	Decreased

* May be clear during the first few hours of illness.

Treatment

Give antibiotics

- Give antibiotic treatment immediately after admission.
  Ceftriaxone: 50 mg/kg IM/ IV, over 30–60 min every 12 hrs; or 100 mg/kg IM/IV, once daily;

  OR

  Cefotaxime: 50 mg/kg IM/IV, every 6 hrs
  If Ceftriaxone / Cefotaxime is not available use other alternative drugs as given below:

1. Chloramphenicol : 25 mg/kg IM/IV every 6 hrs, plus
   Ampicillin : 50 mg/kg IM/IV every 6 hrs

   OR

2. Chloramphenicol : 25 mg/kg IM/IV every 6 hrs, plus
   Benzylpenicillin : 60 mg/kg (100,000 units/kg) every 6 hrs IM/IV.

All cases should be looked for the following signs of raised intracranial pressure

- Unequal pupils.
- Rigid posture or posturing.
- Focal paralysis in any of the limbs or trunk.
- Irregular breathing.

Raised intracranial pressure can be managed by intravenous mannitol (0.25-0.5 gm/kg/dose, i.e. 1.25-2.5 ml of 20% mannitol). The other alternative is oral glycerol 1 gm/kg 4-6 hrly.

- Review therapy when CSF results are available. If the diagnosis is confirmed, the total duration of treatment is 10 days.

- **If there is poor response to treatment:**
  - Consider the presence of common complications, such as subdural effusions (persistent fever plus focal neurological signs or reduced level of consciousness) or a cerebral abscess. If these are suspected, refer the child to a hospital with specialized facilities for further management.
  - Look for other sites of infection which may be the cause of fever, such as cellulitis at injection sites, arthritis, or osteomyelitis.
  - In malarious areas, take a blood smear to check for malaria since cerebral malaria should be considered as a differential diagnosis or co-existing condition. Treat with an antimalarial if malaria is diagnosed.

Supportive care: As discussed earlier (see section on severe malaria).

Fluid and Nutritional Management

- There is no good evidence to support fluid restriction in children with bacterial meningitis. Give them their daily fluid requirement.
- Give due attention to acute nutritional support and nutritional rehabilitation.

Monitor the child

Nurses should monitor the child's state of consciousness, respiratory rate and pupil size every 3 hrs during the first 24 hrs (thereafter, every 6 hrs), and a doctor should monitor the child at least twice daily. Management of complication such as convulsions, hypoglycemia has already been dealt.

On discharge, assess all children for neurological problems, especially hearing loss. Measure and record the head circumference of infants. If there is neurological damage, refer the child for physiotherapy, if possible, and give simple suggestions to the mother for passive exercises. Sensorineural deafness is common after meningitis. Arrange a hearing assessment on all children one month after discharge from hospital.

11.4 Dengue fever

Suspect dengue fever in an area of dengue risk if a child has fever lasting more than 2 days. Headache, pain behind the eyes, joint and muscle pains, abdominal pain, vomiting and/or a rash may occur but are not always present. It can be difficult to distinguish dengue from other common childhood infections.

Causative organism, dengue virus is an arthropode borne virus and has 4 serotypes (Den I, II, III and IV). Aedes aegypti a day time mosquito is the principal vector in India and countries of South-east Asian region, mostly seen in rainy season or in months following rainy season.

Diagnosis

Confirmation of diagnosis of dengue fever is based on demonstration of IgM antibody specific for dengue virus. Total leucocyte count is either normal or decreased. Platelet count is less than normal.

All cases of Dengue fever should be reported to the local/district/state health authorities, as it is a notifiable disease.

Treat dengue fever

Most children can be managed at home provided the parents have reasonable access to the hospital:

- Counsel the mother to bring the child back for daily follow-up but to return immediately if any of the following occur: severe abdominal pain; persistent vomiting; cold, clammy extremities; lethargy or restlessness; bleeding e.g. black stools or coffee-ground vomit.
- Encourage oral fluid intake with clean water or ORS solution to replace losses from fever and vomiting.
- Give paracetamol for high fever if the child is uncomfortable. Do not give aspirin or ibuprofen as these drugs may aggravate bleeding.
- Follow up the child daily until the temperature is normal. Check the haematocrit daily where possible. Check for signs of severe disease.
- Admit any child with signs of severe disease (mucosal or severe skin bleeding, shock, altered mental status, convulsions or jaundice) or with a rapid or marked rise in haematocrit.

11.5 Severe dengue

What is severe dengue?

Severe dengue includes dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS).

Grading of dengue haemorrhagic fever

DHF is classified into four grades of severity, where grades III and IV are considered to be DSS. The presence of thrombocytopenia with concurrent haemoconcentration differentiates grades I and II DHF from DF.

Grade I	:	Fever accompanied by non-specific constitutional symptoms; the only haemorrhagic manifestation is a positive tourniquet test and/or easy bruising.
Grade II	:	Spontaneous bleeding in addition to the manifestations of Grade I patients, usually in the form of skin or other haemorrhages.
Grade III	:	Circulatory failure manifested by a rapid, weak pulse and narrowing of pulse pressure or hypotension, with the presence of cold, clammy skin and restlessness.
Grade IV	:	Profound shock with undetectable blood pressure or pulse.

Suspect severe dengue

Suspect severe dengue in an area of dengue risk if a child has fever lasting more than 2 days plus any of the following features:

- Evidence of plasma leakage
  - High or progressively rising haematocrit (Hematocrit = 3X Hb gm/dl)
  - Pleural effusions or ascites
- Circulatory compromise or shock
- Spontaneous bleeding

- Altered consciousness level
  - Lethargy or restlessness
  - Coma
  - Convulsions
- Severe gastrointestinal involvement
  - Persistent vomiting
  - Increasing abdominal pain with tenderness in the right upper quadrant
  - Jaundice

Treat severe dengue

Most cases of DHF grade I can be managed on outpatient basis.

Indications for hospitalization

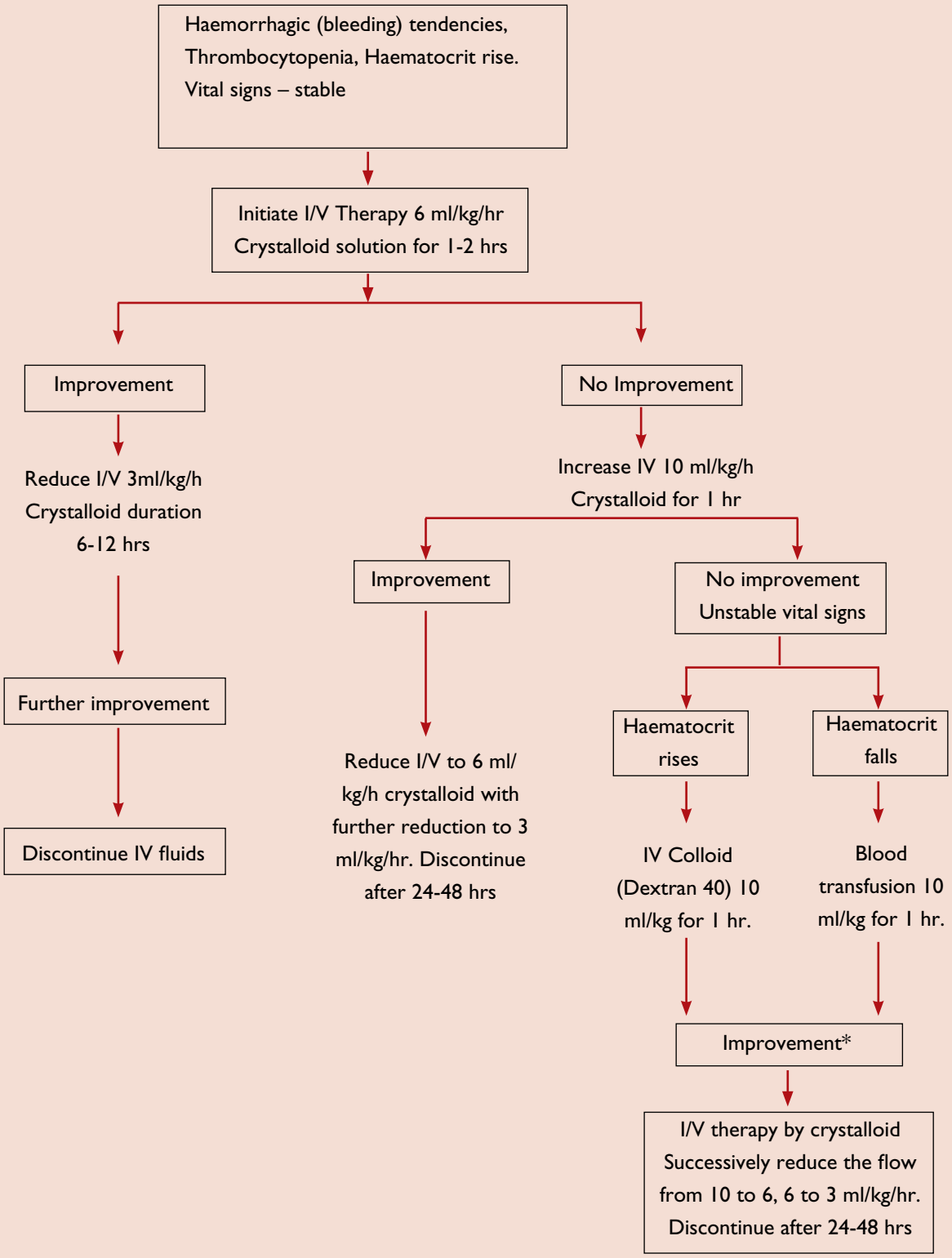
Hospitalization for bolus intravenous fluid therapy may be necessary where significant dehydration has occurred and rapid volume expansion is needed because of reduced blood volume due to plasma leak. Signs in such cases include:

- Tachycardia
- Increased capillary refill time (>2 seconds)
- Cool, mottled or pale skin
- Diminished peripheral pulses
- Changes in mental status
- Oliguria
- Sudden rise in haematocrit or continuously elevated haematocrit despite administration of fluids
- Narrowing of pulse pressure (<20 mm Hg)
- Hypotension (a late finding representing uncorrected shock)

Fluid management – cases without shock (pulse pressure >20 mm Hg)

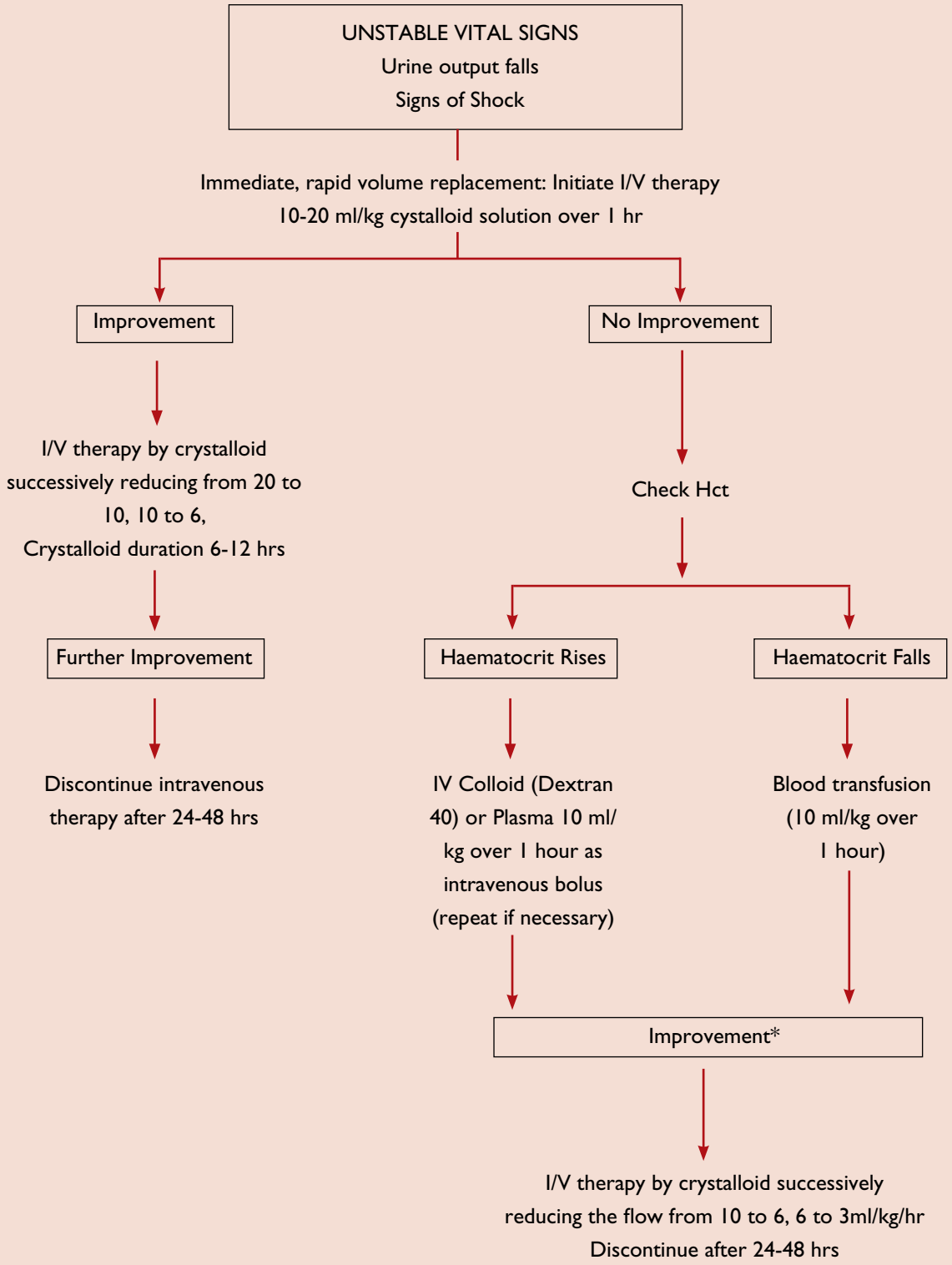
- In cases of severe dengue fever without shock, therapy should be initiated with crystalloid fluids such as 5% dextrose in normal saline 6 ml/kg/hr for 3 hrs.
- Check vital signs, urine output and hematocrit after 3 hrs. If there is improvement, fluid administration can be decreased to 3 ml/kg/hr for 3 hrs.
- With further improvement continue I/V therapy 3 ml/kg/hr for 6-12 hrs and then discontinue.
- If there is no improvement with initial fluid therapy, increase I/V therapy to 10 ml/kg over 1 hr. In case of improvement, reduce fluid volume form 10 ml to 6 ml and further to 3 ml/ kg/hr accordingly.
- In cases with no improvement with 10 ml/kg/ hr fluid therapy, vital signs, urine output and hematocrit should be checked. If vital signs are unstable and hematocrit is rising, fluid therapy should be changed to colloid (Dextran 40 or plasma) 10 ml/kg for 1 hour. Cases with unstable vital signs and falling hematocrit (suggesting internal bleeding), should be given whole blood 10 ml/kg over one hour. If there is improvement with colloid therapy or blood transfusion, fluid therapy can be changed to crystalloid (10 ml/kg/hr) and can be gradually reduced.
- Cases not improving with colloid therapy or blood transfusion may require vasopressor therapy (see *management* of shock, Module I).

Fluid management – severe dengue without shock DHF-Grade I or II (Pulse pressure >20 mm Hg)



* If no improvement, consider adding Dopamine (as described in management of shock).

Fluid management – severe dengue with shock (pulse pressure ≤ 20 mm Hg)



* If no improvement consider adding Dopamine (as described in management of shock).

Fluid management – patients with shock (Pulse pressure ≤ 20 mm Hg)

- Treat as an emergency. Give 10-20 ml/kg of an isotonic crystalloid solution such as Ringer's lactate or 5% dextrose saline over one hour.
  - If the child responds (capillary refill and peripheral perfusion start to improve, pulse pressure widens), reduce to 10 ml/kg for one hour and then gradually to 6 ml/kg/hr over the next 6-8 hrs.
  - If the child does not respond (continuing signs of shock), give another bolus of the crystalloid over 1 hr bringing the fluid dose to 20-30 ml/kg.
- If shock persists oxygen should be started and hematocrit should be checked.
- If the hematocrit is rising, colloids (Dextran 40, plasma or 5% albumin) should be administered 10 ml/kg rapidly. If hematocrit is falling, whole blood 10 ml/kg should be transfused.
- Patients not showing improvement with above fluid therapy may require vasopressors (*see management of shock in module 1*).
- Make further fluid treatment decisions based on clinical response, i.e. review vital signs hourly and monitor urine output closely. Changes in the haematocrit can be a useful guide to treatment but must be interpreted together with the clinical response. For example, a rising haematocrit together with unstable vital signs (particularly narrowing of the pulse pressure) indicates the need for a further bolus of fluid, but extra fluid is not needed if the vital signs are stable even if the haematocrit is very high (50–55%). In these circumstances continue to monitor frequently and it is likely that the haematocrit will start to fall within the next 24 hrs as the reabsorptive phase of the disease begins. Similarly, during later part of the disease, reabsorption of extravasated plasma may lead to drop in hematocrit. This should not be interpreted as a sign of internal hemorrhage.
- With clinical improvement, fluid administration can be gradually reduced as per chart.
- In most cases, I/V fluids can be stopped after 36-48 hours. Remember that many deaths result from giving too much fluid rather than too little.
- Electrolyte and/or acid-base disturbances may occur in severe cases and will require appropriate management.

