Facility Based Integrated Management of Neonatal and Childhood Illness (FB-IMNCI)

Participant Handbook (Medical Officer)

Government of Nepal
Ministry of Health & Population
Department of Health Services
Family Welfare Division
2076
Introduction of Facility Based IMNCI

The Facility Based Integrated Management of Neonatal and Childhood Illness (FB-IMNCI) package includes appropriate management of major causes of childhood and neonatal mortality. The package has been designed specially to address childhood cases referred from peripheral level health institutions to higher institutions. As such, the package is expected to bridge the current gap in appropriate and timely management of childhood cases. The Facility Based IMNCI package has been designed to address the major causes of childhood illnesses especially infection, birth asphyxia, prematurity, low birth weight, pneumonia, diarrhoea, malaria, meningitis, severe malnutrition, severe malnutrition among children.

The interventions in the training manuals are based on the latest available scientific evidence; and the manuals also complement standard comprehensive pediatric textbooks, which should be consulted for management of complications or rare conditions.

About FB-IMNCI training package

Facility Based IMNCI training package has been developed to capacitate team of health workers at district level to manage cases referred from lower level health facilities.

Objectives of training:

- To capacitate team of health workers at district hospital with required knowledge and skills to manage complicated under-five and neonatal cases.
- To ensure timely and effective management of referral cases.

Sections:

The Facility Based IMNCI training package consists of following major sections

a. IMNCI approach
b. Emergency Triage Assessment and Treatment (ETAT)

c. Newborn Care
d. Cough
e. Diarrhoea
f. Fever
g. Malnutrition and Anemia
h. Other Problems

Participants: Medical Officers from district, zonal, sub-regional and regional hospitals.

Number of participants: 20 per batch

Number of facilitators: 4 per batch

Methods: The methods used for learning will be self-reading, discussion, demonstration, exercise, wall chart presentations, case studies, skill stations and clinical sessions.
Total duration: 6 days (5 days’ classroom and 1 days’ clinical session)

Venue: As decided by Family Welfare Division

Evaluation:

The participants will be evaluated in terms of knowledge and skills during the training sessions. The knowledge of participants will be evaluated using pre-and post-test questionnaire. The skills will be assessed using standard checklist during practical sessions through skill stations and clinical sessions.
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CHAPTER 1.1: LINKAGE OF CB-IMNCI WITH FB-IMNCI

1.1.1 Causes of child mortality in Nepal

Every year more than 10 million children die in developing countries before they reach their fifth birthday. In Nepal, the under-five mortality rate is 39 per 1000 live births (NDHS 2016). Majority of these deaths occur within the neonatal period. The neonatal mortality rate is 21 per 1000 live births and infant mortality rate is 32 per 1000 live births. Though Nepal met its Millennium Development Goal target of reducing under-5 mortality to 54 deaths per 1,000 live births by 2015, it has a long way to go to meet the Sustainable Development Goal target of reducing under-five mortality to 28 deaths per 1,000 live births. More challenging is the goal of reducing neonatal mortality rate below 12 per 1000 live births.

The most common causes of infant and child mortality in developing countries including Nepal are perinatal conditions, pneumonia, diarrhoea, malaria, measles and malnutrition (Figure 1.1). These are also the commonest causes of morbidity in young children. Many of these deaths may be prevented by early referral of sick children to health facility and providing appropriate treatment.

**Figure 1.1: Causes of Under Five Child Mortality Estimates of Nepal**

Data source: Inter-agency Group for Child Mortality Estimation, 2014 [www.childmortality.org](http://www.childmortality.org)

1.1.2 Linkage of CB-IMNCI Programme with FB-IMNCI Programme

Community based Integrated Management of Childhood Illnesses (IMCI) programme was started in 1997 AD and was scaled up to all 75 districts by 2009 as a priority one public health programme of Government of Nepal. To address the burning need to reduce the high neonatal mortality rate, community based Newborn Care Package (NCP) was piloted to 10 districts in 2008 and rapidly scaled up to 41 districts by 2011. However, the assessment of
CB-NCP programme in pilot districts in 2012 revealed serious issues, primarily related to coverage and quality of care by FCHVs and the NMR remained stagnant at 33 per 1000 live births, as shown by NDHS 2011. In addition, there was shifting of care seeking behavior of mothers/families towards trained health workers (e.g. substantial increase in institutional delivery). While serious discussions were going on about most cost-effective interventions to reduce neonatal death rates, WHO published the revised generic version of IMCI protocol in 2014, with major changes in classification and treatment of pneumonia and emphasis on illnesses of young infants under 2 months of age. As almost 60% contents of CB-IMCI and CB-NCP programmes were same, there was duplication of resources. In this background, Nepal Government, MoHP Policy level decision was made to merge the two programs (CB-IMCI and CB-NCP) into a single CB-IMNCI Program in 2014 (2071/06/28), along with national adaptation of new WHO IMCI protocol and limiting the role of FCHVs to promotive and preventive health services only.

While CB-IMNCI programme was scaled up to all 75 districts in a phase wise manner, the need for facility based IMNCI programme, focusing on newborn care, was realized, in order to further reduce the under-five mortality rate, along with neonatal mortality rate. This demanded a referral protocol for the care of sick children referred from the primary care health facilities who used CB-IMNCI protocol. Thus, this programme links to CB-IMNCI programme by focusing on major killer diseases or conditions that were recommended to be referred to higher facility after pre-referral treatment, as per RED classification.

Table 1.1: Linkage of CB-IMNCI with FB-IMNCI Protocol

<table>
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<th>CB-IMNCI Protocol Classifications</th>
<th>FB-IMNCI Protocol Diagnosis</th>
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<tr>
<td>Emergency Conditions</td>
<td>Very Severe Disease (when 1 of 4 General Danger Signs present)</td>
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</tr>
<tr>
<td></td>
<td>• Convulsion</td>
<td></td>
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<tr>
<td></td>
<td>• Vomits everything</td>
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<td></td>
<td>• Lethargic or Unconscious</td>
<td>Emergency Triage Assessment and Treatment (ETAT)-ABCD approach</td>
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<tr>
<td></td>
<td>• Airway and Breathing Problem</td>
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<tr>
<td></td>
<td>• Shock (Circulation)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Coma and Convulsion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Dehydration (severe)</td>
<td></td>
</tr>
<tr>
<td>Cough or Difficulty Breathing</td>
<td>• Red: Severe Pneumonia or Very Severe Disease</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Yellow: Pneumonia</td>
<td>Pneumonia and its complications</td>
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<td></td>
<td>• Green: Cough and Cold</td>
<td>• Upper Respiratory Infection</td>
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<td></td>
<td></td>
<td>• Bronchiolitis</td>
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<td></td>
<td></td>
<td>• Bronchial Asthma</td>
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<td></td>
<td></td>
<td>• Croup</td>
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<td>Diarrhoea</td>
<td>Acute Diarrhoea</td>
<td>Acute watery diarrhoea</td>
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<tr>
<td></td>
<td>• Red: Severe Dehydration</td>
<td>Cholera</td>
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<td></td>
<td>• Yellow: Some Dehydration</td>
<td>Dysentery</td>
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<tr>
<td></td>
<td>• Green: No Dehydration</td>
<td>Persistent Diarrhoea</td>
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<tr>
<td></td>
<td>Severe Persistent Diarrhoea</td>
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<tr>
<td></td>
<td>Persistent Diarrhoea</td>
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<td>Yellow: Malaria or Measles with mouth or eye complications</td>
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<td>Green: Measles or Fever</td>
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<td>Yellow: Moderate Acute Malnutrition, Anemia</td>
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<td></td>
<td>Green: No malnutrition, No anemia</td>
<td>Dengue</td>
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<td></td>
<td></td>
<td>Kala-azar</td>
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<tr>
<td>Others</td>
<td>Red: HIV Infected</td>
<td>TB</td>
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<td></td>
<td>Yellow: HIV Exposed</td>
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<td>Green: No HIV Infection</td>
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<td>Developmental delay</td>
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CHAPTER 1.2: INTEGRATED APPROACH TO MANAGEMENT OF SICK CHILDREN

Chart 1.1: Steps in the management of children brought to hospital

First step is triage and providing treatment to children with emergency signs, which is described in section 2.
1.2.1: Taking history in children

History taking generally starts with understanding the presenting complaint. Record what the mother/caregiver tells you about the child’s problems. Use good communication skills (given in section 1.10) when interacting with mother.