Manage haemorrhagic complications

- Mucosal bleeding may occur in any patient with dengue but is usually minor. It is due mainly to the low platelet count, and this usually improves rapidly during the second week of illness.
- If major bleeding occurs it is usually from the gastrointestinal tract, particularly in patients with very severe or prolonged shock. Internal bleeding may not become apparent for many hours until the first black stool is passed. Consider this in children with shock who fail to improve clinically with fluid treatment, particularly if the haematocrit is stable or falling and the abdomen is distended and tender.
- In children with profound thrombocytopenia (<20 000 platelets/mm3), ensure strict bed rest and protection from trauma to reduce the risk of bleeding. Do not give IM injections.
- Monitor clinical condition, haematocrit and, where possible, platelet count.
- Transfusion is very rarely necessary. When indicated it should be given with extreme care because of the problem of fluid overload. If a major bleed is suspected, give 5-10 ml/kg fresh whole blood slowly over 2 to 4 hrs and observe the clinical response. Consider repeating if there is a good clinical response and significant bleeding is confirmed.
- Platelet concentrates (if available) should only be given if there is severe bleeding. They are of no value for the treatment of thrombocytopenia without bleeding.

Provide supportive care

- Give paracetamol for high fever if the child is uncomfortable. Do not give aspirin or ibuprofen as this will aggravate the bleeding.
- Do not give steroids.

- Convulsions are not common in children with severe dengue. But if they occur, manage as described earlier.
- If the child is unconscious, provide care for an unconscious child.
- Children with shock or respiratory distress should receive oxygen.
- Hypoglycaemia (blood glucose <54 mg/dl) is unusual but if present, give I/V glucose.

Monitoring

- In children with shock, monitor the vital signs hourly (particularly the pulse pressure, if possible) until the patient is stable, and check the haematocrit 3 to 4 times per day. The doctor should review the patient at least four times per day and only prescribe intravenous fluids for a maximum of 6 hrs at a time.
- For children without shock, nurses should check the child's vital signs (temperature, pulse and blood pressure) at least four times per day and the haematocrit once daily, and a doctor should review the patient at least once daily.
- Check the platelet count daily, where possible, in the acute phase.
- Keep a detailed record of all fluid intake and output.

Criteria for discharging inpatients

The following criteria should be met before patients recoving from DHF/DSS are discharged:

- Absence of fever for at least 24 hours without the use of antipyretics.
- Return of appetite.
- Visible clinical improvement.
- Good urine output.
- Stable haematocrit.
- At least 2 days after recovery from shock.
- No respiratory distress from pleural effusion or ascites.
- Platelet count of more than 50000/mm3.

Refer to specialized care unit:
• Patients with refractory shock
• Patients with major bleeding

11.6 Fever lasting longer than 7 days (Table 23)

As there are many causes of prolonged fever, it is important to know the most common causes in a given area. Investigations for the most likely cause can then be started and treatment decided.

Table 23: Additional differential diagnosis* of fever lasting longer than 7 days			
Diagnosis	**In Favour**	**Diagnosis**	**In Favour**
Abscess	• Fever with no obvious focus of infection (deep abscess) • Tender or fluctuant mass • Local tenderness or pain • Specific signs depend on site Subphrenic, liver, Psoas, Retroperitoneal, lung, renal, etc	**Infective endocarditis**	• Weight loss • Enlarged spleen • Anaemia • Heart murmur • Petechiae • Splinter haemorrhages in nail beds • Microscopic haematuria • Finger clubbing
Rheumatic fever	• Heart murmur which may change over time • Arthritis/arthralgia • Cardiac failure • Fast pulse rate • Pericardial friction rub • Chorea • Recent known streptococcal infection	**Tuberculosis**	• Weight loss • Anorexia, night sweats • Cough • Enlarged liver and/or spleen • Family history of TB • Chest X-ray suggestive of TB • Tuberculin test Positive • Lymphadenopathy
Kala-azar	• Endemic area • Enlarged spleen and/or liver • Anaemia • Weight loss	**Childhood Malignancies**	• Weight loss • Anaemia • Bleeding manifestations • Lymphadenopathy • Enlarged liver and/or spleen • Mass or lump in the body

- Causes in addition to given in previous boxes

11.7 Typhoid fever

Suspect typhoid fever if a child presents with fever, plus any of the following: diarrhoea or constipation, vomiting, abdominal pain, particularly if the fever has persisted for more than seven or more days and malaria has been excluded or the fever has not responded to appropriate antimalarial therapy.

On examination key features of typhoid fever are:

- Fever with no obvious focus of infection.
- No stiff neck or other specific signs of meningitis, or a lumbar puncture for meningitis is negative.
- Signs of toxemia e.g., lethargy, disorientation/ confusion and convulsions.

- Rose spots on the abdominal wall in light-skinned children.
- Hepatosplenomegaly, tense and distended abdomen.

Typhoid fever can present atypically in young infants as an acute febrile illness with shock and hypothermia.

Diagnosis

Complete blood counts in most cases with typhoid fever are normal. Leucopenia or pancytopenia is seen in 10-25% cases. Widal test, which detects agglutinating antibodies to O and H antigens of Salmonalla typhi is often the only test available for diagnosis of typhoid fever in resource poor settings. Level of 1 in 160 dilution or more is taken as positive test. Widal test may be negative in cases with fever of less than 5-7 days duration. Blood culture and sensitivity testing/ IGM Typhidot test should be done whenever possible.

Management

Since the emergence of multidrug resistant (MDR) typhoid fever, third generation cephalosporines are recommended for treatment of typhoid fever. Cases requiring hospitalization should be treated with ceftriaxone (80mg/kg I/V or IM once daily). In ambulatory patients cefixime (20 mg/kg/day) can be used. In areas where sensitive strains have reemerged, use of chloramphanicol (25 mg/kg/dose, 8 hrly) is recommended. Duration of antibiotic treatment should be for 5 days after the child becomes afebrile or 10-14 days whichever is later. Other drugs used to treat typhoid fever include fluoroquinolones (ciprofloxacin 15-20 mg/kg/day in 2 divided doses, ofloxacin 10-20 mg/kg/day in 2 divided doses) and azithromycin (10-20 mg/kg/day).

The cases with typhoid fever should be closely monitored for complications like gastrointestinal hemorrhage, intestinal perforation, hypotension and shock. Antipyretics for fever and maintenance intravenous fluids may be required initially in cases who have poor oral intake.

EXERCISE - 9

1. Kareena, a 4-year-old child has been urgently referred to you with classification of very severe febrile disease. Not very low weight and anaemia. She is from a high malaria risk area. She is in coma and has no signs of shock. The child is not severely malnourished and has some pallor. Her temperature is 39.2°C.

a) List the emergency signs. What emergency treatment would you give?

b) Enlist important points in history and physical examination.

c) What is your differential diagnosis?

d) What investigations would you like to do?

Further examination reveals that she has no rash and no stiff neck. CSF examination is normal and blood smear shows asexual forms of Plasmodium falciparum.

e) What is the most likely diagnosis? How would manage the case?

SECTION. 12 MANAGEMENT OF CHILDREN WITH ANAEMIA

12.0 Learning objectives

After completion of this section the participant should be able to-

- Understand approach to a case of anaemia
- Understand treatment of nutritional anaemia
- Understand indications for blood transfusion

Anaemia is very common in children in developing countries. Severe anemia in a child is suggested by the presence of severe palmar pallor and may be associated with a fast pulse rate, difficulty in breathing, or confusion or restlessness. There may be signs of heart failure such as gallop rhythm, an enlarging liver and rarely pulmonary oedema. This presentation with symptoms and signs resulting from cardiorespiratory decompensation due to anaemia is uncommon. However, mild to moderate aemia is a common co-corbidity in children attending health facility for various condition. Hence, anaemia/pallor should be looked for in each patient attending the health facility.

Clinical approach

Nutritional anaemia is the most common cause of anaemia in children. Nutritional anaemia results from deficiency of iron, folic acid and vitamin B12. Iron deficiency anaemia (IDA) commonly occurs in later part of infancy and preschool children particularly if they are not receiving adequate complementary feeding. Physical examination of children with IDA is usually unremarkable. They do not have significant hepatosplenomegaly or lymphadenopathy. Children having anaemia due to folic acid and/or B12 deficiency (megaloblastic anaemia) may have hyperpigmentation of knuckles and occasionally bleeding manifestations due to thrombocytopenia.

Clinical assessment of anaemia in children less than 5 years is listed in Table 24.

Table 24: Findings on anaemia in children	
History	**Examination**
• Duration of symptoms • Usual diet (before the current illness) • Family circumstances (to understand the child's social background) • Prolonged fever • Worm infestation • Bleeding from any site • Lymphnode enlargement • Previous blood transfusions • Similar illness in the family (siblings)	• Severe palmar pallor • Skin bleeds (petechial and/or purpuric spots) • Lymphadenopathy • Hepato-Splenomegaly • Signs of heart failure (gallop rhythm, raised JVP, respiratory distress, basal crepitations)

Laboratory diagnosis

Annemia in children less than 5 years in defined as Haemoglobin < 11gm/dl. Complete blood counts and examination of peripheral blood smear should be done in all anemic children if possible. Blood films should be examined for malaria parasites particularly in high malaria risk areas. Stool examination for ova, cyst and occult blood. Blood counts should be performed using electronic cell counter if available. Children with IDA will have microcytic-hypochromic anaemia. Usually leucocyte counts and platelet counts are normal. Children with folate and/or B12 deficiency will have macrocytic anemia. These cases may have associated leucopenia and/or thrombocytopenia. Such cases should be referred for specialised investigation as in these cases other causes resulting in alterations in blood counts (bi/pancytopenia) and macrocytosis need to be excluded.

Treatment

IDA should be treated using oral iron 2-3 mg/kg/day (dose of elemental iron). Older children who can take tablets can be given IFA tablets. Iron therapy should be continued 8-12 weeks after normal haemoglobin level is achieved.

The children on iron therapy should be evaluated for response to treatment. Iron therapy results in prompt clinical response (return of appetite, decreased irritability). Check haemoglobin level after two weeks of therapy. Children not responding to treatment should be evaluated for compliance to treatment and adequacy of dose and presence of infections such as UTI and tuberculosis.

12.1 Give blood transfusion as soon as possible to:

- All children with Hb <4 gm/dl.
- Children with Hb 4-6 gm/dl with any of the following:
  - Dehydration
  - Shock
  - Impaired consciousness
  - Heart failure
  - Fast breathing
  - Very high parasitaemia (>10% of RBC)

The details of blood transfusion is given in *Annexure 10*.

12.2 Refer for investigations and further management:

- Cases of anaemia and Hepato-splenomegaly/Splenomegaly, if malaria has been excluded or not strongly suspected.
- Children with similar history in the family (siblings).
- Cases of anaemia with significant lymphadenopathy, bleeding manifestations.
- Cases of anaemia with abnormal/immature cells or marked leucocytosis or bicytopenia or pancytopenia on smear examination.
- Children who are not responding to adequate dose of iron/folate given for 2 weeks.

SECTION. 13
CASE MANAGEMENT OF CHILDREN WITH SEVERE ACUTE MALNUTRITION (SAM)

Malnutrition remains one of the most common causes of morbidity and mortality among children. The high case fatality rates among severely malnourished children can be reduced by using standardized and easily implementable protocols. This section provides simple, specific guidelines for the management of severely malnourished children.

13.0 Learning objectives

After completion of this section the participant should be able to:

- Recognize criteria for hospital admission of malnourished children.
- Perform initial assessment of the severely malnourished child.
- Understand organization of care.
- Provide general treatment for malnutrition.
- Treat associated conditions.
- Understand discharge and follow-up guidelines of the severely malnourished child.

13.1 Criteria for hospital admission

- Weight for height/length <-3 z score of median of WHO child growth standards or
- Bipedal edema.

If weight-for-height or weight-for-length cannot be measured, use the clinical signs for visible severe wasting (see Figure 30). Reference values for weight-for-height or length are given in *Annexure 11*.

Fig. 30: Child with Marasmus (Baggy Pants appearance).

Fig. 31: Child with Kwashiorkor.

13.2 Assessment of severely malnourished child

A good history and physical examination is required for deciding the treatment but always start the emergency treatment first. The details of history and examination can be recorded later.

History	Examination
• Recent intake of food and fluids • Usual diet (before the current illness) • Breastfeeding • Duration and frequency of diarrhoea and vomiting • Type of diarrhoea (watery/bloody) • Loss of appetite • Family circumstances (to understand the child's social background) • Chronic cough • Contact with tuberculosis • Recent contact with measles • Known or suspected HIV infection. • Immunizations	• Anthropometry- weight, height/ length, mid arm circumference • Oedema • Pulse, respiratory rate • Signs of dehydration • Shock (cold hands, slow capillary refill, weak and rapid pulse) • Severe palmar pallor • Eye signs of vitamin A deficiency: - dry conjunctiva or cornea, - Bitot's spots - Corneal ulceration - Keratomalacia· • Localizing signs of infection, including ear and throat infections, skin infection or pneumonia· • Fever (temperature ≥ 37.5° C or ≥ 99.5° F) or hypothermia (axillary temperature <35.0° C or <95.0° F)· • Mouth ulcers • Skin changes of kwashiorkor: - Hypo or hyperpigmentation - Desquamation - Ulceration (spreading over limbs, thighs, genitalia, groin, and behind the ears) - Exudative lesions (resembling severe burns) often with secondary infection (including Candida)

Note: Children with vitamin A deficiency are likely to be photophobic and will keep their eyes closed. It is important to examine the eyes very gently to prevent corneal rupture.

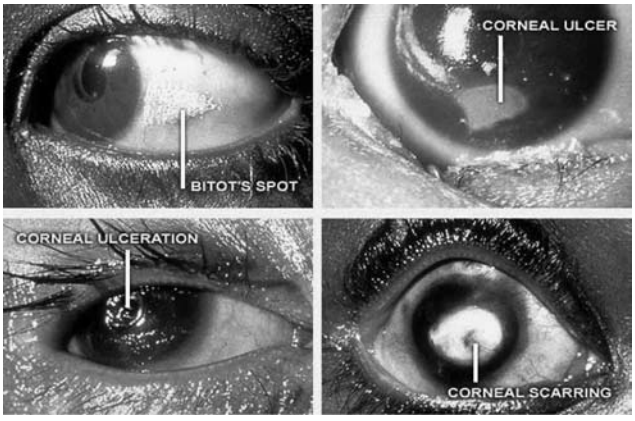


Fig. 32 : Vitamin A deficiency signs

Laboratory Tests

- Haemoglobin or packed cell volume in children with severe palmar pallor.
- Blood sugar.
- Serum electrolytes (sodium, potassium)
- Screening for infections:
  - Total and differential leukocyte count, blood culture (If possible)
  - Urine routine examination
  - Urine culture
  - Chest x-ray

13.3 Organization of care

On admission, the child with severe malnutrition should be separated from infectious children and kept in a warm area (25–30°C, with no draughts), and constantly monitored. Washing should be kept to a minimum, after which the child should be dried immediately.