- Greet the mother appropriately and offer her a seat to sit with her child
- Ask the mother - what the child’s problem is?
- Use words that mother understands
- Listen carefully to what she tells you
- Give her time to answer the questions
- Ask additional questions when she is not sure about the answer.

Take history of the present illness. You will learn more about the symptom-specific history in subsequent sections. The feeding history of infants and younger children is essential, as this is the age when malnutrition begins. For children, birth history, information on immunization and development milestone is also important. The history is obtained from a parent or caretaker in younger children.

1.2.2: Physical examination

- All children must be examined thoroughly, so that important signs are not missed.
- In contrast to the systematic approach for adults, examination of a child should be organized in a way that does not upset the child. The approach to examine children should be flexible. General principles of examination is:
  - Do not upset the child unnecessarily.
  - Let the child be with mother or caregiver.
- Observe as many signs as possible before touching the child:
  - Does the child speak, cry or make any sound?
  - Is the child alert, interested and looking around?
  - Does the child appear irritable or drowsy or having a seizure?
  - Is the child vomiting?
  - Is the child able to feed?
  - Is the child cyanosed or pale?
  - Does the child show signs of respiratory distress?
These signs should be recorded before the child is disturbed. You might ask the mother or caretaker to cautiously reveal part of the chest to look for lower chest wall in drawing or to count the respiratory rate. If the child is distressed or crying, he or she might have to be left for a brief time with his/her mother in order to settle, or the mother could be asked to breastfeed, before key signs such as respiratory rate can be measured. Then proceed to signs that require touching the child but are minimally disturbing, such as feeling the pulse or listening to the chest or heart. You obtain limited useful information if you listen to the chest of a crying child. Signs that involve interfering with the child, such as recording the temperature, testing for skin turgor, capillary refill time, blood pressure or looking at the child’s throat or ears should be done at last.

1.2.3: Point of care/bedside investigations

Perform investigations relevant to history and examination findings. Some of the tests may be easily performed at the bedside (so called as point of care tests). Important investigations relevant to sick children include complete blood count, blood sugar, routine urine examination, and rapid diagnostic tests for malaria. In addition, other investigations may be needed in hospitalized patients.

1.2.4: Differential diagnosis

After the assessment has been completed, consider the various conditions that could cause the illness in the child and make a list of possible differential diagnoses. This helps to ensure that wrong assumptions are not made, a wrong diagnosis is not chosen, and rare problems are not missed. Remember that a sick child might have more than one clinical problem requiring treatment.

1.2.5: Decide need for admission (Hospitalization) or referral

Children need hospitalization if they have emergency signs or priority signs for which they need investigations or if they need work-up for underlying conditions. Examples of common conditions for which children need admission are:

- Fever lasting more than 7 days
- Generalized swelling
- Severe pallor/anemia
- Poor growth/weight gain in spite of dietary counseling
- Persistent diarrhoea

If child needs some special treatment and referral, give pre-referral treatment before sending.
Any newborn with following criteria should be immediately admitted to the SNCU:

1. Birth weight <1800 gm or gestation <34 weeks
2. Large baby (4 kg or more)
3. Perinatal asphyxia
4. Apnea or gasping
5. Refusal to feed
6. Respiratory distress (Rate 60 or more/min or grunt/retractions)
7. Severe jaundice (Appears<24 hrs/stains palms & soles/lasts>2 weeks)
8. Hypothermia less than 36.5°C (97.7°F), or hyperthermia (≥37.5°C, ≥99.5°F) if not improved with initial management
9. Central cyanosis
10. Shock (cold periphery with CRT>3 seconds and weak & fast pulse)
11. Coma, convulsions or encephalopathy
12. Abdominal distension
13. Diarrhoea/dysentery
14. Bleeding
15. Major malformations

1.2.6 Inpatient Care

All admitted children should receive appropriate treatment for the most probable diagnosis and supportive therapy.

Diagnosis

Depending on the availability of laboratory and imaging services in the hospital, investigations should be done to help confirm or refuse the diagnosis

Specific treatment:

Specific treatment is provided to the patient according to the diagnosis. However, empirical treatment is started based on possible differential diagnosis.

Supportive care

1. Oxygen therapy (see section 2.2.7)
2. Fluid therapy (see section 2.3.8)
3. Management of fever (see section 6.2.7)
4. Pain control (see 8.3.5)
5. Play therapy and distraction
Monitoring

Monitoring is a critical component, which is often neglected in inpatient care. Many conditions are dynamic and may be apparent on subsequent examinations. Key aspects in monitoring the progress of sick children are:

- Making a plan 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 who may decide for change of management if necessary.

Chart 1.2 The sample monitoring chart for a sick child is given below.*

<table>
<thead>
<tr>
<th>Parameter/time</th>
<th>Adm</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Temp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SpO₂</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urine output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 hourly (ml/kg/hr)</td>
<td></td>
<td></td>
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<tr>
<td>S. Glucose</td>
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</tr>
</tbody>
</table>

*May need more frequent monitoring if the child is too sick

1.2.7: Discharge and follow up

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:

- Counseling the mother on correct treatment and feeding of the child at home.
- Ensure age appropriate immunization before discharge and remind the mother about the date and place of child's immunization visit.
- Communicating with the health personnel who referred the child or who will be responsible for follow-up care. Provide discharge card or a referral note as 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 looking for signs
indicating the need to return immediately.

- Assisting the family with special support (e.g. providing equipment for a child with disability)
- 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. Services of community health workers should be utilized wherever available.
- Advise mothers to return immediately if the child develops any of the danger signs (Box 1.1: When to Return Immediately)

<table>
<thead>
<tr>
<th>Box 1.1: When to Return Immediately</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Not breastfeeding or drinking poorly.</td>
</tr>
<tr>
<td>- Becomes sicker.</td>
</tr>
<tr>
<td>- Develops a fever or feels cold to touch.</td>
</tr>
<tr>
<td>- Fast breathing.</td>
</tr>
<tr>
<td>- Difficult breathing.</td>
</tr>
<tr>
<td>- Diarrhoea with blood in stool.</td>
</tr>
</tbody>
</table>

1.2.9. Safe Transport of sick children including newborn

Introduction
From the moment a perinatal problem is recognized to the point of its resolution, there is a continuum of care. A common feature of disease in the neonatal period is a rapidly progressive course. Use of special centers for the treatment of the sick newborn has been accompanied by improvement in survival, and the safe transfer of these infants to the center is an important part of their overall care. Appropriate stabilization, initiated on recognition of a problem, is necessary throughout the transfer process.

Constraints in transport of sick children
In developing countries, the problem of transporting small and sick neonates is compounded by several practical constraints like:

- Facilities are scarce and not easily available
- Families have poor resources
- Organized transport services are not available. At times the baby may have to be transported on foot or on bullock cart.
- No health provider is available to accompany the baby
- Facilities are not fully geared up to receive sick neonates
- Communication systems are non-existent or inefficient
Preparation before transport

1. Assess and Stabilize

It is of utmost importance that a child is stabilized before the transport is begun, as an unstable child is going to deteriorate on the way and may reach the referral facility in a moribund state defeating the very purpose. Make sure that there is a genuine indication for referral

i. Temperature:
   - Assess temperature by touch or by using a thermometer.
   - If hypothermic, warm under a warmer or by KMC or extra blankets

ii. Airway:
   - Assess the airway for patency
     - Position of the neck- correct position putting shoulder roll
     - Secretions in mouth/nose- Suction
     - Check for Chest movements

iii. Breathing:
   - Assess the child for breathing efforts
     - Tactile stimulation in neonates
     - Ventilation using a bag and mask with 100% oxygen

iv. Circulation:
   - Assess the status of circulation by assessing pulse volume and capillary refilling time
     - If CRT > 3 seconds in neonates and > 2 seconds in child and/or peripheral pulses are poor with normal temperature
       - Fluid bolus normal saline or Ringer lactate- 10ml/kg in neonates and 20 ml/ kg in child should be provided over 20-30 minutes
       - Reassess for need of further boluses.