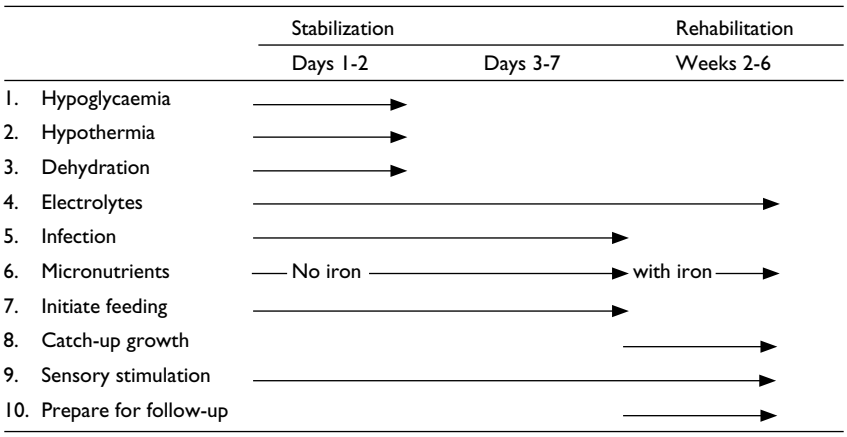
Facilities and sufficient staff should be available to ensure correct preparation of appropriate feeds, and to carry out regular feeding during the day and night. Accurate weighing machines are needed, and records should be kept of the feeds given and the child's weight so that progress can be monitored.

13.4 Providing general treatment for malnutrition

The triage process and assessment of children with severe malnutrition and management of shock has already been discussed.

Severe anemia, if present, will need urgent treatment.

There are 10 essential steps in two phases: an initial stabilization phase and a longer rehabilitation phase.



The focus of initial management is to prevent death while stabilizing the child

Important things not to do and why?

- **Do not give I/V fluids routinely**. I/V fluids can easily cause fluid overload and heart failure. Only give I/V fluids to children with signs of shock.
- **Do not give diuretics to treat oedema**. The oedema will go away with proper feeding. Giving diuretics will worsen child's electrolyte imbalance and may cause death.
- **Do not give high protein formula**. Almost all severely malnourished children have infections, impaired liver and intestinal function. Because of these problems, they are unable to tolerate the usual amount of dietary protein.
- **Do not give iron during the initial feeding phase**. Add iron only after the child has been on catch-up formula for 2 days (usually during week 2). Giving iron early in treatment has been associated with free radical generation and may interfere with the body's immune mechanisms against proliferating bacteria.

13.4.1 Hypoglycaemia

All severely malnourished children are at risk of developing hypoglycaemia (blood glucose <54 mg/dl) which is an important cause of death.

If there is any suspicion of hypoglycaemia and blood glucose results can be obtained quickly (e.g. with glucometer), measure immediately. If the blood glucose cannot be measured, assume that all children with severe malnutrition have hypoglycaemia.

Treat hypoglycaemia

- If the child is lethargic, unconscious, or convulsing, give IV 10% glucose 5 ml/kg followed by 50 ml of 10% glucose or sucrose by NG tube. If IV dose cannot be given immediately, give the NG dose first. Give appropriate antibiotics and start feeding as soon as possible.
- If not lethargic, unconscious, or convulsing, give the first feed of starter formula (75 cals/100ml), if it is quickly available and then continue with 2 hourly feeds.
- If the first feed is not quickly available give 50 ml of 10% glucose or sugar solution (4 rounded teaspoon of sugar in 200 ml or one cup of water) orally or by nasogastric tube, followed by the first feed as soon as possible.
- Give 2-hourly feeds, day and night, at least for the first day.
- Give appropriate antibiotics.
- Keep the baby warm and check temperature.

Monitoring

If the initial blood glucose was low, repeat the measurement (using finger prick or heel prick blood) and estimate blood sugar after 30 minutes. If the axiliary temperature falls <35°C or if there is deterioration in the level of consciousness anytime, repeat the blood sugar measurement

- If glucose is again <54 mg/dl, repeat the 10% glucose or sugar solution.

Prevent hypoglycaemia/Begin Starter Formula

Feed 2 hrly, starting immediately or, if necessary, rehydrate first. Continue feeding throughout the night.

13.4.2 Manage hypothermia

What is hypothermia?

If the axillary temperature is <35°C (<95°F) or does not register on a normal thermometer, assume hypothermia.

Where a low-reading thermometer is available, take the rectal temperature (<35.5°C or <95.5°F) to confirm the hypothermia.

Treat all hypothermic children for hypoglycaemia and for infection as well.

Treat hypothermia

- Make sure the child is clothed (including the head). Cover with a warmed blanket and place a heater (not pointing directly at the child) or lamp nearby, or put the child on the mother's bare chest or abdomen (skin-to-skin) and cover them with a warmed blanket and/or warm clothing. Do not use hot water bottles.
- Feed the child immediately (if necessary, rehydrate first).
- Give appropriate antibiotics.

Monitoring

- Take the child's temperature 2-hrly until it rises to more than 36.5°C. Take it half-hourly if a heater is being used.
- Ensure that the child is covered at all times, especially at night. Keep the head covered, preferably with a warm bonnet to reduce heat loss.
- Check for hypoglycemia whenever hypothermia is found.

Prevent hypothermia

- Place the bed in a warm, draught-free part of the ward and keep the child covered.
- Change wet nappies, clothes and bedding to keep the child and the bed dry.
- Avoid exposing the child to cold (e.g. after bathing, or during medical examinations).
- Let the child sleep with the mother for warmth in the night.
- Feed the child 2-hourly, starting immediately (see initial refeeding).
- Always give feeds through the night.

13.4.3 Dehydration

Recognize dehydration

Dehydration tends to be over diagnosed and its severity is overestimated in severely malnourished children. Many of the signs that are normally used to assess dehydration are unreliable in a child with severe malnutrition, making it difficult or impossible to detect dehydration reliably or determine its severity. Moreover, many signs of dehydration are also seen in septic shock. As a result dehydration tends to be overdiagnosed and its severity overestimated. A severely malnourished child is usually apathetic when left alone and irritable when handled. In severely malnourished child, the loss of supporting tissue and absence of subcutaneous fat make the skin thin and loose. It flattens very slowly when pinched, or may not flatten at all. Oedema if present, may mask diminished elasticity of the skin.

Ask the mother if the child has had watery diarrhoea or vomiting. If the child has watery diarrhoea or vomiting, assume dehydration and give ORS (Also ask about blood in the stool, as this will affect choice of antibiotics).

Remember a child with severe acute malnutrition may be dehydrated in the presence of oedema.

Treatment

Whenever possible, rehydrate a dehydrated child with severe malnutrition orally or through a nasogastric tube.

A severe acute malnourished child is at risk of hypokalemia due to reduced muscle mass. In addition to ORS start potassium supplements to prevent hypokalemia (syrup potassium chloride -15 ml of the syrup provides 20 meq of potassium)-*refer to section 13.4.4*.

REMEMBER: Use IV rehydration only if the child has signs of shock and is lethargic or has lost consciousness

Calculate amount of ORS to give

How often to give ORS	Amount to give
Every 30 minutes for the first 2 hours	5 ml/kg body weight
Alternate hours for up to 10 hours	5-10 ml/kg*

* The amount offered in this range should be based on the child's willingness to drink and the amount of ongoing losses in the stool. Starter formula is given in alternate hours during this period until the child is rehydrated.

- If the child has already received IV fluids for shock and is switching to ORS, omit the first 2-hour treatment and start with the amount for the next period of up to 10 hours.

Monitor the child who is taking ORS

Monitor every 30 min for the first 2 hrs and then hourly.

Signs to check:

- Respiratory rate.
- Pulse rate.
- Urine output – Ask: Has the child passed urine since last checked?
- Frequency of stools and vomiting – Ask: Has the child had a stool or vomited since last checked?

Signs of overhydration:

If you find signs of over hydration (increasing respiratory rate by 5/min and pulse rate by 15/min), stop ORS immediately and reassess after 1 hr.

- Measures to prevent dehydration from continuing watery diarrhoea are similar to those for well-nourished children.
  - If the child is breastfed, continue breastfeeding.
  - Give ORS between feeds to replace stool losses. As a guide, give 50–100 ml after each watery stool.

Shock in severely malnourished children

Shock from dehydration and sepsis are likely to coexist in severely malnourished children. They are difficult to differentiate on clinical signs alone. Children with dehydration will respond to I/V fluids. Those with septic shock and no dehydration will not respond. The amount of fluid given is determined by the child's response. Overhydration must be avoided.

Give I/V fluids to severely malnourished child if:

- Child is lethargic or unconscious and
- Has cold hands plus
  - Slow capillary refill (longer than 3 seconds)
  - Weak and fast pulse

Slow Capillary Refill

You have already read how to check for capillary refill.

Fast Pulse

2 months up to 12 months: 160 beats or more per minute

12 months up to 5 years: 140 beats or more per minute

Intravenous rehydration

The only indication for I/V infusion in a severely malnourished child is circulatory collapse caused by severe dehydration or septic shock.

Fluid management in shock with severe dehydration

In case of inability to secure intravenous access, intraosseous route should be used. Since, Ringer's lactate with 5% dextrose is not commercially available, use half normal (N/2) saline with 5% dextrose as rehydrating fluid.

- Give oxygen
- Give rehydrating fluid at slower infusion rates of 15ml/kg over the first hour with continuous monitoring (pulse rate, pulse volume, respiratory rate, capillary refill time, urine output).
- Administer IV antibiotics
- Monitor pulse and respiratory rates every 5-10 min. If there is improvement (pulse slows; faster capillary refill) at the end of the first hour of IV fluid infusion, consider diagnosis of severe dehydration with shock. Repeat rehydrating fluid at the same rate over the next hour and then switch to ORS at 5-10ml/kg/hour, either orally or by nasogastric tube.
- If there is no improvement or worsening after the first hour of the fluid bolus, consider septic shock and treat accordingly.

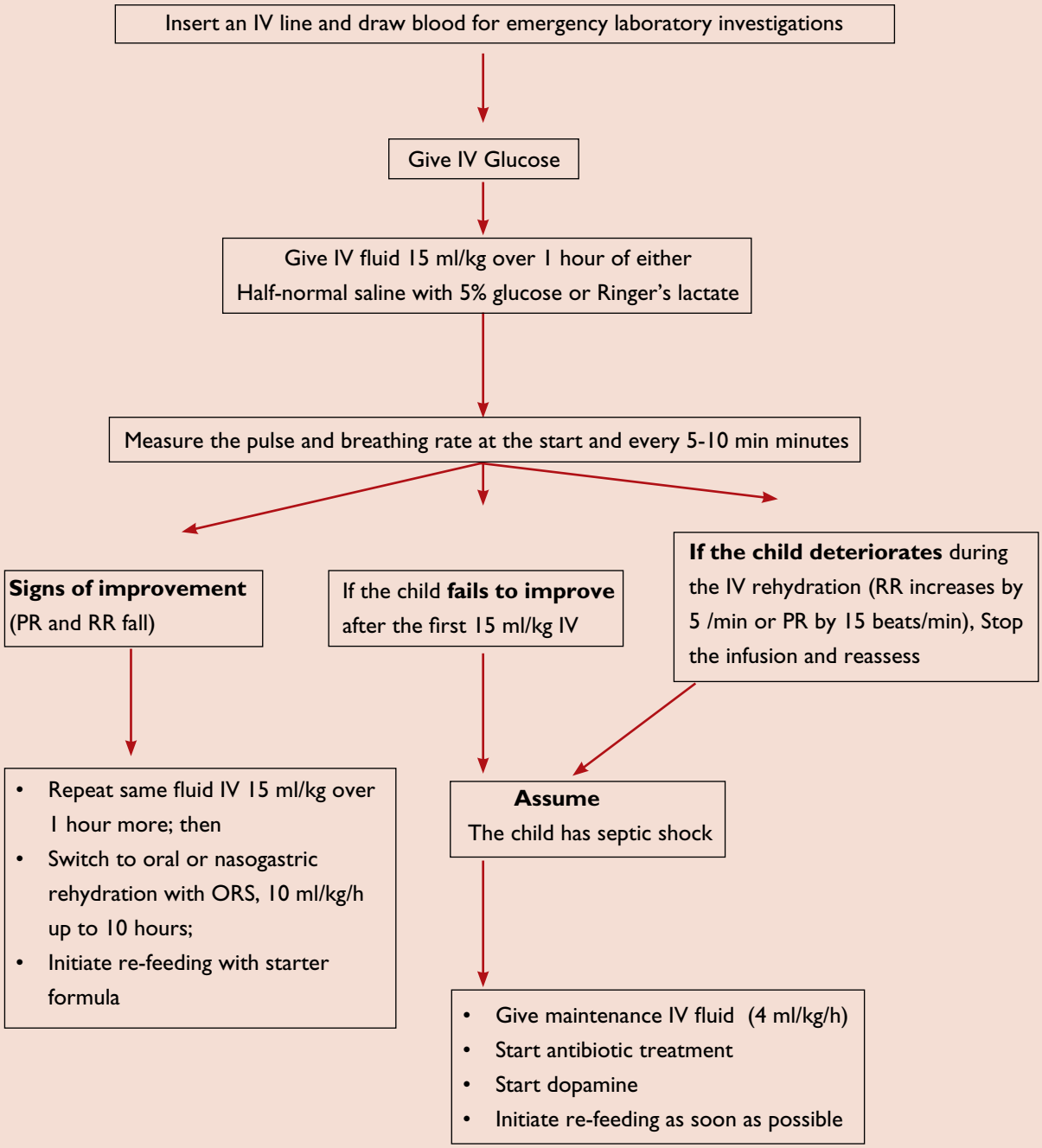
Caution:

- Do not use 5% dextrose alone
- Add potassium to the IV fluids at the rate of 1.5ml per 100ml after the patient passes urine. 1ml of potassium chloride provides 2 mmol of potassium. Thus if you add 1ml to 100 ml it will give 20 mEq/litre. You should not increase to more than 40 mEq/litre.
- Monitor frequently and look for features of over hydration and cardiac decompensation. Increasing respiratory rate (> 5 per minute) and increasing pulse rate (> 15 per minute), increasing edema and periorbital puffiness indicates overhydration which may be dangerous and may lead to heart failure.

Chart 5: Management of shock in a child with severe acute malnutrition

Give this treatment only if the child has signs of **shock AND is lethargic or has lost consciousness**

- Weigh the child. Estimate the weight if child cannot be weighed or weight not known
- Give Oxygen
- Make sure child is warm



13.4.4 Electrolyte imbalance

- Give supplemental potassium at 3-4 meq/kg/day for at least 2 weeks. Potassium can be given as syrup potassium chloride; the most common preparation available has 20 meq/15 ml.
- On day 1, give 50% magnesium sulphate IM once (0.3mL/kg up to a maximum of 2 ml), Thereafter, give extra magnesium (0.4–0.6 meq/kg daily) orally. If oral commercial preparation is not available you can give injection magnesium sulphate (50% which has 2 meq/ml) orally as magnesium supplements mixed with feeds for 2 weeks.
- Prepare food without adding salt to avoid sodium overload.

13.4.5 Infection

Presume and treat infection

Assume all children with severe malnutrition admitted in a hospital have an infection and give broad spectrum antibiotics. If a specific infection is identified (such as Shigella), give specific appropriate antibiotics according to condition identified. Hypoglycaemia and hypothermia are often signs of severe infection.

Select antibiotics and prescribe regimen

Select antibiotics as shown in the chart below.

Status	Antibiotics
All admitted cases	• Inj. Ampicillin 50 mg/kg/dose 6 hrly and Inj. Gentamicin 7.5 mg/kg once a day for 7 days • Add Inj. Cloxacillin 50 mg/kg/dose 6 hrly if staphylococcal infection is suspected • Revise therapy based on sensitivity report
For septic shock or worsening/ no improvement in initial hours	• IV Cefotaxime 50 mg/kg/dose 6 hrly or Inj. Cerftriaxone 50 mg/kg/dose 12 hrly plus Inj. Amikacin 15 mg/kg/once a day
Meningitis	• IV Cefotaxime 50 mg/kg/dose 6 hrly or Inj. Ceftriaxone 50 mg/kg/dose 12 hrly plus Inj. Amikacin 15 mg/kg/once a day
Dysentery	• Inj. Ceftriaxone 100 mg/kg once a day for 5 days

Duration of antibiotic therapy depends on the diagnosis i.e.:

Suspicion of clinical sepsis: at least 7 days

Culture positive sepsis: 10-14 days

Meningitis: at least 14-21 days

Deep seated infections like arthritis and osteomyelitis: at least 4 weeks

Treat Associated Conditions

- Give antimalarials if blood smear positive for malaria parasites.
- Start ATT if tuberculosis is diagnosed or strongly suspected (Mx and Xray chest).
- Suspect HIV if he has also other problems like persistent diarrhoea, oral thrush, pneumonia, parotid swelling or generalized lymphadenopathys . Investigate and follow HIV guidelines.
- Severe anaemia: Give whole blood or packed cell transfusion if Hb is < 4g/dl or Hb is 4-6 g/dl and child has respiratory distress. Give 10 ml/kg slowly over 4-6 hours and give Inj. Frusemide 1 mg/kg at the start of the transfusion. Do not repeat blood transfusion within 4 days.
- If eye problems (keratomalacia) due to vitamin A deficiency, in addition to vitamin A doses instill ciprofloxacin eye

drops 2-3 hourly and atropine eye drops 3 times a day for 7-10 days. Also cover the eyes with pad and bandage.

- Skin lesions: Bathe or soak the affected areas for 10 min in 1% potassium permanganate solution and apply gentian violet or nystatin cream if available to skin sores and any barrier cream (zinc cream) to the raw areas.
- Persistent diarrhoea: Diarrhoea is common in severe malnutrition but with cautious refeeding, it should subside during the first week. In the rehabilitation phase, the poorly formed loose stools are not a cause for concern, provided the child's weight gain is satisfactory. If the child has persistent diarrhoea, screen for non-intestinal infections and treat appropriately. Continue breast feeding and try to give feeds with low lactose initially and subsequently change to lactose free options if diarrhoea persists. (Annexure 6).

Response to treatment for infection

- **Good response**
  - Alert and active
  - Improved activity and weight gain > 5 gm/kg/day
  - Absence of clinical and lab. evidence of infections
  - Absence of complications like hypoglycaemia or hypothermia
- **Poor response**
  - Lethargic, poor activity
  - Poor appetite or no weight gain
  - Clinical/ lab. evidence of infections
  - Danger signs present

If poor response

- Ensure child has received appropriate and adequate antibiotics
- Check whether vitamin and mineral supplements are given correctly (see below)
- Reassess for possible sites of infection
- Suspect resistant infections (malaria, tuberculosis) or HIV
- Look for lack of stimulation and other social problems

13.4.6 Micronutrients

Give oral vitamin A in a single dose.

Vitamin A orally in single dose as given below:

- < 6 months : 50,000 IU (if clinical signs of deficiency are present).
- 6-12 months : 1 lakh IU.
- Older children: 2 lakh IU.
- Children < 8 kg irrespective of age should receive 1 lakh IU orally.
- Give half of the above dose if injectable (intramuscular) vitamin A needs to be given.
- Give same dose on Day 0,1 and 14 if there is clinical evidence of vitamin A deficiency.

Other micronutrients should be given daily for at least 2 weeks:

- Multivitamin supplement (should contain vitamin A, C, D, E and B12 & not just vitamin B-complex): 2 Recommended Daily Allowance.
- Folic acid: 5mg on day 1, then 1 mg/day.
- Zinc : 2mg/kg/day.
- Copper: 0.3 mg/kg/day (if separate preparation not available use commercial preparation containing copper).
- When weight gain commences and there is no diarrhoea add 3 mg of iron/kg/day.

13.4.7 Initiate feeding

Essential features of initial feeding are:

- Start feeding as early as possible.
- Feed the child if alert and drinking even during rehydration.
- Give frequent and small nutrient rich feeds of low osmolarity and low lactose.
- Offer 130 ml/kg/day of liquids (100 ml/kg/day if child has severe oedema), 80-100 Kcal/kg/day and 1-1.5 g/kg/day of proteins.
- Use nasogastric feeding till child takes orally 75% of all feeds.
- If child breastfed, continue breastfeeding but give the feed first.
- Ensure night feeds.

Starter Formula

Starter formula is to be used during initial management. It is started as soon as possible and continued for 2-7 days until the child is stabilized. Severely malnourished children cannot tolerate usual amounts of proteins and sodium at this stage, or high amounts of fat. They may die if given too much protein or sodium. Starter formula is specially made to meet the child's needs without overwhelming the body's systems in the initial stage of treatment which provides 75 calories /100 ml and 0.9 gm of protein/100 ml.

Feed the child Starter formula orally, or by NG tube if necessary:

Oral feeding

It is best to feed the child with a cup and spoon. Encourage the child to finish the feed. It takes skill to feed a very weak child, so nursing staff should do this task first and mother may help with feeding later when child becomes stronger. Encourage breastfeeding on demand between starter formula feeds.

Nasogastric feeding

It may be necessary to use a NG tube if child is very weak. Use an NG tube if the child does not take 75% of the feed for 2-3 consecutive feeds.

Remove the NG tube when the child takes:

- 75% of the day's amount orally; or
- Two consecutive feeds fully by mouth.

Record intake and output on a 24-Hour food intake chart.

Criteria for increasing volume/decreasing frequency of feeds

1. If there is vomiting, significant diarrhoea, or poor apetite, continue 2-hrly feeds.
2. If there is little or no vomiting, diarrhoea is less than before, and most feeds are consumed, change to 3-hrly feeds.
3. After a day on 3-hrly feeds: If there is no vomiting, occasional diarrhoea, and most feeds are consumed, change to 4-hrly.

Recommended schedule with gradual increase in feed volume is as follows

Days	Freq	Vol/kg/feed	Vol/kg/day
1-2	2 hourly	11 ml	130 ml
3-5	3 hourly	16 ml	130 ml
6 onwards	4 hourly	22 ml	130 ml

Table 25: Volumes of starter formula per feed (approx 130 ml/kg/day)			
Child's weight (Kg)	**2-hourly (ml/feed)**	**3-hourly (ml/feed)**	**4-hourly (ml/feed)**
2.0	20	30	45
2.2	25	35	50
2.4	25	40	55
2.6	30	45	55
2.8	30	45	60
3.0	35	50	65
3.2	35	55	70
3.4	35	55	75
3.6	40	60	80
3.8	40	60	85
4.0	45	65	90
4.2	45	70	90
4.4	50	70	95
4.6	50	75	100
4.8	55	80	105
5.0	55	80	110
5.2	55	85	115
5.4	60	90	120
5.6	60	90	125
5.8	65	95	130
6.0	65	100	130
6.2	70	100	135
6.4	70	105	140
6.6	75	110	145
6.8	75	110	150
7.0	75	115	155
7.2	80	120	160
7.4	80	120	160
7.6	85	125	165
7.8	85	130	170
8.0	90	130	175
8.2	90	135	180
8.4	90	140	185
8.6	95	140	190
8.8	95	145	195
9.0	100	145	200
9.2	100	150	200
9.4	105	155	205
9.6	105	155	210
9.8	110	160	215
10.0	110	160	220

Table 26: Initial diets recommended in severe malnutrition: Starter formula			
Diets contents (per 100ml)	Starter formula	Starter formula (Cereal based)Ex: 1	Starter formula (Cereal based) Ex: 2
Fresh cow's milk or equivalent (ml)* (Approximate measure of one cup)	30 (1/3)	30 (1/3)	25 (1/4)
Sugar (g) (Approximatemeasure of one level teaspoon)	9 (1 + 1/2)	6 (1)	3 (1/2)
Cereal flour:Powdered puffed rice (g) (Approximate measure of one level teaspoon)	- -	2.5 (3/4)	6 (2)
Vegetable oil (g) (Approximate measure of one level teaspoon)	2 (1/2)	2.5 (1/2+)	3 (3/4)
Water: make up to (ml)	100	100	100
Energy (kcal)	75	75	75
Protein (g)	0.9	1.1	1.2
Lactose (g)	1.2	1.2	1.0

*Can replace fresh milk 30 ml with 3.5 gm whole dried milk

How to prepare the feeds

- Wash hands before measuring ingredients
- Mix sugar and oil, then add the fresh milk. Add boiled, cooled water up to 100 ml, stirring all the time. Whisk vigorously so that oil does not separate out. If using milk powder, mix milk and sugar in a jug, then add oil and stir to make a paste. Add cooled boiled water to the 100 ml mark.
- Milk cereal diets do need cooking. Mix the rice flour, milk or milk powder, sugar, oil in a measuring jug. Slowly add cooled, boiled water up to 100 ml. Transfer to cooking pot and whisk the mixture vigorously. Boil gently for 4 min, stirring continuously. Some water will evaporate, so transfer the mixture to a measuring jug and add enough water to make 100 ml. Cooking can be avoided if you use puffed rice powder or commercial pre-cooked rice preparation as cereal flour. The above charts give the composition for 100 ml diet. Prepared diet may be kept at room temperature for 6 hrs or 24 hrs wherever there is a facility for refrigeration, 1 litre diet could be prepared by multiplying the requirement of each constituent by 10.
- The initial cereal based low lactose (low osmolarity) diet is recommended for those with persistent diarrhoea.

Monitoring

Monitor and record (see Appendix for monitoring charts)

- Amounts of feed offered and left over
- Stool frequency and consistency
- Vomiting
- Daily body weight

Demonstration on filling of 24-hour food intake chart

24-Hour Food Intake Chart

Ward _____

Name _____ Hospital number _____

Age _____ Weight _____ Date of Admission _____

Date ..... Feed: ..... feeds of ..... ml each = ... ml per day						
Time	Type of feed	Volume offered (ml)	Volume left in cup (ml)	Amount taken by child (ml)	Vomit estimate (ml)	Watery diarrhoea (Yes/No)
Totals:				Sub-total		Total taken in 24 hrs

13.4.8 Catch-up growth

Recognize readiness for transition

Signs that a child has reached this phase are:

- Return of appetite (easily finishes 4-hourly feeds of starter formula)
- Most / all of the edema has gone.

Begin giving catch up formula slowly and gradually

Make a gradual transition from starter to catch-up formula.

Catch up formula

Catch up formula is used to rebuild wasted tissues. It contains more calories and protein.

- Replace the starter formula with an equal amount of catch-up formula for 2 days. Give a milk-based formula, such as catch-up formula which contains 100 kcal/100 ml and 2.9 g of protein per 100 ml.
- Then on the 3rd day: Increase each successive feed by 10 ml as long as child is finishing feeds. Continue increasing the amount until some feed remains uneaten. The point when some of the feed remains unconsumed is likely to occur when intakes reach about 200 ml/kg/day.

After a gradual transition, give:

- Frequent feeds, unlimited amounts
- 150–220 kcal/kg/day
- 4–6 g of protein/kg/day.

If the child is breastfed, continue to breastfeed between feeds. However, breast milk does not have sufficient energy and protein to support rapid catch-up growth, so give catch up formula as indicated.

Table 27: Catch-up formulas

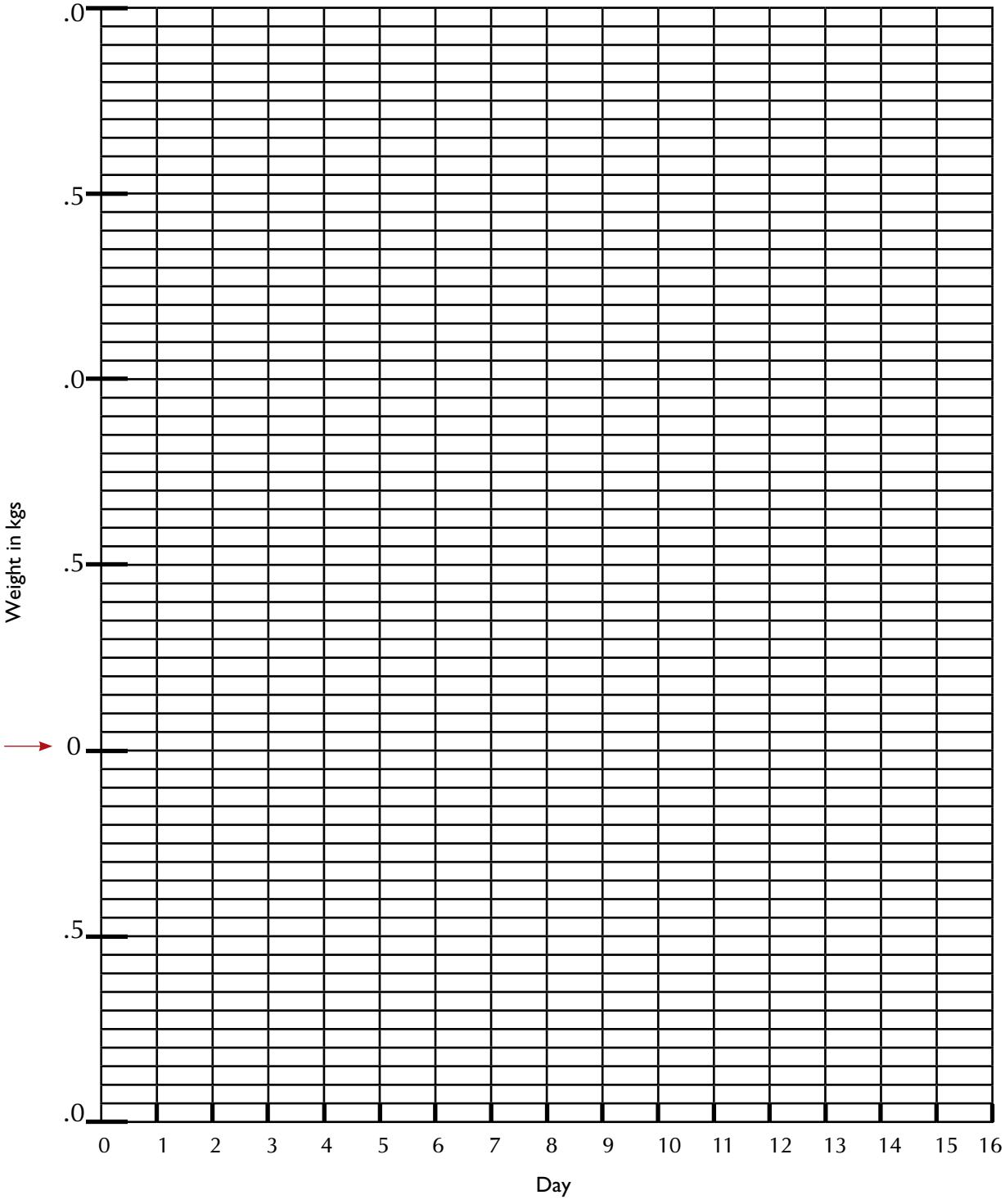
Diets Contents(per 100ml)	Catch-up formula	Catch-up formula (cereal based)Ex: 1
Fresh milk or equivalent (ml) (approximate measure of one katori)	95 (3/4+)	75 (1/2)
Sugar (g) (Approximatemeasure of one level teaspoon)	5 (1)	2.5 (1/2-)
Cereal flour: Puffed rice (g) (Approximatemeasure of one level teaspoon)	- -	7 (2)
Vegetable oil (g) (Approximatemeasure of one level teaspoon)	2 (1/2)	2 (1/2)
Water to make (ml)	100	100
Energy (kcal)	101	100
Protein (g)	2.9	2.9
Lactose (g)	3.8	3

The catch-up cereal based low lactose (lower osmolarity) diets are recommended for those with persistent diarrhoea.

Blank Weight Chart

Name _____ Weight on admission_____

Age _____ Weight on discharge_____



DEMONSTRATION ON FILLING WEIGHT CHART & CALCULATING DAILY WEIGHT GAIN

13.4.9 Sensory stimulation

During rehabilitation provide:

- Tender loving care.
- A cheerful stimulating environment.
- Structured play therapy for 15-30 min a day.
- Physical activity as soon as child is well.
- Maternal involvement as much as possible (eg. comforting, feeding, play).

Failure to respond to treatment

Table 28: Criteria for failure to respond to treatment

Criteria after admission	Time
Primary failure	
• Failure to regain appetite	Day 4
• Failure to start to loose oedema	Day 4
• Oedema still present	Day 10
• Failure to gain at least 5 gm/kg of body weight per day	Day 10
Secondary failure	
• Failure to gain at least 5 gm/kg of body weight per day during rehabilitation for 3 successive days	

If the weight gain is <5 g/kg/day, determine:

- Whether this occurred in all cases being treated (if so, a major review of case management is required).
- Whether this occurred in specific cases (reassess these children as if they were new admissions).

Inadequate feeding

Check

- That night feeds are given.
- That target energy and protein intakes are achieved. Is the actual intake (i.e. what was offered minus what was left over) correctly recorded? Is the quantity of feed recalculated as the child gains weight? Is the child vomiting or ruminating?
- Feeding technique: is the child fed frequent feeds, unlimited amounts?
- Quality of care: are staff motivated/gentle/loving/patient?
- All aspects of feed preparation: scales, measurement of ingredients, mixing, taste, hygienic storage, adequate stirring.
- Whether complementary foods given to the child are energy dense.
- Vitamins and mineral supplements are given appropriately

Look for untreated infection

If feeding is adequate and there is no malabsorption, suspect a hidden infection. The following are easily overlooked: urinary tract infections, otitis media, tuberculosis and giardiasis. In such a case:

- Re-examine carefully.
- Repeat urine microscopy for white blood cells.
- Examine the stool.
- If possible, take a chest X-ray.