v. Fluids:
   - If the child to be transported cannot be fed
     - Maintenance fluid based on birth weight and day of life in neonate and present weight of child
     - Presence or absence of abnormal losses needs to be calculated and started

vi. Feeding:
   - Assess the child for feeding. If a child can be fed, he should be fed enterally by
     - Cup or gavages
     - Directly at the breast.
     - Nasogastric tube

vii. Medications:
   - Assess the need for antibiotics, anticonvulsants, vitamin K( neonates)
2. **Write a note**  
Write a precise note for the providers at the referral facility using transfer checklist (Checklist 1.1) and see below for sample of referral note for neonate and child (page no. 23-24)

3. **Encourage mother to accompany**  
Mother should accompany the child for breast feeding and for providing supportive care to the child on the way and in the hospital

4. **Arrange a provider to accompany**  
If feasible doctor/nurse/health worker should accompany the child

5. **Communication**  
- Explain the condition, the prognosis and the reasons for referral of the child to the family  
- Explain where to go and indicate whom to contact.  
- Inform the referral facility beforehand, if possible

---

**Care during transport**  
The accompanying person should be explained to ensure the following:

1. **No Noxious stimuli**
2. **Emergent**  
   Stabilize and arrange for early referral
3. **No sepsis**  
   Infection control practices during transport with minimal handling
4. **Stabilize prior to transport**
5. **Maintenance of warm chain while transport of neonate**  
   a. KMC  
   b. Properly covered in cotton or cloth  
   c. Improvised containers  
   d. Transport incubator
6. **Prevention of hypoglycemia**  
   a. **Provide feeds**  
      i. If child is in a position to suck on the breast, he should be offered breast feeds.  
      ii. If he can take spoon feeding, expressed breast milk can be provided carefully.  
      iii. If the distance is long, a nasogastric tube may be inserted and gavage feeding given
7. **Maintenance of airway and breathing**  
   a. Keep the neck of the child in slight extension  
   b. Do not cover the child’s mouth and nose
c. Gently wipe the secretions from the nose and the mouth with a cotton or cloth covered finger.

d. Check breathing
   i. If neonate stops breathing, provide tactile stimulation to the soles. If still not breathing start bag and mask ventilation
   ii. If the child stops breathing, start bag and mask ventilation

8. **Educate the parents about danger sign while transport**
# Checklist 1.1 Transfer Checklist*

<table>
<thead>
<tr>
<th>Name:</th>
<th>Age:</th>
<th>Sex:</th>
<th>Hospital number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of transfer:</td>
<td>Time of transfer:</td>
<td>Reason for transfer:</td>
<td></td>
</tr>
<tr>
<td>Transfer from:</td>
<td>Transfer to:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor/ health worker accompanying the patient:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## When potential transfer is identified

- Identify the problem and the reason for transfer
- Inform the doctor/ senior health worker on call
- Inform parents
- Ensure that bed is available in the receiving unit
- Ensure that the problems of the patient is communicated to the receiving unit
- Identify transfer ‘team’
- Book ambulance (with oxygen) and ensure that the ambulance will take the transfer team back to our hospital

## Patient preparation

- Patient must have a ‘definitive’ airway. If in doubt, continue bag and mask throughout the way
- Ensure normal blood glucose and counsel on how to prevent low blood sugar
- At least one reliable intravenous access should be obtained
- For short transfers and/ or for older children, maintenance fluid may sometimes be omitted but must be carried in case of unexpected delays
- For neonates, intravenous fluid should be continued via burette set
- Prevent hypothermia

## Equipment preparation

- Resuscitation box – Bag and mask, normal saline, epinephrine, syringes, 10 % dextrose, burette set
- Portable pulse oximeter if available
- Full portable oxygen cylinder
- Patient’s transfer notes, x-rays, investigation reports
- Ensure the transfer team has a mobile phone, the receiving unit’s contact number and the contact number of a doctor on call
- Money for emergency
- Confirm route to receiving hospital

## Time of leaving the referral unit:

### Vital signs on leaving the referral unit

- Temperature:
- Heart rate:
- Respiratory rate:
- CRT:
- SpO2:

## Time of arrival at the receiving unit:

### Vital signs on arrival at the receiving unit:
- Temperature:
- Heart rate:
- Respiratory rate:
- CRT:
- SpO2:

Adverse events during transfer (if any):

Name and signature of the doctor/ health worker

..........................................................
Sample referral note- neonate

Date________________________ Time_________________________
Name______________________ Date and Time of Birth________________________
Sex______________________ Mother’s Blood GP: __________________

Birth Details
Mode of Delivery________________________ Place of Delivery________________________
Time of 1st Cry________________________ Apgar 1 min____5 min____10 min____

Resuscitation details Initial steps/Free flow oxygen/Bag and Mask Ventilation / Chest compressions/ Medications
Birth weight ______________ grams

Clinical course
Feeding well Yes/No, Breast feeds Yes/No, Cup/Spoon Feeds Yes / No
Type of feeds EBM / Formula / Any other milk Diluted Milk Yes / No
Passage of Urine Yes / No Stool Yes / No

Examination Findings
Jaundice Yes / No
Soles Warm/Cold, Temperature _______ °C
Trunk Warm/Cold, Resp Rate__/min
Heart Rate_____/min Central Cyanosis Yes / No CRT < 3 sec / > 3 sec
Chest Retractions Yes/No With Nasal Cannula / Face mask / Hoodbox
Receiving oxygen Yes / No Blood sugar____ mg%
SpO2 ___% Any congenital malformation____
Time of last feed ___ am/pm

Investigations with date
__________________________________________________________________________________________

Provisional Diagnosis:
__________________________________________________________________________________________

Treatment given
__________________________________________________________________________________________

Reason for transfer LBW / Respiratory distress / Not feeding well / Convulsions / Jaundice / Malformation / Birth asphyxia / Any other

Referring hospital-
Name- Phone no.

Referral hospital-
Name- Phone no.
Mode of transport________________________ Accompanying person________________________

Signatures:
Name: Date and Time:
Sample referral note- Child beyond neonatal period

Date________________________ Time________________________
Name______________________ Age___________________ Sex____________

Relevant history:
Relevant findings:
Vitals- HR- /min RR- /min Temperature-
SpO2- % BP- mm of Hg Glucose- mg/dl
Receiving oxygen- CPAP/Yes/No
Receiving IVF/Yes/No Fluid- Rate-
Feeding- Yes/No Type- Time of last feed-
Pallor- Yes/No Icterus- Yes/No Cyanosis- Yes/No
Lymphadenopathy- Yes/No Edema- Yes/No
Nutritional status- (Z score) Wt for age-
Ht for age- Wt for ht-

Systemic Examination-
CVS- Chest-
Per abdomen- CNS-

Relevant Investigations with date
________________________________________________________________________
________________________________________________________________________

Treatment given
________________________________________________________________________
________________________________________________________________________

Provisional diagnosis:
Reason for transfer:

Referring hospital-
Name- Phone no.

Referral hospital-
Name- Phone no.
Mode of transport ______________________ Accompanying person_________________

Signatures
Name
Date and Time
CHAPTER 1.3: COMMUNICATION SKILLS

1.3. Provide effective and empathetic counseling

Good communication skills are essentially the techniques you can use to show the mother or family that you care and respect them and that you want to help. Good communication skills are a significant part of counseling. When you counsel, you talk person-to-person to help someone. If you use good communication skills, your counseling will be more effective.

1.3.1 The good communication skills include;

a. Showing respect
   - Greet mother appropriately and ask her to sit with her baby
   - Treat the mother as someone who can understand her baby’s health problems and can make good decisions about care

b. Not being judgmental
   - Never blame a mother/caregiver for the baby’s problem, cultural practices, or past decisions she has made.

c. Speaking clearly and using words the mother understands
   - Communication should be understood by both the health worker and the mother. If possible, speak with the mother in the language with which she is most comfortable.

d. Listening actively
   - Listen to what the mother says and how she says it
   - Maintain silence for some time. Give the mother time to think, ask questions, and talk.
   - Offer feedback to encourage the mother to continue.
   - Summarize what the mother has said.
   - Provide praise and encouragement for positive behavior or practices

e. Use body language
   - Smile.
   - Maintain eye contact while talking and listening.
   - Speak gently.
   - If culturally suitable and acceptable, touch the mother gently on her arm or shoulder.
f. Encouraging the woman to voice her concerns and ask questions

☐ Answer her questions honestly

g. Respecting the mother’s right to make decisions about her own health care and that of her baby

☐ It is your responsibility to give the woman all the information she needs to make a decision, not to make the decision for her

h. Listening to what the mother has to say

☐ Give her enough time to tell you what she thinks is important.