Psychological problems

Check for abnormal behaviour such as stereotyped movements (rocking), rumination (i.e. self-stimulation through regurgitation), and attention seeking. Treat by giving the child special love and attention. For the child who ruminates, firmness, with affection, can assist. Encourage the mother to spend time playing with the child.

Monitoring progress during treatment

- If good weight gain i.e. > 10 g/kg/d, continue with the same treatment
- If moderate weight gain i.e. 5-10 g/kg/day, check whether intake targets are being met or if infection has been overlooked
- If poor weight gain i.e. <5g/kg/d, make a full assessment, particularly for:
  - Inadequate feeding
  - Untreated infection
  - HIV infection
  - Psychological problems
- Child is considered to have recovered when he reaches a weight for height -1 z score of median of WHO child growth standards.

13.4.10 Discharge and prepare for follow-up

Table 29: Criteria for discharge from hospital care

	Criteria
Child	• Weight for height reached -1SD of median of WHO standards • Eating adequate amount of nutritious food that mother can prepare at home • Consistent weight gain • All vitamin and mineral deficiencies have been treated • All infections and other conditions have been treated or are being treated like anemia, diarrhoea, malaria, tuberculosis • Full immunization programme started
Mother or caretaker	• Able to take care of the child • Able to prepare appropriate foods and feed the child • Has been trained to give structured play therapy and sensory stimulation • Knows how to give home treatment for common problems and recognizes danger signs warranting immediate medical assistance

Weigh the child daily and plot it on a graph. The target weight for discharge is equivalent to -1SD of the median WHO reference values for weight-for-height. The usual weight gain is about 10-15 gm/kg/day. With high energy feeding most severely malnourished children reach the target weight for discharge after 2-4 weeks.

Before discharge, ensure that the mother or caretaker understands the importance of continued correct feeding for her child and is able to prepare nutritious complementary foods. Appropriate mixed diets are same as those recommended for a healthy child given at least 5 times a day providing 100-120 Kcal/kg/day. Continue breast feeding. Every attempt should be made to manage the child till recovery and to avoid relapse and death after discharge. Follow-up regularly at 1, 2, 4 weeks, then monthly for 6 months and subsequently every 6-months for 2 years.

13.5 Discharge before full recovery

In some cases, parents will insist for early discharge or the hospital does not have resources to look after all the malnourished children till full recovery, a early discharge may be planned.

Table 30: Criteria for early discharge	
	Criteria
Child	• Has a good apetite, eating atleast 120-130 Kcal/kg/day and receiving adequate micronutrients· • Has lost oedema· • Consistent weight gain (at least 5 gm/kg/day for 3 consecutive days)· • Completed antibiotic treatment· • Completed immunization appropriate for age
Mother or caretaker	• Trained on appropriate feeding· • Has financial resources to feed the child· • Motivated to follow the advise given

If child is discharged early, plan for the follow-up until recovery either through special clinic in the OPD or nutrition rehabilitation centre or local health worker who will take responsibility for continuing supervision. Write a detailed discharge note mentioning inpatient treatment given, weight on discharge, treatments to be continued, feeding recommendations (150 Kcal/kg/day and protein 4 gm/kg/day) and the action health worker is expected to take. In general child should be weighed weekly and if there is failure to gain weight over a 2-week period or weight loss between any two measurements, child should be referred back.

EXERCISE- 10

1. Reena, 10 months old female child weighing 4.0 kg is brought with loose stools and vomiting for 2 days. She is irritable, eyes are sunken and skin pinch goes back slowly. The child has no breathing problem or signs of shock. Her length is 68 cm.

a) List the emergency signs.

b) Does she need hospitalization?

c) How would you manage her dehydration?

2. Rekha is 1 year old, weighs 5.0 kg and her length is 66 cm. She has been referred urgently to the hospital for lethargy & inability to drink or feed. She has no breathing problem, her extremities are cold & capillary refill time is 5 seconds. Pulses are fast and weak. She has no diarrhoea, her axillary temperature is 36°C and she has some pallor.

a) List the emergency signs.

b) Write the emergency treatment for this child?

3. Rahul is 11 months old infant. He has been referred for severe malnutrition and Anaemia. He has no cough, diarrhoea or fever. He weighs 4.8 kg and has visible severe wasting and some pallor.

a) List the emergency and priority signs.

b) On assessment Rahul has no obvious signs of infection and blood sugar is 30 mg/dl. Write the treatment plan?

c) The length of the child is 66 cm. Determine the weight-for- length from the Table (*Annexure 11*).

d) When will you start feeding this child?

e) What investigations would you like to do?

f) He is not breastfed and is being given diluted cow's milk with a feeding bottle and dal water. When offered starter formula milk in the ward he took only 2-3 spoonful. The nurse can give 2 hourly feeds. Write the feeding plan for first 48 hours.

g) After 6 days you observe that child is more active and demanding feeds. He has taken the nasogastric tube out. The nurse reports that when offered, he consumed about 90-100 ml. Write your plan of action?

Case Study

Anshu 1 year old boy has been brought to the hospital with cough and difficult breathing for 3 days. He is restless and irritable but able to feed. He has no cyanosis; respiratory rate is 52 per minute with severe lower chest indrawing, no signs of dehydration and has warm extremities. He weighs 7.5 kg, length is 73 cm and has no visible wasting and no odema feet. However, he has some pallor. Mother gives history child has measles 8 days back and passing blood in stools for 2 days.

a) List the emergency signs from the above case description?

b) Write the emergency management plan.

c) What history would you take? What would you like to examine in the child?

On examination you found that child has no eye complications but has 2 superficial mouth ulcers and chest auscultation reveals bilateral crepitations.

d) What is the probable diagnosis in this case?

e) What investigations would you like to perform?

f) Write the treatment for the child?

g) How would you monitor the child in the hospital?

h) What complications might occur?

Drill 1

Calculate weight-for-height (or weight- for- length) Z scores for the following cases. (The participants should refer to Annexure 11 of the Training Module depicting the reference charts)

1. Reena is a 2 year old girl. Her weight is 6.9 Kg and length is 75 cm. What is her weight for height Z score?

2. Rahul is a 4 year old boy. His weight is 13 Kg and height is 95 cm. What is his weight for height Z score?

3. Vikas is a 3 year old boy. His weight is 9.8 Kg and length is 82 cm. What is his weight for height Z score?

4. Soni is a 1 year old girl. Her weight is 5.1 Kg and length is 72 cm. What is her weight for height Z score?

5. Kishan is a 6 month old boy. His weight is 7.3 Kg and length is 67 cm. What is his weight for height Z score?

6. Arvind is a 3 year old boy. His weight is 14 Kg and height is 95 cm. What is his weight for height Z score?

7. Divya is a 8 month old girl. Her weight is 6.7 Kg and length is 68 cm. What is her weight for height Z score?

ANNEXURE: 6

Diagnostic considerations of children presenting with Emergency signs (differential diagnosis)

Table 31: Differential diagnosis of the child presenting with an airway or severe breathing problem	
Diagnosis or underlying cause	**In favour**
Pneumonia	• Cough with fast breathing and fever • Lower chest wall indrawing • Crepitations on auscultation
Asthma	• History of recurrent wheezing • Prolonged expiration • Wheezing or reduced air entry • Response to bronchodilators
Foreign body aspiration	• History of sudden choking • Sudden onset of stridor or respiratory distress • Focal reduced air entry or wheeze
Retropharyngeal abscess	• Slow development over days, getting worse • Inability to swallow • High fever
Croup	• Barking cough • Hoarse voice • Associated with upper respiratory tract infection
Diphtheria	• Bull neck appearance of neck due to enlarged lymph nodes • Red throat • Grey pharyngeal membrane • No DTP vaccination
Congenital heart disease	• Difficulty in feeding • Central cyanosis • Heart murmur • Enlarged liver
Pneumothorax	• Sudden onset • Hyper-resonance on percussion • Shift in mediastinum

Child presenting with shock

Table 32 : Differential diagnosis of the child presenting with shock	
Diagnosis or underlying cause	In favour
Bleeding shock	• History of trauma· Bleeding site
Dengue shock syndrome	• Known dengue outbreak or season • History of high fever· Purpura
Cardiac shock	• History of heart disease • Enlarged neck veins and liver
Septic shock	• History of febrile illness • Very ill child • Known outbreak of meningococcal infection
Shock associated with severe dehydration	• History of profuse diarrhoea • Known cholera outbreak

Table: 33 Differential diagnosis of a child or a young infant with lethargy, unconsciousness of convulsions			
Differential diagnosis of the child presenting with lethargy, unconsciousness or convulsions		**Differential diagnosis of the young infant (less than 2 months) presenting with lethargy, unconsciousness or convulsions**	
Diagnosis or underlying cause	**In favour**	**Diagnosis or underlying cause**	**In favour**
Meningitis	• Very irritable • Stiff neck or bulging fontanelle • Petechial rash (meningococcal	Meningitis	• Apnoeic episodes • Convulsions • High-pitched cry • Tense/bulging fontanelle
Cerebral malaria(Often seasonal)	• Blood smear positive for malaria parasites • Jaundice • Anaemia • Convulsions • Hypoglycaemia	Birth asphyxia Hypoxic ischaemic encephalopathy Birth trauma	• Onset in first 3 days of life • History of difficult delivery
Febrile convulsions	• Prior episodes of short convulsions when febrile • Associated with fever • Age 6 months to 5 years • CSF normal	Sepsis	• Fever or hypothermia • Shock • Seriously ill with no apparent cause
Hypoglycaemia	(Always seek and treat the cause to prevent a recurrence).Confirm by blood sugar levels.		
Head injury	• Signs or history of head trauma	Neonatal tetanus	• Onset (age 3–14 days) • Irritability • Difficulty in breast feeding • Trismus • Muscle spasms • Convulsions
Poisoning	• History of poison ingestion or drug overdose	Haemolytic disease of the newborn, kernicterus	• Onset in first 3 days of life • Jaundice • Pallor
Shock (unlikely to cause convulsions)	Poor perfusionRapid, weak pulse		
Acute glomerulonephritis with encephalopathy	• Raised blood pressure • Peripheral or facial oedema • Blood in urine • Decreased or no urine		
Diabetic ketoacidosis	• High blood sugar • History of polydipsia and polyuria • Acidotic (deep, laboured) breathing		

Table: 34 Differential diagnosis of the child presenting with stridor	
Diagnosis	In favour
Viral croup	• Barking cough • Respiratory distress • Hoarse voice • If due to measles, signs of measles
Retropharyngeal abscess	• Soft tissue swelling • Difficulty in swallowing • Fever
Foreign body	• Sudden history of choking • Respiratory distress
Diphtheria	• Bull neck appearance due to enlarged cervical nodes and oedema • Red throat • Grey pharyngeal membrane • Blood-stained nasal discharge • No history of DTP vaccination
Congenital anomaly	• Stridor present since birth

Table:35 Differential diagnosis of the child presenting with chronic cough	
Diagnosis	**In favour**
Tuberculosis	• Weight loss or failure to thrive • Anorexia, night sweats • Enlarged liver and spleen • Chronic or intermittent fever • History of exposure to infectious tuberculosis • Signs of fluid in chest (dull to percussion/reduced breath sounds) • Positive tuberculin test • Suggestive X-ray chest
Asthma	• History of recurrent wheeze, cough • Hyperinflation of the chest • Prolonged expiration • Reduced air entry (in very severe airway obstruction) • Good response to bronchodilators
Foreign body	• Sudden onset of choking or stridor • Unilateral chest signs (e.g. wheezing or hyperinflation) • Recurrent lobar consolidation • Poor response to medical treatment
Pertussis	• Paroxysms of cough followed by whoop, vomiting, cyanosis or apnoea • Subconjunctival haemorrhages • No history of DPT immunization • Afebrile
HIV	• Known or suspected maternal or sibling HIV infection • History of blood transfusion • Failure to thrive or weight loss • Oral thrush • Chronic parotitis • Skin infection with herpes zoster (past or present) • Generalized lymphadenopathy • Chronic fever • Persistent diarrhoea • Finger clubbing
Bronchiectasis	• History of tuberculosis or aspirated foreign body • Poor weight gain • Purulent sputum, bad breath • Finger clubbing • Localized signs on X-ray
Lung abscess	• Reduced breath sounds over abscess • Poor weight gain / chronically ill child • Cystic or cavitating lesion on chest X-ray

Diarrhoea Treatment Plan B: Treat Some Dehydration with ORS

GIVE RECOMMENDED AMOUNT OF ORS IN CLINIC OVER 4-HOUR PERIOD

- Determine amount of ORS to give during first 4 hours.

Age*	Up to 4 months	4 months up to 12 months	12 months up to 2 years	2 years up to5 years
Weightin ml	< 6 kg 200-400	6 - < 10 kg 400-700	10 - < 12 kg 700-900	12 – 19 kg 900-1400

* Use the child's age only when do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the child's weight (in Kg) by 75.

- If the child wants more ORS than shown, give more.
- **Show the mother how to give ORS solution:**
  - Give frequent small sips from a cup.
  - If the child vomits, wait 10 minutes. Then continue, but more slowly.
  - Continue breastfeeding but stop other feeding.
- **After 4 hours:**
  - Reassess the child and classify the child for dehydration.
  - Select the appropriate plan to continue treatment.
  - Begin feeding the child in clinic.
- **If the mother must leave before completing treatment:**
  - Show her how to prepare ORS solution at home.
  - Show her how much ORS to give to finish 4-hour treatment
  - Give her enough ORS packets to complete rehydration. Also give 2 packets as recommended in Plan A.
  - Explain the 4 Rules of Home Treatment:

1. Give extra fluid
2. Give zinc supplements
3. Continue feeding
4. When to return

} Plan A

Diarrhoea Treatment Plan A: Treat Diarrhoea at Home

COUNSEL THE MOTHER ON THE 4 RULES OF HOME TREATMENT

1. GIVE EXTRA FLUID (AS MUCH AS THE CHILD WILL TAKE)

- Tell the mother:

If the child is exclusively breastfed: Breastfeed frequently and for longer at each feed. If passing frequent watery stools:

- For less than 6 months age give ORS and clean water in addition to breast milk
- If 6 months or older give one or more of the home fluids in addition to breast milk.

If the child is not exclusively breastfed: Give one or more of the following home fluids; ORS solution, yoghurt drink, milk, lemon drink, rice or pulses based drink, vegetable soup, green coconut water or plain clean water.
It is especially important to give ORS at home when:

- The child has been treated with Plan B or Plan C during this visit
- The child cannot return to a clinic if diarrhoea worsens.
  - Teach the mother how to mix and give ors. Give the mother 2 packets of ors to use at home.
  - Show the mother how much fluid to give in addition to the usual fluid intake:

Up to 2 years	-	50 to 100 ml after each loose stool
2 years or more	-	100 to 200 ml after each loose stool

Tell the mother to:

- Give frequent small sips from a cup.
- If the child vomits, wait 10 minutes. Then continue, but more slowly.
- Continue giving extra fluid until the diarrhoea stops.

2. GIVE ZINC SUPPLEMENTS

- Tell the mother how much zinc to give :

2 months Up to 6 months	10 mg per day for 14 days
6 months and more	20 mg per day for 14 days

  - Show the mother how to give the zinc supplements
  - Remind the mother to give the zinc supplement for the full 10-14 days.

3. CONTINUE FEEDING

4. WHEN TO RETURN: Advise mothers to return immediately if:

- Not able to drink or breastfeed
- Becomes sicker
- Develops a fever
- Blood in stools
- Drinking poorly

Management of dysentery

- Young infants (<2 months):
  - Admit and rule out surgical causes (for example, intussusceptions) - and refer to a surgeon, if appropriate.
  - Give the young infant IM/IV ceftriaxone (100 mg/kg) once daily for 5 days.
- Child: Give oral antibiotics for 3 days. In admitted children IM/IV Ceftriaxone (100 mg/kg) once daily for 5 days may be used.