1.3.2 Types of information to be provided during hospitalization and during admission

Communication begins right at the time of admission of the child to the hospital till the time child is discharged or referred to higher center and during follow up visit. Parents need to be informed at each step of the patient care, which includes

- The reasons for admission
- Initial diagnosis of the patient at the time of admission
- Outline management plan
- Initial/current prognosis
- Daily progression
- Changing clinical course /adverse event
- Information and consent regarding any intervention/procedure
- Reasons for referral and care during transport in case of emergency referral to higher centers
- Follow up information in case of discharge

Remember information provided should be

- Practical and in simple language easily understood by the parents/relatives
- Should be of immediate relevance
- Do not flood the parents with too much information at a single contact
- Avoid use of technical words
- Information provided may require repetition for the parents to understand it
- Timing of providing information is crucial. Fix up a specific time daily
• Discussion should be unhurried and relaxed
• Preferably provide bedside information so that the parents are oriented to the current situation of the baby
• Any bad news/adverse event should be disclosed in a quiet and private setting
• Documentation of the information provided to the parents is important. Hence document and put the signature of parents especially after explaining poor prognosis/adverse events.

1.3.3 Levels of communication

i. Communication at the time of admission
   Discussion should be done after stabilization of the child. Give honest opinion about the condition of the baby.

ii. Communication during stay
   Communicate with the parents about the condition, treatment plan of patient every morning and evening and clear their doubts and queries about the condition of the child more frequently if required. Mother should also be involved in the care of the child whenever possible.

iii. Communication in case of death
   If the child is critically ill, the family members should have been prepared for any eventuality. As soon as possible sit down with the parents to tell them about the condition of the child. The exact cause of death should be informed to the parents in the simple language

iv. Communication on discharge
   Give standardize information to ensure that every family member receive uniform information. The family may be counseled regarding care, nutrition, immunization and follow up. Parents should be encouraged to contact the hospital for any queries and write contact number in discharge sheet. Communication at the time of referral to a higher center
   Explain clearly to the parents about clinical condition and reasons why the child needs referral. Explain where to go, how to go and whom to contact on reaching. Explain the care that baby requires during transport.

See annex 13 and 14 for effective communication skills and counselling along with role play
CHAPTER 1.4: INFECTION PREVENTION

Infection is a leading cause of death in neonates and children. The neonatal sepsis accounts for one third of neonatal death. A good antenatal care with immunization against tetanus, adequate treatment of infections in mother decreases the incidence of infection in the newborn babies. Along with antenatal preventive care, the simple infection preventive steps at home and health care facility adds on to reduces the chances of newborn and children getting infected as well as reducing the risk of health care worker getting exposed to infected persons. Every hospital should have written policies of infection prevention. Prevention of infection is more cost effective than treating infection.

1.4.1 Sources of infection in newborn and sick babies

Newborn with immature immune system, sick babies, premature and low birth weight babies are always at high risk of developing infection. The infection is spread or caused by;

- **Touching**
  - Touching an object that is dirty or contaminated spreads germs and contaminates the hands.
- **Blood and body secretion**
  - By a mother to her baby during pregnancy, birth, or with breastfeeding.
  - By contact with blood or amniotic fluid from an infected person.
- **Air**
  - Infectious germs coughed into the air by an infected person and passed to others who breathe in the air.
- **Food and water**
  - Contaminated food and water (bottle feeding).

1.4.2 Common precautions for infection prevention to be taken during inpatient care of children:

While caring for the sick children, certain precaution needs to be taken routinely to protect both health care workers and patients from contact with infectious materials and prevent infection. These are as follows:

- Follow universal precautions
  - Consider every person as potentially infectious
  - Wash hand and wear gloves before every procedure
  - Wear protective clothing.
  - Use aseptic technique.
  - Protect yourself from blood and other body fluids during deliveries and procedures.
  - Practice safe waste disposal.
  - Prevent injuries with sharps.
• Use clean clothes
• Keep the newborn unit/patient care room clean.
• Isolate patients with infection to prevent nosocomial infections.
• Keep separate spirit and povidone iodine swab containers, stethoscope, measuring tape and thermometer for each patient
• Change IV set daily (as per feasibility).
• Use syringe, suction catheter once only
• Feeding tubes can be left alone as long as patient can keep (maximum upto 7 days)
• Do not keep fomites on the baby cot.
• Change the solution in suction bottles and sterile water in oxygen chamber every day and sterilize the bottle daily by dipping in 2% gluteraldehyde for 4-6 hrs.
• Do not use a single dextrose/saline bottle for >24 hours.
• There should be a separate IV fluid bottle for each patient.
• Label the bottle with date and time of opening.
• Use syrup within 1 week of opening.
• Antibiotics vials to be changed after 24 hours.
• Use separate IV set for giving antibiotics.

1.4.2 Basic requirements to follow infection prevention:
• Running water supply.
• Soap.
• Elbow or foot operated taps.
• Strict hand washing practice and flex containing steps of hand washing
• Adequate amount of disposables, such as; sterile gloves, needle and syringe,
• Disinfectant/antiseptic solutions.
• Instrument decontamination with 0.5% chlorine solution (virex) for 10 minutes
• Strict adherence to asepsis routines and good housekeeping.
• Rational use of antibiotics.

1.4.3 Common infection preventive procedure
A. Hand washing
• It is the single most important means of preventing nosocomial infections.
• It is very SIMPLE and CHEAP.
• 2 minutes hand washing to be done before entering the unit.
• 20 seconds hand washing to be done before and after touching babies.
• Wash hands with soap and water.
  o Before and after caring/touching for newborn and before any treatment procedure
  o Whenever hands (or any other skin area) are contaminated with blood or other body fluids
Preparing for hand washing:

- Remove jewelry (rings, bracelets) and watches before washing hands
- Ensure that the nails are clipped short
- Roll the sleeves up to the elbow.

Steps of Hand washing

- Wet the hands and wrists, keeping hands and wrists lower than the elbows (permit the water to flow to the fingertips, avoiding arm contamination).
- Apply soap and lather thoroughly.
- Palms and fingers and web spaces by putting right palm over the left and then left over the right
- Palm to palm and finger interlaced
- Back of the finger to opposing finger over-locked
- Rotational rubbing of right thumb clasped in left palm and vice versa
- Rotational rubbing backwards and forwards with tops of the fingers and thumb of right hand in left and vice versa
- Wash wrist and forearm up to elbow
- Do not lower hand i.e. keep hand folded at elbow
- Close tap with elbow
- Dry hand using sterile cloth / or dry hand in air
- Hand rinsing with alcohol is not a substitute for proper hand washing.
- If running water is not available, use a bucket and pitcher. Do not dip your hands into a bowl to rinse, as this re-contaminates them.
Palm to palm

right palm over left & vice versa

Palm to palm, finger interlaced

Back of fingers to opposing finger interlocked

Rotational rubbing of right thumb clasped in left palm

Rotational rubbing of tips of right fingers and thumb over left palm and vice versa

Figure 1.2: Hand washing technique

See annex 15 for checklist of steps of hand washing
B. Wearing sterile gloves

Indication for wearing sterile gloves

- Wear sterile gloves
  - Receiving baby at delivery
  - Cutting cord and applying 4% chlorhexidine gel
  - Eye care
  - Invasive procedure
    - Blood sampling
    - Venous/umbilical catheterization
    - Urethral catheterization or supra-pubic tap for urine collection
    - Starting IV lines and giving IV/IM injections
    - Giving skin, umbilical or eye care when infected

Procedure for wearing sterile gloves

- Scrub hands thoroughly with soap and water.
- Dry them completely
- Open the glove packet carefully without touching the gloves or the inside surface of the packaging material (The cuffed gloves should be with the palms up)
- Pick up the first glove by the cuff, touching only the inside portion of the cuff (the inside is the side that will be touching your skin when the glove is on).
- While holding the cuff, slip your other hand into the glove (Pointing the fingers of the glove toward the floor will keep the fingers open)
- Be careful not to touch anything, and hold the gloves above your waist level.
- Pick up second glove by sliding fingers of the gloved hand under the cuff of the second glove.
- Be careful not to contaminate gloved hand with ungloved hand as the second glove is being put on
- Put second glove on ungloved hand by maintaining a steady pull through the cuff
- Roll back cuffs (unfold them).
• Adjust the glove fingers until the gloves fit comfortably
• Once sterile gloves are on, hold your hands up and away from your body and always above your waist.
• After a procedure, rinse gloves in chlorine solution while still on hands, including disposables
• After the procedure, always wash gloved hands to remove the blood stains and secretions and rinse gloves in chlorine solution while still on hands, including disposables
• Turn gloves inside out as you take them off and put into 0.5% chlorine solution
• Wash hands again with soap and water.