CHILD WITH LOOSE STOOL WITH BLOOD		
↓		
Severely Malnourished?	→ Yes →	Refer To Hospital
↓ NO ↓		
Give Antimicrobial For Shigella		
↓		
Better In 2 Days	→ Yes →	Complete 3 Days Treatment
↓ NO ↓		
Initially Dehydrated, Age < 1 Year Or Measles in Past 6 Weeks	→ Yes →	Refer To Hospital
↓ NO ↓		
Change To Second Antimicrobial For Shigella		
↓		
Better In 2 Days	→ Yes →	Complete 5 Days Treatment
↓ NO ↓		
Refer To Hospital Or Treat For Amoebiasis		

Antimicrobials that are effective for treatment of Shigellosis	Antimicrobials that are ineffective for treatment of Shigellosis
Ciprofloxacxin 15mg/Kg/2 times per day for 3 days Ceftriaxone (100 mg/kg) IM/IV once daily for 5 days	- Metronidazole -Streptomycin - Tetracyclines - Chloramphenicol - Sulfonamides - Amoxycillin - Nitrofurans (e.g. nitrofurantoin, furazolidone) - Aminoglycosides (e.g. gentamicin, kanamycin) - First and second generation cephalosporins (e.g. cephalexin, cefamandole).

DIETS FOR PERSISTENT DIARRHOEA

The Initial Diet A: [Reduced lactose diet; milk rice gruel, milk sooji gruel, rice with curd, dalia]

Ingredients	Measure	Approximate quantity
Milk	1/3 cup	40 ml
Sugar	½ level tsp	2 g
Oil	½ level tsp	2 g
Puffed rice powder*	4 level tsp	12.5 g
Water		To make 100 ml

* Can be substituted by cooked rice or sooji

Preparation

- Mix milk, sugar, rice together
- Add boiled water & mix well
- Add oil

The feed can now be given to the child

The second Diet B: [Lactose-free diet with reduced starch]
About 50-70% of children improve on the initial Diet A. Remaining children, if free of systemic infection are changed to Diet B which is milk (lactose) free and provides carbohydrates as a mixture of cereals and glucose. Milk protein is replaced by chicken, egg or protein hydrolysate.

Ingredients	Measure	Approximate quantity
Egg white	3 level tsp	15 g
Glucose	3/4 level tsp	3 g
Oil	1 level tsp	4 g
Puffed rice powder*	2 level tsp	7 g
Water	¾ cup	To make 100 ml

* Can be substituted with cooked rice

Preparation

Whip the egg white well. Add puffed rice powder, glucose, oil and mix well. Add boiled water and mix rapidly to avoid clumping.

The Third Diet C: [Monosaccharide based diet]

Overall 80-85% patients with severe persistent diarrhoea will recover with sustained weight gain on the initial Diet A or the second Diet B. A small percentage may not tolerate a moderate intake of the cereal in Diet B. These children are given the third diet (Diet C) which contains only glucose and a protein source as egg or chicken. Energy density is increased by adding oil to the diet.

Ingredients	Measure	Approximate quantity
Chicken or Egg white	2 ½ level tsp5 level tsp	12 g25 g
Glucose	¾level tsp	3 g
Oil	1 level tsp	4 g
Water	½ - ¾ cup	To make 100 ml

Preparation

Boil chicken, remove the bones and make chicken puree. Mix chicken puree with glucose and oil. Add boiled water to make a smooth paste.

Or

Whip the egg white well. Add glucose, oil and mix well. Add boiled water and mix rapidly to avoid clumping.

Counsel the Mother Feeding: Recommendations during Sickness and Health			
Up to 6 months of age • Breastfeed as often as the child wants, day & night, at least 8 times in 24 hrs. • Do not give any other food or fluids not even water. <u>Remember :</u> • Continue • breastfeeding if the child is sick	**6 months up to 12 months** • Breastfeed as often as the child wants • Give at least 1 katori serving* at a time of: - Mashed roti/bread mixed in thick dal with added ghee/oil or khichdi with added oil/ghee. Add cooked vegetables also in the servings or - Sevian/dalia/ halwa/kheer prepared in milk or - Mashed boiled/fried potatoes - Offer banana/biscuit/ cheeko/mango/ papaya * 3 times per day if breastfed, 5 times per day if not breastfed. <u>Remember</u> • Keep the child in your lap & feed with your own hands • Wash your own & child's hand with soap & water every time before feeding	**12 months up to 2 years** • Breastfeed as often as the child wants • Offer food from the family pot • Give at least 11/2 katori serving* at a time of - Mashed roti/bread mixed in thick dal with added ghee/oil or khichdi with added oil/ghee. Add cooked vegetables also in the servings or - Mashed roti/rice/bread mixed in sweetened milk or - Sevian/dalia/ halwa/kheer prepared in milk or - Offer banana/biscuit/ cheeko/mango/ papaya * 5 times per day <u>Remember</u> • Sit by the side of child & help him to finish the serving • Wash your own & child's hand with soap & water every time before feeding	**2 years & older** • Give family foods at 3 meals each day • Also, twice daily, give nutritious food between meals, such as : - Banana/biscuit/ cheeko/ mango/ papaya as snacks <u>Remember :</u> • Ensure that the child finishes the serving • Teach your child wash his hands with soap and water every time before feeding

ANNEXURE-7

Drug dosages / regimens

DRUG	DOSE	ROUTE
Aminophylline	For asthma Loading dose: 5-6 mg/kg (max. 300 mg) slowly over 20-60 minutes Maintenance dose: 5 mg/kg up to every 6 hours OR By continuous infusion 0.9 mg/kg/hour	IV IV
Amoxicillin	15 mg/kg three times per day For Pneumonia 25 mg/kg two times a day	Oral
Ampicillin	25 mg/kg four times a day 50 mg/kg every 6 hours	Oral IM/IV
Cefotaxime	50 mg/kg every 6 hours	IM/IV
Ceftriaxone	80 mg/kg/day as a single dose given over 30 min For meningitis 50 mg/kg ever 12 hours (max single dose 4 g) OR 100 mg/kg once daily	IM/IV IM/IV IM/IV

Chloramphenicol	Calculate EXACT dose based on body weight. Only use these doses if this is not possible. For meningitis 25 mg/kg every 6 hours (maximum 1g per dose) For other conditions 25 mg/kg every 8 hours (maximum 1 g per dose)	IV IM Oral
Chlorphenamine	0.25 mg/kg once (can be repeated up to 4 times in 24 hours	IM/IV or SC
Ciprofloxacin	10-15 mg/kg per dose given twice per day (max 500 mg per dose)	Oral
Cloxacillin	25-50 mg/kg every 6 hours	IV
Cotrimoxazole(trimethoprim-sulfamethoxazole, TMP-SMX)	4 mg trimethoprim/kg and 20 mg sulfa-methoxazole/kg two times per day	Oral
Dexamethasone	For severe viral croup 0.6mg/kg single dose	Oral
Diazepam	For convulsions 0.5 mg/kg 0.2-0.3 mg/kg	Rectal: IV
Epinephrine(adrenaline)	For wheeze 0.01 ml/kg (up to a maximum of 0.3 ml) of 1:1000 solution (or ml/kg of 1:10000 solution) For severe viral Croup A trial of 0.3 ml/kg of 1:1000 nebulized solution	SC
Furosemide (frusemide)	For cardiac failure 1-2 mg/kg every 12 hours	Oral or IV
Gentamicin	7.5 mg/kg once per day	IM/IV
Nalidixic acid	15 mg/kg 4 times a day	Oral
Paracetamol	10-15 mg/kg, up to 4 times a day	Oral

Benzylpenicillin(penicillin G)	General dosage 50000 units/kg every 6 hours For meningitis 100000 units /kg every 6 hours	IM/IV
Phenobarbital	Loading dose 15 mg/kg Maintenance dose 2.5-5 mg/kg	Oral/IM/IV
Potassium	2-4 meq/kg/dose/kg/day	Oral
Prednisolone	1 mg/kg twice a day	Oral
Salbutamol	1 mg per dose <1 year 2mg per dose 1-4 years Acute episode 6-8 hourly Inhaler with spacer: 2 doses contains 200 µg Nebulizer: 2.5 mg/dsoe	Oral

ANTI-TUBERCULOSIS ANTIBIOTICS			
Calculate exact dose based on body weight			
Essential anti-TB drug (abbreviation)	Mode of action	Daily dose mg/kg (range)	Intermittent dose: 3 times/week mg/kg (range)
Ethambutol (E)	Bacteriostatic	20 (15–25)	30 (25–35)
Rifampicin (R)	Bactericidal	10 (8–12)	10 (8–12)
Isoniazid (H)	Bactericidal	5 (4–6)	10 (8–12)
Pyrazinamide (Z)	Bactericidal	25 (20–30)	35 (30–40)
Streptomycin (S)	Bactericidal	15 (12–18)	15 (30–40)
Thioacetazone (T)	Bacteriostatic	3	Not applicable

Note: Avoid thioacetazone in a child who is known to be HIV-infected or when the likelihood of HIV infection is high, because severe (sometimes fatal) skin reactions can occur.

Management of Pediatric Tuberculosis under the Revised National Tuberculosis Control Program (RNTCP)

1. Diagnosis

Suspect cases of Pul. TB: Children presenting with fever and / or cough for more than 2 weeks, with or without weight loss or no weight gain; and history with a suspected or diagnosed case of active TB disease within the last 2 years.

Diagnosis to be based on a combination of:

- Clinical presentation
- Sputum examination wherever possible
- Chest X-ray (PA view)
- Mantoux test (Positive if induration >10 mm after 48-72 hours) and
- History of contact.

2. Treatment of Pediatric TB

DOTS is the recommended strategy for treatment of TB and all Pediatric TB patients should be registered under RNTCP.

Category of treatment	Type of patients	Intensive Phase	Continuation Phase
Category I	• New sputum smear positive Pul. TB • Seriously ill* sputum smear negative Pul TB • Seriously ill Extra-pul. TB	2 H3 R3 Z3 E3***	4H3R3
Category II	• Sputum smear positive relapse • Sputum smear positive treatment failure	2 S3 H3 R3 Z3 E3 / 1H3R3Z3E3	5H3R3 E3 4H3R3
Category III	• Sputum smear negative and • Extra pul. TB, not seriously ill**	2 H3 R3 Z3	4H3R3

* Seriously ill sputum smear negative Pul. TB includes all forms of Pul. TB other than primary complex, seriously ill Extra Pul. TB includes TBM, disseminated TB/military TB, TB pericarditis, TB peritonitis and intestinal TB, bilateral or extensive pleurisy, spinal TB with or without neurological complications, genitourinary tract TB, bone and joint TB.
** Not-seriously ill Extra Pul. TB includes lymph node TB and unilateral pleural effusion.
*** Prefix indicates month and subscript indicates thrice weekly.

- In patients with TBM on category I treatment, the 4 drugs used during intensive phase should be HRZS or HRZE. Continuation phase in TBM or spinal TB with neurological complications should be given for 6-7 months, extending the total duration of treatment to 8-9 months.
- Steroids should be used initially in cases of TBM and TB pericarditis and reduced gradually over 6-8 weeks.
- Before starting category II treatment, patient should be examined by a pediatrician or a TB expert. Ethambutol is to be used for all age groups.

Chemoprophylaxis

Asymptomatic children under 6 years of age, exposed to an adult with infectious (smear positive) tuberculosis, from the same household, will be given 6 months of isoniazid (5 mg/kg daily) chemoprophylaxis.

NATIONAL DRUG POLICY ON MALARIA (2008)

1. All clinical suspected cases should preferably be investigated for malaria by Microscopy or Rapid Diagnostic Kit (RDK).

2. The first line of treatment is chloroquine and the ACT (Artesunate+Sulpha Pyrimethamine) combination is recommended for the treatment of Pf cases in qualified areas like chloroquine resistant areas, cluster of Blocks and identified districts on the basis of epidemiological situation.

3. Pf cases should be treated with chloroquine in therapeutic dose of 25 mg/kg body weight divided over three days. This practice is to be followed at all levels including VHWs like FTDs/ASHA as well in chloroquine sensitive areas. In high risk area in addition to chloroquine, single dose of Primaquine 0.75 mg/kg bw should be given on first day.

4. Microscopically positive Pv cases should be treated with chloroquine in full therapeutic dose of 25 mg/kg body weight divided over three days. This practice is to be followed at all levels including VHWs like FTDs/ASHA etc. Primaquine should be given in dose of 0.25mg/kg bw daily for 14 days as per prescribed guidelines only to prevent relapse except in contraindicated patients which include G6PD patients, infants and pregnant women.

5. Wherever microscopy results are not available within 24 hours or the patient is at high risk of Pf both RDT and slide should be taken. Cases positive for Pf by RDK should be treated with full therapeutic dose of chloroquine or ACT combination as per prescribed drug in that area. However negative cases showing sign and symptom of malaria without any other obvious causes should be considered as .clinical malaria. and treated with chloroquine in full therapeutic dose of 25 mg/kg body weight over three days. Such cases if later found positive may be treated accordingly

6. ACT is the first line of antimalarials drug for treatment of P.falciparum in chloroquine resistant areas, identified cluster of Blocks surrounding resistant foci, all seven NE states and 50 high Pf endemic districts in the state of Andhra Pradesh, Chhattisgarh, Jharkhand, Madhya Pradesh and Orissa. The dose is 4mg/kg bw of artesunate daily for 3 days + 25mg/ kg bw of sulphadoxine/sulphalene + 1.25 mg per kg bw of pyrimethamine on the first day. ACT should be given only to confirmed P. falciparum cases found positive by microscopy or Rapid Diagnostic kits. Compliance and full intake is to be ensured. Single dose of Primaquine i.e 0.75 mg/kg body weight, may be given with ACT combination as it will be beneficial for gametocyte clearance in P.falcipaum and will facilitate effective interruption of transmission.

7. ACT tablets are not to be used in pregnant women.

8. Artesunate tablets should not be administered as mono therapy. It should invariably be combined with sulpha pyrimethamine tablets in prescribed dosages.

9. The area/PHC showing a treatment failure more than 10% (both Early and Late Treatment Failures) to the chloroquine drug in the minimum sample of 30 cases, should be switched over to the alternate antimalarial drug e.g. Artesunate-Sulpha-Pyrimethamine (ACT) combination.

10. Change of drug to second line of treatment may also be implemented in a cluster of Blocks around the resistant foci after taking into consideration the epidemiological trend of P.falciparum and approval of Directorate of NVBDCP.

11. Resistance should also be suspected if in spite of full treatment with no history of vomiting, diarrhea, patient does not respond within 72 hours parasitologically. Such individual patients should be reported to concerned District Malaria /State Malaria Officer/ROHFW Pf monitoring teams for monitoring of drug sensitivity status.

12. In cases resistant to chloroquine and SP-ACT, oral quinine with tetracycline or doxycline can be prescribed.

13. Mefloquine should only be given to chloroquine/multi resistant uncomplicated P.falciparum cases only in standard doses as prescribed by WHO against the prescription of medical practitioners supported by laboratory report showing asexual stage of P.falciparum parasite and not gametocyte alone and other species.

14. Primaquine is contra indicated in pregnant woman and infants.

15. Chemoprophylaxis should be administered only in selective groups in high P.falciparum endemic areas. Use of personal protection measures including insecticide treated bed nets should be encouraged for pregnant women and other vulnerable population including travellers for longer stay. However for longer stay in high Pf endemic districts by the Military & Para-military forces, the practice of chemoprophylaxis should be followed wherever appropriate e.g. troops on night patrol duty etc and decisions of their Medical Administrative Authority should be followed. For short term chemoprophylaxis (less than 6 weeks), daily doxycycline is the drug of choice (if not contraindicated). However, it is not recommended for pregnant women and children less than 8 years. Mefloquine is the drug of choice for chemoprophylaxis involving longer stay. It is contraindicated in cases with history of convulsions, neuropsychiatric problems and cardiac diseases. Hence, necessary precautions should be taken and all individuals should undergo screening before prescription of the drug.

16. In severe and complicated P.falciparum malaria cases intra-venous Quinine/ parenteral Artemisinine derivatives are to be given irrespective of chloroquine resistance status. This treatment may continue till such time oral Quinine/ Artemesinine derivatives become available.

17. Migratory labour/project population: Since these groups belong to high risk category they need to be screened on weekly basis and treated accordingly.

18. All the medical, paramedical and village level health volunteers should be adequately trained

DRUG SCHEDULE FOR TREATMENT OF MALARIA UNDER NVBDCP.