![Figure 1.3: Proper technique to wearing and removing sterile gloves](image)

See annex 16 for checklist of steps of wearing sterile gloves

C. Skin preparation

Indication
• Before IV cannulation or IM injection or local procedure like lumbar puncture
• For collection of blood samples for culture sensitivity and other investigations.

Steps of venipuncture
• Wash and dry hands.
• Wear sterile glove.
• Prepare skin site, confine to smallest area (5 cm) of skin.
• Swab with alcohol first, allow it to dry.
• Swab with iodine on site and allow it to dry.
• Swab again with alcohol to wipe off iodine.
• Skin is now ready for puncture or prick.

D. Safe disposal of waste

The proper disposal of hospital waste is very important to prevent spread of infection in hospital to other patients, health care workers and prevent the community from contracting infection from hospital waste.

• Needle and syringe
  - Burn needle with needle burner and cut the hub of the syringe with hub cutter
  - Put these in a separate disposable box (Puncture-proof container)
  - Send for incineration when box is three-quarter full

• Blood and body tissue
  - Burn or bury solid waste
  - Send for incineration in leak proof plastic bags
  - Liquid waste into flushable drain if drainage system does not mix with stream

• Contaminated laundry
  - Rinse off contaminated clothes with gloved hand.
  - Do not mix with others
  - Wash with soap

E. Terminal Disinfection

• Terminal disinfection is done after transferring out, discharge or death of a baby
• Preferably all items of the baby to be kept in the incubator Otherwise one can just do routine cleaning thoroughly
• Cleaning of bed:
  o Clean the radiant warmer with soap water 2% (Disinfectant solution such as bacillocid)
  o Use autoclaved linen
  o Put all the contaminated instruments in 0.5% virex for 10 minutes for decontamination

Table 1.2: Methods of cleaning different equipment

<table>
<thead>
<tr>
<th>Articles</th>
<th>Methods</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeding utensils</td>
<td>Wash with soap and water and then boil for 10 mins</td>
<td>Before each use</td>
</tr>
<tr>
<td>Swab container, injection &amp; medicine tray</td>
<td>Wash with soap and water and autoclave</td>
<td>Daily morning</td>
</tr>
<tr>
<td>Oxygen hood</td>
<td>Soap and water</td>
<td>Daily</td>
</tr>
<tr>
<td>Item</td>
<td>Cleaning Method</td>
<td>Frequency</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Weighing scale</td>
<td>2% Disinfectant solution (such as bacillocid)</td>
<td>Daily</td>
</tr>
<tr>
<td>Stethoscope</td>
<td>Spirit swab</td>
<td>Daily</td>
</tr>
<tr>
<td>Body Linen</td>
<td>Wash and autoclave</td>
<td>Every use</td>
</tr>
<tr>
<td>Cotton gauze</td>
<td>Autoclave</td>
<td>As required</td>
</tr>
<tr>
<td>Procedures sets</td>
<td>Autoclave</td>
<td>Every use</td>
</tr>
<tr>
<td>Incubator</td>
<td>Soap water/ 2% Disinfectant solution (such as *bacillocid - not occupied)</td>
<td>Daily</td>
</tr>
<tr>
<td>Cheattle forceps</td>
<td>Autoclave</td>
<td>Daily</td>
</tr>
<tr>
<td>Resuscitation bag and reservoirs,</td>
<td>Soap and water. Immerse in gluteraldehyde for 4-6 hrs. Rinse in distilled water</td>
<td>Weekly for resuscitation bag and reservoir. Daily for others.</td>
</tr>
<tr>
<td>oxygen tubing, bottle and tubing of suction machine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face mask</td>
<td>Clean with soap and water, immerse in 2% gluteraldehyde for 20 mins, rinse in distilled water, dry and wrap with autoclaved linen</td>
<td>Daily and after each use</td>
</tr>
<tr>
<td>Laryngoscope</td>
<td>Clean with spirit swabs thoroughly daily and after each use. Wrap in autoclaved cloth.</td>
<td>If used in infected baby, wash with soap and water. Put the blade in 2% gluteraldehyde after removing the bulb.</td>
</tr>
</tbody>
</table>

* Bacillocid (each 100-gm composed—1,6, dihydroxy2,5 Dioxy hexane11.2 gm, Glutaraldehyde 5.0 gm, Benzylkonium chloride 5.0gm, Alkyl urea derivatives 3.0gm)
<table>
<thead>
<tr>
<th>Waste category, symbol and labeling</th>
<th>Color code for container</th>
<th>Examples of wastes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-risk health care waste</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-risk waste Biodegradables</td>
<td>Green</td>
<td>Left over stuff foods, gardens, fruits peels, flowers, etc.</td>
</tr>
<tr>
<td>Non-risk waste recyclable</td>
<td>Dark blue</td>
<td>Non-biodegradable, which can be recycled: plastic bottles, cans, metals, glass, plastics, papers, rubber, etc.</td>
</tr>
<tr>
<td>Other non-risk health care waste</td>
<td>Light blue</td>
<td>Other health care waste that do not belong to bio-degradable and recyclable.</td>
</tr>
<tr>
<td>HCW requiring special attention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pathological waste</td>
<td>Red</td>
<td>Human body parts, organs</td>
</tr>
<tr>
<td>Hazardous sharps</td>
<td>Red</td>
<td>Needles, glass syringes with fixed needles, scalpels, blades, glass, etc. which may cause puncture and cuts</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>Red</td>
<td>Unused and date expired drugs</td>
</tr>
<tr>
<td>Waste Type</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Cytotoxic pharmaceutical waste</td>
<td>Waste with anti-neoplastic effect such as: alkylated substances, anti-metabolites, antibiotics, plant alkaloids, hormones, etc.</td>
<td></td>
</tr>
<tr>
<td>Infectious and Highly infectious waste</td>
<td>Discarded items contaminated with blood and body fluids from clinically confirmed infected patients including cotton, dressing materials, soiled plaster, linen, bedding, swabs, gloves, syringes without needle, infusion equipment without spike, bandages, other materials contaminated with blood, dialysis equipment, blood from patients infected with HIV, viral hepatitis, brucellosis, respiratory tract secretion from patients infected with TB, anthrax, rabies.</td>
<td></td>
</tr>
<tr>
<td>Highly infectious waste</td>
<td>Waste generated from the microbiological cultures, laboratory waste, such as sputum cultures of TB laboratories, highly concentrated microbiological cultures</td>
<td></td>
</tr>
<tr>
<td>Other hazardous waste</td>
<td>To be discarded by authorized staff only</td>
<td></td>
</tr>
<tr>
<td>Radioactive waste</td>
<td>Waste includes solid, liquid and gaseous waste contaminated with radionuclides such as Cobalt, Technetium, Iodine, Iridium, generated from in-vitro analysis of body tissue and fluid, in-vivo body organ imaging and tumor</td>
<td></td>
</tr>
</tbody>
</table>
SECTION 2: EMERGENCY TRIAGE ASSESSMENT AND TREATMENT (ETAT)
CHAPTER 2.1: INTRODUCTION TO TRIAGE

2.1.1. Case Scenario
A nine-month old baby boy is carried into the outpatient department of a district hospital in his mother’s arms. He appears to be asleep. At the triage desk, he is seen by a nurse and found to have lips and tongue that are grey/blue in color, and he is taken straight into the resuscitation room as an emergency.

In the resuscitation room he is given oxygen from an oxygen concentrator. He is noted to be grunting and breathing very fast. His hands are cold to touch and the capillary refill time is prolonged to four seconds. An intravenous cannula is placed. Blood sample is taken at the same time for blood glucose, hematocrit and other investigations. A normal saline is started at 20ml/kg to run as fast as it can go.

Other treatments are given, depending on the result of the investigations and the response to the treatment he receives. It is now 18 minutes since the baby came through the outpatient department’s door, and his situation is stable. It is now time to take a full history and carry out a full examination to make a definitive diagnosis. He is diagnosed as having severe pneumonia and receives specific treatment for this. However, before coming to this diagnosis, no time was wasted; his status was stabilized, based on a few leading signs and symptoms, even when the medical staff did not know exactly what was wrong with him.

This was good triage and emergency management.

Would it have happened like this in your hospital?

2.1.2 Introduction
Deaths in hospital often occur within 24 hours of admission. Many of these deaths could be prevented if very sick children are identified soon after their arrival in the health facility, and treatment is started immediately. This can be facilitated by rapid triage for all children presenting to hospital to identify those needing immediate emergency care. The Emergency Triage Assessment and Treatment (ETAT) guidelines provide guidance on the most common emergency conditions in children presenting at the health facility.

Therefore, a process of rapid triage for all children presenting to hospital needs to be put in place, to determine whether any emergency or priority signs are present. Triage may be done in 15-20 seconds medical staff, as soon as the child arrives, and no special equipment is needed for this. Once emergency signs are identified, prompt emergency treatment needs to be given to stabilize the condition of the child.

2.1.3: Triage
TRIAGE is the sorting of patients into priority groups according to their need and the resources available. Pediatric triage is the process of rapidly screening all sick children on their arrival in hospital in order to place them in one of the following categories: Colors can also be used for differentiating the three groups, giving a
• RED sticker to Emergency cases,
• YELLOW for Priority
• GREEN for the Queue.

2.1.4 Triage Process
All children should be checked on their arrival in hospital by a person who is trained to assess how ill they are. This person decides whether the patient will be seen immediately and will receive life-saving treatment, or will be seen soon, or can safely wait his/her turn to be examined.
Triage should be quick and you must learn to assess several signs at the same time.
The triage process in sick newborn and children has only few differences.

Emergency signs can be identified on an average in twenty seconds.
Those with EMERGENCY SIGNS require immediate emergency treatment.
• Call for help from more experienced health worker, if available, but do not delay starting treatment.
• Stay calm and work with other health workers who may be required to give the treatment, because a very sick child may need several treatments at once.
• The most experienced health worker should continue assessing the child to identify all underlying problems and prepare a treatment plan.
• Ask about head or neck trauma before providing treatment
• Take careful note if the child is severely malnourished, because this will affect the treatment of shock and dehydration caused by diarrhoea.
• Carry out point of care emergency investigations (eg, blood glucose, hemoglobin, blood grouping and cross-matching - if the child appears to be severely anemic or is bleeding significantly.)
• After giving emergency treatment, proceed immediately to assess, diagnose and treat the underlying condition. All these children should be hospitalized and observed till stabilization.

Those with PRIORITY SIGNS should be given priority in the queue, so that they can rapidly be assessed and treated without delay.

Those who have no emergency or priority signs are NON-URGENT cases. These children can wait their turn in the queue for assessment and treatment. The majority of sick children will be non-urgent and will not require emergency treatment.

After these steps are completed, proceed with general assessment and further treatment according to the child’s priority.

2.1.5 The triage process: What, When, Who?
Triage should be carried out as soon as a sick child arrives in the hospital, well before any administrative procedure such as registration. This may require reorganizing the flow of
patients in hospital. Triage can be carried out in different locations – e.g. in the outpatient queue, in the emergency room, or in a ward if the child has been brought directly to the ward. If a child with emergency signs is identified in the outpatient queue, he/she must quickly be taken to a place where treatment can be provided immediately, e.g. the emergency room or ward.

All medical and other health worker involved in the patient care can perform triage if properly trained and they should also be able to give the initial emergency treatment.

To quickly assess the patient for serious illness or injury, assess emergency signs which can be easily remembered as

<table>
<thead>
<tr>
<th>A: Airway</th>
</tr>
</thead>
<tbody>
<tr>
<td>B: Breathing</td>
</tr>
<tr>
<td>C: Circulation</td>
</tr>
<tr>
<td>D: Dehydration</td>
</tr>
</tbody>
</table>

If the child has any emergency sign of the ABCD, it means the child has an emergency “E” sign and emergency treatment should be started immediately.

**A and B:** Check whether there is any airway or breathing problem.
- Is the child breathing? Look, listen and feel for air movement.
- Is the airway obstructed? (due to tongue fall, foreign body, croup or neck swelling)
- Is the child blue (centrally cyanosed)?
- Does the child have severe respiratory distress? (Is the child having trouble getting breath so that it is difficult to talk, eat or breastfeed? Is he breathing very fast and getting tired, does he have severe chest indrawing or is he using accessory respiratory muscles?)

**C:** Quickly check circulation and decide whether the child is in shock or has impaired circulation.
- Does the child have cold hands?
- Is the capillary refill time longer than 2 seconds in sick children and 3 seconds in neonate?
- Is the pulse weak and fast? Check radial pulse. May check brachial or femoral pulse in infant.
- If the child has impaired circulation, check if the child malnourished?

Then, quickly determine whether the child is **unconscious.** A rapid assessment of conscious level can be made by assigning the patient to one of the AVPU categories:
- Alert
- V- responds to Voice (lethargic)
- P- responds to Pain (coma)
- U- Unresponsive (coma)
And ask and look for **convulsion**. If the **child is convulsing** when brought to hospital or during examination, this is an emergency, requiring immediate treatment.

**D:** Ask whether the child is having **diarrhoea**. If yes, assess for signs of severe dehydration

- If the child is lethargic or unconscious
- If the child has sunken eyes
- If the skin pinch goes back very slowly

**In neonates, the additional emergency signs includes temperature < 36 deg C or 96.8 deg F and weight < 1500 grams.**

**The Need for Frequent reassessment**

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

**2.1.7: Assessing Priority Signs**

If no emergency signs are found, check for priority signs (Box 2.1 and Box 2.2). These can be remembered from the mnemonic 3TPR-MB in sick children. These children need prompt assessment (no waiting in the queue) to determine what further treatment is needed. Move a child with any priority sign to the front of the queue to be assessed next.

**Box 2.1: Priority signs in sick children**

| 1. Tiny baby: | Any sick child aged < 2 months is more likely to deteriorate quickly, has higher chances of infection and is more difficult to assess |
| 2. Temperature: | A child that feels very hot may have high fever, needs to check temperature by thermometer, give an antipyretic, or do investigations like a blood film for malaria |
| 3. Trauma or other urgent surgical condition: | May require specialist consultation or care for acute abdomen, head injury or fractures. |
| 4. Pallor (severe): | Compare the child’s palm with yours. If it is very pale, including the creases, the child may have severe anemia requiring urgent blood transfusion. |
| 5. Poisoning: | A child with history of swallowing drug/poisonous substance or stings/bites may deteriorate quickly and may need specific treatments like antidotes or anti-venoms |
| 6. Pain (severe): | If the child has severe pain, it may be due to serious conditions and may need early assessment and pain relief. |
| 7. Respiratory distress (not severe): | Chest indrawing, tachypnea or difficulty breathing may be signs of respiratory distress, but not severe enough to require emergency treatment. However, if in doubt, initiate treatment immediately. |
8. **Restless, continuously irritable, or lethargic:** A lethargic child responds to voice but is drowsy and uninterested (V in the AVPU scale). The continuously irritable or restless child is conscious but cries constantly and will not settle. The causes for this may be serious, such as meningitis, cerebral malaria etc.