1. Chloroquine

Chloroquine base	Day 1	10mg/kg	(600 mg adult)
Chloroquine base	Day 2	10mg/kg	(600 mg adult)
Chloroquine base	Day 3	5mg/kg	(300 mg adult)

Dosage as per age groups

Age in years	Day 1	Day 2	Day -3
	Tab. chloroquine	Tab. Chloroquine	Tab. Chloroquine
<1	½	½	¼
1-4	1	1	½
5-8	2	2	1
9-14	3	3	1½
15 & above	4	4	2

2. Primaquine

PRIMAQUINE IS CONTRAINDICATED IN INFANTS AND PREGNANT WOMEN

Dosage as per age groups

(a) P. falciparum

Age in years	Primaquine On Day 1		
	mg base	No. of Tablets(2.5 mg base)	No. of Tablets (7.5 mg base)
<1	Nil		0
1-4	7.5	3	1
5-8	15	6	2
9-14	30	12	4
15 & above	45	18	6

(b) P. vivax

Age in year	Primaquine Daily dose for 14 days*		
	mg base	No. of Tablets(2.5 mg base)	No. of Tablets(7.5 mg base)
< 1	Nil	Nil	Nil
1-4	2.5	1	
5-8	5.0	2	
9-14	10.0	4	1
15 & Above	15.0	6	2

*Primaquine for 14 days should be given as per prescribed guidelines only

3. Artesunate + Sulpha - pyrimethamine (ACT) combination

Age wise Dose Schedule for AS+SP				
Age		1st Day(number of tabs)*	2nd Day(number of tabs)	3rd Day(numbers of tabs)
<1 Year	AS	½	½	½
	SP	¼	Nil	Nil
1-4 Yeas	AS	1	1	1
	SP	1	Nil	Nil
5-8 Year	AS	2	2	2
	SP	1½	Nil	Nil
9-14 Year	AS	3	3	3
	SP	2	Nil	Nil
15 and above	AS	4	4	4
	SP	3	Nil	Nil

Strength of each Artesunate tablet: contains 50 mg & each Sulpha Pyrimethamine (SP) tablet contain 500mg sulphadoxine/sulphalene and 25mg pyrimethamine

*Artemisinin group of drugs is not recommended in pregnancy

4. Severe and complicated malaria cases

Severe malaria is an emergency and treatment should be given as per severity and associated complications which can be best decided by the treating physicians. Parenteral artemisinin derivatives (for non pregnant women) or quinine should be used irrespective of chloroquine resistance status of the area. However, the guidelines for specific antimalarials therapy as per the WHO recommendation are given below:

- Quinine salt 20 mg/kg* body weight (bw) on admission (IV infusion or divided IM injection) followed by maintenance dose of 10 mg/kg bw 8 hourly; infusion rate should not exceed 5 mg salt / kg bw per hour.
  (*loading dose of Quinine salt i.e 20mg /kg bw on admission may not be given if the patient has already received quinine or if the clinician feels inappropriate).
- Artesunate: 2.4 mg/kg bw i.v. or i.m. Given on admission (time=0), then at 12 h and 24 h, then once a day.
- Artemether: 3.2 mg/kg bw i.m. Given on admission then 1.6 mg/kg bw per day.

Note:

A. The parenteral treatment should be given for minimum of 48 hours and once the patient tolerates oral therapy, quinine 10 mg/kg bw three times a day with doxycycline 100 mg once a day or clindamycin in pregnant women and children under 8 years of age, should be given to complete 7 days of treatment in patients treated with parenteral quinine.

B. Full course of ACT should be administered to patients treated with artemisinin derivatives.

C. Use of mefloquine alone or in combination with artesunate should be avoided especially in cerebral malaria due to neuropsychiatric complications associated with it.

5. Chemoprophylaxis

Chemoprophylaxis should be administered only in selective groups in high P.falciparum endemic areas.

- For short term chemoprophylaxis (less than 6 weeks)
  Doxycycline: daily in the dose of 100 mg in adults and 1.5 mg/kg for children (if not contraindicated).
  The drug should be started 2 days before travel and continued for 4 weeks after leaving the malarious area.

Note: It is not recommended for pregnant women and children less than 8 years.

- For longer stay

Mefloquine: 250 mg weekly and should be administered two weeks before, during and four weeks after exposure.

Note: Mefloquine is contraindicated in cases with history of convulsions, neuropsychiatric problems and cardiac conditions. Hence, necessary precautions should be taken and all should undergo screening before prescription of the drug.

Intravenous fluids

The following table gives the composition of intravenous fluids that are commercially available and commonly used in neonates, infants and children. Please note that none of the fluids contains sufficient calories for the long-term nutritional support of children, but that some fluids contain less than others. Wherever feeding and fluids by mouth or nasogastric tube are possible, this is preferable.

Composition							
	Na+	**K+**	**Cl-**	**Ca++**	**Lactate**	**Glucose**	**Calories**
IV fluid	**mmol/l**	**mmol/l**	**mmol/l**	**mmol/l**	**mmol/l**	**G/l**	**/l**
Ringer's lactate (Hartmann's)	130	4.0	112	1.8	27	-	-
Normal saline (0.9% NaCl)	154	-	154	-	-	-	-
5% Glucose	-	-	-	-		50	200
10% Glucose	-	-	-	-	-	100	400
0.45 NaCl / 5% glucose	77	-	77	-	-	50	200
Pediatric maintenance	26	19	22	-	-	50	200

Fluid Management

The total daily fluid requirement of a child is calculated with the following formula: 100 ml/kg for the first 10 kg, then 50 ml/kg for the next 10 kg, thereafter 25 ml/kg for each subsequent kg. For example, an 8 kg baby receives 8 x 100 ml = 800 ml per day, a 15 kg child (10 x 100) + (5 x 50) = 1250 ml per day.

Maintenance fluid requirements	
Body weight of child	**Fluid (ml/day)**
2 kg	200 ml/day
4 kg	400 ml/day
6 kg	600 ml/day
8 kg	800 ml/day
10 kg	1000 ml/day
12 kg	1100 ml/day
14 kg	1200 ml/day
16 kg	1300 ml/day
18 kg	1400 ml/day
20 kg	1500 ml/day
22 kg	1550 ml/day
24 kg	1600 ml/day
26 kg	1650 ml/day

Give the sick child more than the above amounts if there is fever (increase by 10% for every 1° C of fever).

ANNEXURE: 8

PROCEEDURES &SKILLS:

1. Safe injection practices

- Wash your hands thoroughly. Wear gloves if possible.
- Use disposable needles and syringes. Or else, sterilize reusable needles and syringes.
- Clean the chosen site with a spirit/alcohol swab in a circular fashion from the centre to the periphery. Wait for 30 seconds to allow the spirit to dry.
- Carefully check the dose of the drug to be given and draw the correct amount into the syringe.
- Expel the air from the syringe before injecting.
- Always record the name and amount of the drug given.
- Discard disposable syringes in a safe container.

Intramuscular

In >2-year-old children, give the injection in the outer thigh or in the upper, outer quadrant of the buttock, well away from the sciatic nerve. In younger or severely malnourished children, use the outer side of the thigh midway between the hip and the knee, or over the deltoid muscle in the upper arm. Push the needle (23–25 gauge) into the muscle at a 90°angle (45°angle in the thigh). Draw back the plunger to make sure there is no blood (if there is, withdraw slightly and try again). Give the drug by pushing the plunger slowly till the end. Remove the needle and press firmly over the injection site with a small swab or cotton wool.

Subcutaneous

Select the site, as described above for intramuscular injection. Push the needle (23–25 gauge) under the skin at a 45°angle into the subcutaneous fatty tissue. Do not go deep to enter the underlying muscle. Draw back the plunger to make sure there is no blood (if there is, withdraw slightly and try again). Give the drug by pushing the plunger slowly till the end. Remove the needle and press firmly over the injection site with cotton wool.

Intradermal

For an intradermal injection, select an undamaged and uninfected area of skin (e.g. over the deltoid in the upper arm). Stretch the skin between the thumb and forefinger of one hand; with the other, slowly insert the needle (25 gauge), bevel upwards, for about 2 mm just under and almost parallel to the surface of the skin. Considerable resistance is felt when injecting intradermally. A raised, blanched bleb showing the surface of the hair follicles is a sign that the injection has been given correctly.

2. Procedures for giving parenteral fluids

Insertion of an indwelling IV cannula in a peripheral vein

Select a suitable vein to place the cannula or gauge 21 or 23 butterfly needle.

Peripheral Vein

- Identify an accessible peripheral vein. In young children aged >2 months, this is usually the cephalic vein in the antecubital fossa or the fourth interdigital vein on the dorsum of the hand.
- An assistant should keep the position of the limb steady and should act as a tourniquet by obstructing the venous return with his fingers lightly closed around the limb.
- Clean the surrounding skin with an antiseptic solution (such as spirit, iodine, isopropyl alcohol, or 70% alcohol solution), then introduce the cannula into the vein and insert most of its length. Fix the catheter securely with tape. Apply a splint with the limb in an appropriate position (e.g. elbow extended, wrist slightly flexed).

Scalp Veins

These are often used in children aged <2 years but work best in young infants.

- Find a suitable scalp vein (usually in the midline of the forehead, the temporal area, or above or behind the ear).
- Shave the area if necessary and clean the skin with an antiseptic solution. The assistant should occlude the vein proximal to the site of puncture. Fill a syringe with normal saline and flush the butterfly set. Disconnect the syringe and leave the end of the tubing open. Introduce the butterfly needle as described above. Blood flowing back slowly through the tubing indicates that the needle is in the vein.
- Care should be taken not to cannulate an artery, which is recognized by palpation. If there should be a pulsatile spurting of blood, withdraw the needle and apply pressure until the bleeding stops; then look for a vein.

Care of the Cannula

Secure the cannula when introduced. This may require the splinting of neighbouring joints to limit the movement of the catheter. Keep the overlying skin clean and dry. Fill the cannula with heparin solution or normal saline immediately after the initial insertion and after each injection.

Common Complications

Superficial infection of the skin at the cannula site is the commonest complication. The infection may lead to a thrombophlebitis which will occlude the vein and result in fever. The surrounding skin is red and tender. Remove the cannula to reduce the risk of further spread of the infection. Apply a warm moist compress to the site for 30 minutes every 6 hours. If fever persists for more than 24 hours, antibiotic treatment (effective against staphylococci) should be given, e.g. cloxacillin.

IV drug administration through an indwelling cannula

Attach the syringe containing the IV drug to the injection port of the cannula and introduce the drug. Once all the drug has been given, inject 0.5 ml heparin solution (10–100 units/ml) or normal saline into the cannula until all the blood has been expelled and the catheter is filled with the solution.

If infusion through a peripheral vein or scalp vein is not possible, and it is essential to give IV fluids to keep the child alive:

- set up an intraosseous infusion
- or use a central vein
- or perform a venous cut down.

3. Intraosseous access:

- Participants can practice on chicken thigh bone or any other animal bone
- Gather necessary supplies.
- Wash hands and put on clean examination gloves.
- Can use sterile intraosseous needle, bone marrow needle, or 2-gauge needle.
- Identify the insertion site (proximal end of tibia or distal end of femur):
  - The site at the proximal end of the tibia is 1 cm below and 1 cm medial to the tibial tuberosity;
  - The site at the distal end of the femur is 2 cm above the lateral condyle
- Prepare the skin over the insertion site using a swab or cotton- wool ball soaked in antiseptic solution, and allow to dry.
- Hold the needle (with the attached syringe if using a hypodermic needle) in the other hand at a 90-degree angle to the selected insertion site, angled slightly towards the foot.
- Advance the needle using a firm, twisting motion and moderate, controlled force. Stop immediately when there is a sudden decrease in resistance to the needle, which indicates that the needle has entered the marrow cavity.
- Once the needle is properly positioned, remove the stylet (if a bone marrow or intraosseous needle was used) and attach the syringe.
- Aspirate using the syringe to confirm that the needle is correctly positioned. The aspirate should look like blood (if in a live baby)
- Secure the needle in place using tape, and splint the leg as for a fractured femur ensuring that the elastic bandage does not interfere with the needle or infusion set.
- Inspect the infusion site every hour.
- Remove the intraosseous needle as soon as alternative IV access is available, and within eight hours, if possible.

4. Measuring length /Height

INFANTOMETER

- Measure length while supine, if length < 85 cm or in children too weak to stand (subtract 0.5 cm if > 85cm).
- Use a measuring board with a headboard and sliding foot piece.
- Measurement will be most accurate if child is naked, if not possible ensure clothes do not get in the way of measurement.
- Work with a partner. One person should stand behind the headboard.
- Position the crown of the head against the headboard, compressing the hair.
- Hold the head with two hands and tilt upwards until the eyes look straight upwards.
- Check that the child lies straight along the centre of the board.
- The other person straightens the knees.
- Place the foot piece firmly against the feet, with toes pointing up.
- Measure length to the last 0.1 cm.

STADIOMETER

- Remove the child's socks & shoes.
- Work with a partner.
- Help the child stand with back of the head, shoulder blades, buttocks, calves and heels touching the vertical board.
- Hold the child's knees and ankles to keep the legs straight and feet flat.
- Position the head so that the child is looking straight ahead.
- Place the headboard firmly on top of the head and compress the hair.
- Measure the height to the last completed 0.1 cm.

5. Use of Nebuliser

- Bronchodilators can be effectively given by nebulisation using an electric air compressor.
- Continuous flow oxygen at 6 to 8 litres per minute can also be used in place of compressor .
- Attach aerosol mask to the top of nebuliser.
- Put the drug and 2-4 ml of normal saline in the nebuliser compartment.
- Treat the child until all the liquid in the nebuliser has been almost used up, which usually occurs in 5-10 minutes.
- Tubing and nebuliser chamber should be washed with detergent and dried prior to reuse.

6. Use of MDI with spacers:
USE OF A SPACER

- Spacer is a way of effectively delivering bronchodilator drugs
- Works as well as nebuliser if correctly used
- No child < 5 years should be given inhaler without spacer
- Release a puff (100 micrograms of Salbutamol) into the spacer chamber after attaching the MDI to the other end of the spacer.
- Allow normal breathing for 3–5 breaths. A slow deep breath is preferred but may not be feasible if the child is not earlier trained.
- Give Salbutamol inhalation by MDI-Spacer 4 puffs (100mcg/puff) at 2-3 min interval.

Spacers can be made in the following way:

- Use a plastic cup or a 500 ml drink bottle or similar
- Cut a hole in the base in the same shape/size as the mouthpiece of inhaler
- Spacer devices with a volume of 750 ml are commercially available

To use an inhaler with a spacer:

- Remove the inhaler cap. Shake the inhaler well
- Insert mouthpiece of inhaler through the hole in the bottle
- The child should put the opening of the bottle into his mouth
- Press down the inhaler while the child continues to breath normally
- Wait for 3 to 4 breaths and repeat
- For younger children place the cup over the child's mouth and use as a spacer in the same way

ANNEXURE: 9

Assessment of severity of acute asthma in a child upto 5years Using Pulmonary Score Index			
Score	**RespiratoryRate /min**	**Wheezing***	**Accessory muscleSternomastoid activity**
0	<30	None	No apparent activity
1	31-45	Terminal expiration with stethoscope	Questionable increase
2	46-60	Entire expiration	Increase apparent
3	>60	During inspiration and expiration without stethoscope *If no wheezing due to minimal air exchange.	Maximal activity
Pulmonary Score (Total from 3 columns)		**Severity assessment**	
0–3		Mild	
4–6		Moderate	
> 6		Severe	
Those children whose score is > 6 or have signs of imminent respiratory arrest			

ANNEXURE: 10

Blood transfusion

Use blood that has been screened and found negative for transfusion-transmissible infections. Do not use blood that has passed its expiry date or has been out of the refrigerator for more than 2 hours. Large volume rapid transfusion at a rate >15 ml/kg/hour of blood stored at 4° C may cause hypothermia, especially in small babies. Preferably give packed cells if available in place of whole blood.

Blood Transfusion		
General indications for blood transfusion:	**Before transfusion, check the following:**	**During transfusion, check the following:**
Acute blood loss, when 20–30% of the total blood volume has been lost and bleeding is continuing **Severe anaemia** if packed cells are available, give 10 ml/kg over 3-4 hours preferably. If not, give whole blood 20 ml/kg over 3-4 hours. **Septic shock** if IV fluids are insufficient to maintain adequate circulation and in addition to antibiotic therapy.	• The blood is the correct group and the patient's name and number are on both the label and the form (in an emergency, reduce the risk of incompatibility or transfusion reactions by cross-matching group-specific blood or giving O-negative blood if available.· • The blood transfusion bag has no leaks. • The blood pack has not been out of the refrigerator for more than 2 hours, the plasma is not pink or has large clots, and the red cells do not look purple or black. • Any signs of heart failure. If present, give 1mg/kg of furosemide IV at the start of the transfusion in children whose circulating blood volume is normal. Do not inject into the blood pack.· • Do a baseline recording of the child's temperature, respiratory rate and pulse rate. The volume transfused should initially be 20 ml/kg body weight of whole blood, given over 3–4 hours.	• If available, use an infusion device to control the rate of the transfusion • Check that the blood is flowing at the correct speed. • Look for signs of a transfusion reaction (see below), particularly carefully in the first 15 minutes of the transfusion. • Record the child's general appearance, temperature, pulse and respiratory rate every 30 minutes.· • Record the time the transfusion was started and ended, the volume of blood transfused, and the presence of any reactions.