9. **Referral (urgent):** Ask the mother if she was referred from another facility and for any note that may have indicated referral for urgent problem.

10. **Malnutrition (severe acute):** A child with visible severe wasting or oedema of both feet may have severe acute malnutrition, which requires specific management.

11. **Burns (major):** Burns are extremely painful and children who seem quite well can deteriorate rapidly. Get surgical help or follow surgical guidelines and appropriate fluid resuscitation protocol.

---

**Box 2.2: Priority signs in sick newborn:**

| 1. Tiny Baby: Weight 1500-1800g or >4000g |
| 2. Temperature: stress (temp 36.5°C -36°C, 97.7°F-96.8°F) |
| 3. Respiratory distress (rate ≥ 60, no retractions) |
| 4. Irritable/restless/jittery |
| 5. Abdominal distension |
| 6. Severe jaundice |
| 7. Severe pallor |
| 8. Bleeding from any sites |
| 9. Major congenital malformations |
### Chart 2.1 Triage of all sick children

<table>
<thead>
<tr>
<th>Treat</th>
<th>Do not move neck if cervical spine injury possible. Keep the child warm</th>
</tr>
</thead>
</table>
| **AIRWAY AND BREATHING** | • IF NOT BREATHING OR GASPING  
- Rule out neck trauma  
- Manage airway  
- Start basic life support  
• IF FOREIGN BODY ASPIRATION  
- Manage airway in choking child  
• IF NO FOREIGN BODY ASPIRATION  
- Manage Airway  
- Give oxygen  
- Make sure child is warm |
| • Not breathing or  
• Obstructed breathing or  
• Central cyanosis or  
• Severe respiratory distress | ANY SIGN POSITIVE  
• IF NOT BREATHING OR GASPING  
- Rule out neck trauma  
- Manage airway  
- Start basic life support  
• IF FOREIGN BODY ASPIRATION  
- Manage airway in choking child  
• IF NO FOREIGN BODY ASPIRATION  
- Manage Airway  
- Give oxygen  
- Make sure child is warm |
| **CIRCULATION** | • IF the child has any bleeding, apply pressure to stop the bleeding. Do not use a tourniquet  
- Give oxygen  
- Make sure child is warm  
• IF NO SEVERE ACUTE MALNUTRITION  
- Insert IV* and begin giving fluids rapidly  
• IF SEVERE ACUTE MALNUTRITION  
- If lethargic or unconscious:  
  - Insert IV line and give fluids  
  - Give IV Glucose  
- If not lethargic or unconscious:  
  - Give glucose orally or by NG tube  
- Proceed immediately to full assessment and treat- |
| Cold hand with:  
• Capillary refill longer than 3 seconds, and  
• Weak and fast pulse | IF POSITIVE  
• If the child has any bleeding, apply pressure to stop the bleeding. Do not use a tourniquet  
- Give oxygen  
- Make sure child is warm  
• IF NO SEVERE ACUTE MALNUTRITION  
- Insert IV* and begin giving fluids rapidly  
• IF SEVERE ACUTE MALNUTRITION  
- If lethargic or unconscious:  
  - Insert IV line and give fluids  
  - Give IV Glucose  
- If not lethargic or unconscious:  
  - Give glucose orally or by NG tube  
- Proceed immediately to full assessment and treat- |
| **COMA/CONVULSING** | • Manage airway  
- Position the unconscious child (if head or neck trauma is suspected, stabilize the neck first)  
- Give oxygen  
- Check and correct hypoglycemia  
- Give IV calcium if infant <3 months  
- If convulsion continue give anti-convulsant  
- Make sure the child is warm |
| • Coma or  
• Convulsing (now) | IF COMA OR CONVULSING  
• Manage airway  
- Position the unconscious child (if head or neck trauma is suspected, stabilize the neck first)  
- Give oxygen  
- Check and correct hypoglycemia  
- Give IV calcium if infant <3 months  
- If convulsion continue give anti-convulsant  
- Make sure the child is warm |
| **SEVERE DEHYDRATION (ONLY IN CHILD WITH DIARRHOEA)** | • IF NO SEVERE ACUTE MALNUTRITION  
- Insert IV line and begin giving fluid (NS/RL) rapidly  
• IF SEVERE ACUTE MALNUTRITION  
- Do not give IV fluids , give ORS(ReSoMal)  
- Proceed immediately to full assessment and treat- |
| Diarrhoea plus any two of these:  
• Lethargy  
• Sunken eyes  
• Very slow skin pinch | DIRRHOEA plus TWO SIGNS POSITIVE  
• IF NO SEVERE ACUTE MALNUTRITION  
- Insert IV line and begin giving fluid (NS/RL) rapidly  
• IF SEVERE ACUTE MALNUTRITION  
- Do not give IV fluids , give ORS(ReSoMal)  
- Proceed immediately to full assessment and treat- |

*If not able to insert peripheral IV, insert an external jugular or intraosseous line.  
# 5 ml/kg every 30 mins for 2 hours

**Note:** If a child has trauma or other surgical problems, get surgical help or follow surgical guidelines.  
Urgent Proceed with assessment and further treatment according to the child’s priority.
Chart 2.2 Triage of sick newborns

Triage of a sick or at risk newborn who presents at Health Facility

**Emergency Signs**
- Weight <1500g
- Hypothermia (temp <36°C, 96.8°F)
- Apnea or gasping respiration
- Severe respiratory distress (rate >70, severe retractions, grunt)
- Central cyanosis
- Shock (cold periphery, CRT >3 secs, weak & fast pulse)
- Coma, convulsions

**Priority Signs**
- Weight 1500-1800g or >4000g
- Cold stress (temp 36.5°C - 36°C, 97.7°F-96.8°F)
- Respiratory distress (rate ≥ 60, no retractions)
- Irritable/restless/jittery
- Abdominal distension
- Severe jaundice
- Severe pallor
- Bleeding from any site
- Major congenital malformations

**Non-urgent Signs**
- Weight >1800g-2500g
- Transitional stools
- Possetting (regurgitation)
- Minor birth trauma
- Superficial infections
- Minor malformations
- Jaundice
- All cases not categorized as Emergency/Priority

**Classify**
- Initiate Emergency Treatment
- Assess and act rapidly signs
- Access and Counsel

Newborns Classified as “Emergency” require urgent intervention and emergency measures. All Such Newborns will be admitted to SNCU after initial stabilization.

Newborns classified as "Priority" are sick and need rapid assessment and admission to SNCU. Newborns classified as non-urgent do not require urgent attention but require further assessment and counseling.
# Chart 2.3: Assessment and treatment of newborns displaying emergency signs

<table>
<thead>
<tr>
<th>ASSESS FOR EMERGENCY SIGNS</th>
<th>TREAT EMERGENCY SIGNS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TEMPERATURE</strong></td>
<td><strong>Cold to touch</strong></td>
</tr>
<tr>
<td></td>
<td><em>(abdomen)</em></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AIRWAY AND BREATHING</strong></td>
<td><strong>Not breathing or gasping or Central cyanosis or</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Severe respiratory distress</strong></td>
</tr>
<tr>
<td></td>
<td>• Respiratory rate &gt;60/min</td>
</tr>
<tr>
<td></td>
<td>• Severe lower chest in-drawing</td>
</tr>
<tr>
<td></td>
<td>• Apnoeic spells</td>
</tr>
<tr>
<td></td>
<td>• Grunting</td>
</tr>
<tr>
<td></td>
<td>• Unable to feed</td>
</tr>
<tr>
<td><strong>CIRCULATION</strong></td>
<td><strong>Capillary refill longer than 3 seconds and weak and fast pulse (&gt;160)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CONVULSIONS</strong></td>
<td><strong>Convulsions</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>
CHAPTER 2.2: AIRWAY AND BREATHING

The letters A and B in “ABCD” represent “airway and breathing”. Respiratory problems are common in infants and children and are the predominant cause of death in them. Assessment and treatment decisions must be made quickly to prevent respiratory failure and cardiopulmonary arrest.

2.2.1 Assessment of Airway and breathing

❖ Is the Child Breathing?
To assess whether 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 is present, look again to see whether the chest is moving.

Listen: Listen for any abnormal breath sounds. Is there stridor, wheezing or grunting?