Transfusion reactions

If a transfusion reaction occurs, first check the blood pack labels and patient's identity. If there is any discrepancy, stop the transfusion immediately and notify the blood bank immediately.

Type of transfusion reaction	Signs and symptoms*	Management
Mild reactions (Due to mild hypersensitivity)	• Itchy rash	• Slow the transfusion • Give chlorpheniraamine 0.25 mg/kg IM • Continue the transfusion at the normal rate if there is no progression of symptoms after 30 minutes • If symptoms persist, treat as moderate reaction
Moderately severe reactions (Due to moderate hypersensitivity, non-hemolytic reactions, pyrogens or bacterial contamination)	• Severe itchy rash (urticaria) • Flushing • Fever >38 ° C or >100.4 °F (Note: fever may have been present before the transfusion) • Rigors • Restlessness • Raised heart rate.	Stop the transfusion, but keep the IV line open with normal saline • Give IV hydrocortisone, or chlorpheniramine 0.25 mg/kg IM, if available • Give a bronchodilator, if wheezing • Send the following to the Blood Bank: the blood-giving set that was used, blood sample from another site, and urine samples collected over 24 hours. • If there is improvement, restart the transfusion slowly with new blood set and observe carefully • If no improvement in 15 minutes, treat as life-threatening reaction (see below), and report to doctor in charge and to the Blood Bank.
Life-threatening reactions (Due to haemolysis, bacterial contamination and septic shock, fluid overload or anaphylaxis)	• Fever>38°Cor >100.4° F (note: fever may have been present before the transfusion) • Rigors • Restlessness• • Raised heart rate • Fast breathing • Black or dark red urine (haemoglobinuria) • Unexplained bleeding • Confusion • Collapse	Stop the transfusion, but keep the IV line open with normal saline • Maintain airway and give oxygen • Give epinephrine (adrenaline) 0.01 mg/kg body weight (equal to 0.1 ml of 1 in 10000 solution • Treat shock • Give IV hydrocortisone, or chlorpheniramine IM, if available • Give a bronchodilator, if wheezing • Report to doctor in charge and to blood laboratory as soon as possible • Maintain renal blood flow with IV furosemide 1mg/kg • Give antibiotic as for septicaemia

* Note that in an unconscious child, uncontrolled bleeding or shock may be the only signs of a life-threatening reaction.

After transfusion:

Reassess the child. If more blood is needed, a similar quantity should be transfused.

Give treatment with iron (daily dose of iron/folate tablet or iron syrup) for 14 days, once acute infections have been treated.

- Ask the parent to return with the child after 14 days. Assess the child for response to iron therapy. Children become less irritable and have improved appetite. Rise in Hb can be documented by 10-14th day. If there is no response to iron therapy, assess for the cause (inadequate dose taken, diarrhoea, malabsorption, presence of infection like UTI and TB). Treatment should be given for 3-4 months, where possible. It takes upto 8 weeks to correct the anaemia and 2–3 months after the haemoglobin reverts to normal to build up iron stores
- Advise the mother about good feeding practices.

ANNEXURE: 11

ASSESSING NUTRITIONAL STATUS AND RECOVERY

Calculating the child's weight-for-length

Measuring Length

Two people are needed to measure the child's length.

One person should:

- Assist in positioning the child face-up on the measuring board, supporting the head and placing it against the headboard
- Position the crown of the head against the head-board, compressing the hair
- Check that the child lies straight along the center line of the board and is not slanted, and does not change position. (It is usual for this person to stand or kneel behind the headboard).

The second person should:

- Support the trunk as the child is positioned on the board
- Lay the child flat along the board
- Place one hand on the shins above the ankles or on the knees and press down firmly. With the other hand, place the footpiece firmly against the heels
- Measure the length (to the nearest 0.1 cm) and record immediately.
  The measuring board should be checked for accuracy every month.

Measuring Weight

- Leave a cloth in the weighing pan to prevent chilling the child.
- Adjust the scales to zero with the cloth in the pan.
- Place the naked child gently on the cloth in the weighing pan.
- Wait for the child to settle and the weight to stabilize.
- Measure the weight (to the nearest 10 g) and record immediately.
  Standardization of the scales should be performed weekly or whenever the scales are moved.

WHO reference weight-for-length and weight-for-height

Weight-for-length Reference Card (below 87 cm)

Boys' weight (kg)					Length	G irls' weight (kg)				
-4 SD	-3 SD	-2 SD	-1 SD	Median	(cm)	Median	-1 SD	-2 SD	-3 SD	-4 SD
1.7	1.9	2.0	2.2	2.4	45	2.5	2.3	2.1	1.9	1.7
1.8	2.0	2.2	2.4	2.6	46	2.6	2.4	2.2	2.0	1.9
2.0	2.1	2.3	2.5	2.8	47	2.8	2.6	2.4	2.2	2.0
2.1	2.3	2.5	2.7	2.9	48	3.0	2.7	2.5	2.3	2.1
2.2	2.4	2.6	2.9	3.1	49	3.2	2.9	2.6	2.4	2.2
2.4	2.6	2.8	3.0	3.3	50	3.4	3.1	2.8	2.6	2.4
2.5	2.7	3.0	3.2	3.5	51	3.6	3.3	3.0	2.8	2.5
2.7	2.9	3.2	3.5	3.8	52	3.8	3.5	3.2	2.9	2.7
2.9	3.1	3.4	3.7	4.0	53	4.0	3.7	3.4	3.1	2.8
3.1	3.3	3.6	3.9	4.3	54	4.3	3.9	3.6	3.3	3.0
3.3	3.6	3.8	4.2	4.5	55	4.5	4.2	3.8	3.5	3.2
3.5	3.8	4.1	4.4	4.8	56	4.8	4.4	4.0	3.7	3.4
3.7	4.0	4.3	4.7	5.1	57	5.1	4.6	4.3	3.9	3.6
3.9	4.3	4.6	5.0	5.4	58	5.4	4.9	4.5	4.1	3.8
4.1	4.5	4.8	5.3	5.7	59	5.6	5.1	4.7	4.3	3.9
4.3	4.7	5.1	5.5	6.0	60	5.9	5.4	4.9	4.5	4.1
4.5	4.9	5.3	5.8	6.3	61	6.1	5.6	5.1	4.7	4.3
4.7	5.1	5.6	6.0	6.5	62	6.4	5.8	5.3	4.9	4.5
4.9	5.3	5.8	6.2	6.8	63	6.6	6.0	5.5	5.1	4.7
5.1	5.5	6.0	6.5	7.0	64	6.9	6.3	5.7	5.3	4.8
6.3	6.7	6.2	6.7	7.3	65	7.1	6.5	6.9	6.6	6.0
5.5	5.9	6.4	6.9	7.5	66	7.3	6.7	6.1	5.6	5.1
5.6	6.1	6.6	7.1	7.7	67	7.5	6.9	6.3	5.8	5.3
5.8	6.3	6.8	7.3	8.0	68	7.7	7.1	6.5	6.0	5.5
6.0	6.5	7.0	7.6	8.2	69	8.0	7.3	6.7	6.1	5.6
6.1	6.6	7.2	7.8	8.4	70	8.2	7.5	6.9	6.3	5.8
6.3	6.8	7.7	8.0	8.6	71	84	7.7	7.0	6.5	5.9
6.4	7.0	7.6	8.2	8.9	72	8.6	7.8	7.2	6.6	6.0
6.6	7.2	7.7	8.4	9.1	73	8.8	8.0	7.4	6.8	6.2
6.7	7.3	7.9	8.6	9.3	74	9.0	8.2	7.5	6.9	6.3
6.9	7.5	8.1	8.8	9.5	75	9.1	8.4	7.7	7.1	6.5
7.0	7.6	8.3	8.9	9.7	76	9.3	8.5	7.8	7.2	6.6
7.2	7.8	8.4	9.1	9.9	77	9.5	8.7	8.0	7.4	6.7
7.3	7.9	8.6	9.3	10.1	78	9.7	8.9	8.2	7.5	6.9
7.4	8.1	8.7	9.5	10.3	79	9.9	9.1	8.3	7.7	7.0
7.6	8.2	8.9	9.6	10.4	80	10.1	9.2	8.5	7.8	7.1
7.7	8.4	9.1	9.8	10.6	81	10.3	9.4	8.7	8.0	7.3
7.9	8.5	9.2	10.0	10.8	82	10.5	9.6	8.8	8.1	7.5
8.0	8.7	9.4	10.2	11.0	83	10.7	9.8	9.0	8.3	7.6
8.2	8.9	9.6	10.4	11.3	8.4	11.0	10.1	9.2	8.5	7.8
8.4	9.4	9.8	10.6	11.5	85	11.2	10.3	9.4	8.7	8.0
8.6	9.3	10.0	10.8	11.7	86	11.5	10.5	9.7	8.9	8.1

WHO reference weight-for-length and weight-for-height

Weight-for-length Reference Card (below 87 cm)

Boys' weight (kg)					Length	G irls' weight (kg)				
-4 SD	-3 SD	-2 SD	-1 SD	Median	(cm)	Median	-1 SD	-2 SD	-3 SD	-4 SD
8.9	9.6	10.4	11.2	12.2	87	11.9	10.9	10.0	9.2	8.4
9.1	9.8	10.6	11.5	12.4	88	12.1	11.1	10.2	9.4	8.6
9.3	10.0	10.8	11.7	12.6	89	12.4	11.4	10.4	9.6	8.8
9.4	10.2	11.0	11.9	12.9	90	12.6	11.6	10.6	9.8	9.0
9.6	10.4	11.2	12.1	13.1	91	12.9	11.8	10.9	10.0	9.1
9.8	10.6	11.4	12.3	13.4	92	13.1	12.0	11.1	10.2	9.3
9.9	10.8	11.6	12.6	13.6	93	13.4	12.3	11.3	10.4	9.5
10.1	11.0	11.8	12.8	13.8	94	13.6	12.5	11.5	10.6	9.7
10.3	11.1	12.0	13.0	14.1	95	13.9	12.7	11.7	10.8	9.8
10.4	11.3	12.2	13.2	14.3	96	14.1	12.9	11.9	10.9	10.0
10.6	11.5	12.4	13.4	14.6	97	14.4	13.2	12.1	11.1	10.2
10.8	11.7	12.6	13.7	14.8	98	14.7	13.4	12.3	11.3	10.4
11.0	11.9	12.9	13.9	15.1	99	14.9	13.7	12.5	11.5	10.5
11.2	12.1	13.1	14.2	15.4	100	15.2	13.9	12.8	11.7	10.7
11.3	12.3	13.3	14.4	15.6	101	15.5	14.2	13.0	12.0	10.9
11.5	12.5	13.6	14.7	15.9	102	15.8	14.5	13.3	12.2	11.1
11.7	12.8	13.8	14.9	16.2	103	16.1	14.7	13.5	12.4	11.3
11.9	13.0	14.0	15.2	16.5	104	16.4	15.0	13.8	12.6	11.5
12.1	13.2	14.3	15.5	16.8	105	16.8	15.3	14.0	12.9	11.8
12.3	13.4	14.5	15.8	17.2	106	17.1	15.6	14.3	13.1	12.0
12.5	13.7	14.8	16.1	17.5	107	17.5	15.9	14.6	13.4	12.2
12.7	13.9	15.1	16.4	17.8	108	17.8	16.3	14.9	13.7	12.4
12.9	14.1	15.3	16.7	18.2	109	18.2	16.6	15.2	13.9	12.7
13.2	14.4	15.6	17.0	18.5	110	18.6	17.0	15.5	14.2	12.9
13.4	14.6	15.9	17.3	18.9	111	19.0	17.3	15.8	14.5	13.2
13.6	14.9	16.2	17.6	19.2	112	19.4	17.7	16.2	14.8	13.5
13.8	15.2	16.5	18.0	19.6	113	19.8	18.0	16.5	15.1	13.7
14.1	15.4	16.8	18.3	20.0	114	20.2	18.4	16.8	15.4	14.0
14.3	15.7	17.1	18.6	20.4	115	20.7	18.8	17.2	15.7	14.3
14.6	16.0	17.4	19.0	20.8	116	21.1	19.2	17.5	16.0	14.5
14.8	16.2	17.7	19.3	21.2	117	21.5	19.6	17.8	16.3	14.8
15.0	16.5	18.0	19.7	21.6	118	22.0	19.9	18.2	16.6	15.1
15.3	16.8	18.3	20.0	22.0	119	22.4	20.3	18.5	16.9	15.4
15.5	17.1	18.6	20.4	22.4	120	22.8	20.7	18.9	17.3	15.6

CALCULATING WEIGHT GAIN

This example shows how to calculate weight gain of a child. It is for a weight gain over 3 days:

- Current weight of the child in grams = 6300 g
- Weight 3 days ago in grams = 6000 g

Step 1. Calculate weight gain in g (6300–6000 = 300 g)

Step 2. Calculate average daily weight gain (300g ÷ 3 days = 100g/day)

Step 3. Divide by child's average weight in kg
(100 g/day ÷ 6.15kg = 16.3 g/kg/day).

ANNEXURE: 12

SAFE DISPOSAL OF HOSPITAL WASTE

Proper disposal of hospital waste is important to keep the environment clean. To keep the environment clean, in each unit of ward, the waste should be disposed off in a proper way.

The following are different colour drums with different color polythene for different type of waste, to be disposed off in a different way.

Black drums / Bags:

Left over food, fruits feeds, vegetables, waste paper, packing material, empty box, bags etc. This waste is disposed off by routine municipal council committee machinery.

Yellow drums / Bags:
Infected non-plastic waste

Human anatomical waste, blood, body fluids, placenta etc. This type of waste requires incineration.

Blue drums / Bags:
Infected plastic waste

Used disposable syringes, needles (first destroy the needle in the needle destroyer).
Used sharps, blade and broken glass etc. Patients IV set, BT set, ET tube, catheter, urine bag etc. should be cut into pieces and disposed in blue bag. This waste will be autoclaved to make it non-infectious. This is then shredded and disposed off.

Proforma for Assessment of Sick Child

Case Recording Form Date

Name---------- Age---------- Sex---------- Wt------- Temp ----------

ASK: What are the infant's problems?

ASSESS (Circle all signs present)	**Emergency treatments** • Check for head/neck trauma before treating child – do not move neck if cervical spine injury possible· • EMERGENCY SIGNS: (If any sign positive: give treatment(s), call for help, draw blood for emergency laboratory investigations (glucose, malaria smear, Hb)
AIRWAY AND BREATHING • Not breathing or gasping or • Central cyanosis or • Severe respiratory distress (Respiratory rate ≥ 70/min, Severe lower chest in-drawing, Grunting, Head nodding, Apnoeic spells, Unable to feed due to respiratory distress, Stridor in a clam child)	
CIRCULATION Cold hands with: • Capillary refill longer than 3 seconds, and • Weak and fast pulse IF POSITIVE Check for severe acute malnutrition	
COMA CONVULSING • Coma (AVPU) or • Convulsing (now)	
SEVERE DEHYDRATION (ONLY IN CHILD WITH DIARRHOEA) Diarrhoea plus any two of these: • Lethargy • Sunken eyes • Very slow skin pinch If two signs positive check for severe acute malnutrition	
PRIORITY SIGNS · • Tiny baby (<2 months) • Respiratory distress (RR>60/min) • Temperature <36.5°C or > 38.5°C • Bleeding • Restless, Continuously irritable, or lethargy • Trauma or other urgent surgical condition • Referral (urgent) • Pallor (severe) • Malnutrition: Visible severe wasting • Oedema of both feet • Poisoning • Burns (major)	

Check temperature if baby is cold to touch, rewarm

• **History**

• **Immunization**

• **Examination**

- Temperature	- Pulse	- Resp. Rate	- Weight
- Weight for Length/height		- Sensorium	- Bulging AF
- Neck Rigidity	- Pallor	- Jaundice	

- Eye- pus/bitots spots/corneal involvement
- Skin- depigmentation/desquamation/petichae/purpura/ecchymosis
- Generalized lymphadenopathy
- Pedal odema

Respiratory system-

Cardio-vascular system-

Abdominal examination-

Central nervous system-

• **Differential diagnosis**

• **Lab Investigations**

• **Management**

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