Feel: Can you feel the breath at the nose or mouth of the child?

❖ Is the Airway Obstructed?
If the child is not breathing, or if the child has severe respiratory distress, is there an obstruction to the flow of air?

❖ 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.

❖ Does the Child have Severe Respiratory Distress?
If the child is talking, drinking or feeding comfortably, or appears to be happy, there is no severe respiratory distress (or obstructed breathing). Observe whether the child has significant discomfort from not getting enough air into the lungs.

- Is the child breathing very fast > 70/min or have severe lower chest wall in-drawing, or using the auxiliary muscles for breathing which cause the head to nod or bob with every inspiration? The latter is particularly seen in young infants.
- Is there difficulty in breathing while talking, eating or breastfeeding?
- Is oxygen saturation SpO2 less than 90%?

❖ Abnormal breathing sounds
Are there any noises heard when breathing in? A harsh noise on breathing in (inspiration) is called stridor, a short noise when breathing out (expiration) in young infants is called grunting. Both sounds are signs of severe respiratory problems.
Box 2.2: Signs of Severe Respiratory Distress

- Labored or very fast breathing
- Severe chest in drawing
- Use of accessory muscles
- Head nodding
- Nasal flaring and cyanosis
- Inability to feed because of respiratory problems
- Abnormal respiratory noises (Stridor, grunting)
- SpO2 (Oxygen saturation) < 90%

If the child is breathing adequately, go to the next section to quickly continue the assessment for other emergency signs. If the child has an airway or breathing problem, you should initiate appropriate treatment and then quickly resume the assessment.

Appropriate treatment airway and breathing problems include:

a. Is trauma of the neck a possibility?
b. Positioning to improve the airway
c. Ventilate with Bag and Mask
d. Management of a choking child
e. Oxygen therapy

2.2.2. Is Trauma of the Neck a Possibility?

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.

2.2.3. Positioning to Improve the Airway in absence of trauma

Children are at higher risk of having respiratory obstruction and failure due to small size of upper airway, large size of tongue, smaller and compliant subglottic area, relatively compliant chest wall and limited oxygen reserve. To treat an airway or breathing problem you should first open the airway and then begin giving oxygen.

The drawings below show the chin lift (figure 2.1 & 2.2). This is a way of opening the airway in children who have not been subjected to trauma. The drawings illustrate two different positions. To do this safely you must know if the child has been subjected to any trauma. In such a case, it is important not to tilt the head or move the neck. It is also important to know the child’s age because you will position an infant differently from a child.
**Head tilt-chin lift manoeuvre**

The neck is slightly extended and the head is tilted by placing one hand onto the child’s forehead. Lift the mandible up and outward by placing the fingertips of other hand under the chin. In an infant a neutral position (nose up) (figure 2.1) and in a child a sniffing position (chin up) is maintained (figure 2.2).

![Figure 2.1: Neutral Position in an Infant](image1)

2.2.4. **Positioning to improve the airway in presence of trauma**

If you suspect trauma, open airway with jaw thrust to limit the risk of aggravating a potential cervical spine injury while you immobilize the cervical spine. Jaw thrust is safe to use in cases of trauma for children of all ages. 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 (figure 2.3). The jaw thrust maneuver is also used to open the airway when bag-mask ventilation is performed.
Figure 2.3: Jaw Thrust without Head Tilt

- Kneel behind the patient's head
- Rest your elbows on the surface on which the patient is lying
- Place one hand on each side of the patient's head.
- Place the tips of your index and middle fingers under the angles of the patient's jaw. (This is done on both sides)
- Place your thumbs on the patient's jaw just below the level of the teeth. The thumbs will keep the patient's head from turning or tilting during the lift.
- Lift the jaw upward with your fingertips. The mouth should not be closed as this could prevent air from entering the patient's airway. Use your thumb to retract the patient's lower lip if needed.
- If the lift does not open his airway (tongue is still blocking the airway), lift the jaw up a little further. If you are unable to obtain an airway with the jaw-thrust method, the head-tilt/chin-lift method should be used. The importance of maintaining a patent airway outweighs the risk of spinal damage.

Cervical spine immobilization:

Cervical immobilization is needed to protect extension of an existing spinal cord injury following head and neck trauma. In a child with history of neck trauma the neck is immobilized with a cervical collar, and the body is placed on a spine board and secured with straps. Cervical collar should be rigid, appropriate sized and should not interfere with management of airway. The child should be adequately secured to a backboard in order to fully immobilize the cervical spine and body.

Care must be taken to avoid flexion or extension of the neck when the patient is placed on the backboard. Patient should be kept in neutral position to maximize cervical spine protection. The neutral position is defined as "the normal anatomic position of the head and body that one assumes when standing and looking straight ahead". Neutral positioning in children requires special precautions because of their relatively large head size and prominent occiput. The prominent occiput in children and infants forces the cervical spine into flexion when the child is supine. To prevent flexion the back can be elevated by the placement of padding under the shoulders. The approach to cervical spine stabilization
depends upon the position in which the patient is found. Patients who are found in the prone position must be first log-rolled to the supine position for further evaluation and management. A rigid cervical collar should be applied before rolling the patient.

2.2.5 Ventilate with Bag and Mask

If the child is not breathing or breathing is inadequate (as judged by insufficient chest movements and inadequate breath sounds) even after management of the airway, ventilate with a self-inflating bag and mask.

Before use, check the bag and valve by closing the patient’s connection with your thumb and attempt to expel air from the bag. If the bag and valve are in order, this will not be possible until you release your thumb. If either the bag or valve is faulty, the bag will empty easily. The essence of the technique is to roll the mask onto the face from the chin while avoiding the eyes, with a finger and thumb apply a strong even downward pressure to the top of the mask.

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 2.4.

![Figure 2.4: Choosing the correct mask size](image)

There are several sizes of mask, and a selection of these should be available. Self-inflating bags of minimum volume 450-500ml should be used.

Use only the force and tidal volume necessary to cause the chest to rise visibly. Reservoir and oxygen (5-6L/min) should be connected to the self-inflating bag during resuscitation. If oxygen is not available, use room air for resuscitation. With room air 21% oxygen is delivered but by using oxygen source with reservoir 60% to 90% oxygen can be delivered.
Perform the bag and mask ventilation with E-C clamp technique (figure 2.6). Position the thumb and index finger in a C shape over the mask and exert downward pressure on the mask to ensure proper air seal. Position the last 3 fingers under the angle of mandible to lift the jaw. If you are alone, maintain the E-C clamp with one hand and compress the bag with the other hand. More effective ventilation can be achieved when performed by 2 persons.

If effective ventilation is not achieved (i.e. the chest does not rise) perform the actions listed in Box2.2. If signs of circulation are present but spontaneous breathing is absent, continue bag and mask ventilation at a rate of 20 breaths/minute for a few minutes and see if child revives and starts to breathe spontaneously. If bag and mask ventilation is prolonged it can cause gastric inflation, which can be relieved by nasogastric tube.

Box 2.4: Actions to be taken if effective ventilation is not achieved (MRSOPA)
With the two-provider technique, one person should hold the mask with both hands, while the other person bags the patient.

An alternative method is for the mask holder to apply pressure to the mask while using fore finger to apply jaw lift.

Figure 2.7: Two provider technique for holding mask

When two persons are available and only ventilation is required, use above mentioned method.
In spontaneous breathing patients, gentle positive-pressure breaths administered with bag and mask should be carefully timed to augment the child’s effort. If not breathing adequately intubate/call help for intubation and provide tracheal tube ventilation to the child as it is the most effective and reliable method of assisted ventilation. Some of these children may additionally need chest compression.

**Box 2.5: Rescue breathing for infants and children**

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Give 1 breath every 3 to 5 second (about 12 to 20 breaths/min)</td>
<td>Give each breath in 1 second</td>
</tr>
<tr>
<td>Each breath should result in visible chest rise</td>
<td>Check the pulse about every 2 minutes</td>
</tr>
</tbody>
</table>

After 2 effective ventilations, check the pulse for no more than ten seconds. If pulse is absent, chest compression should be started. (Refer to Section 2.2.5)

See *aanex 17 for checklist of effective bag and mask*

### 2.2.6 Management of a Choking Child (who is conscious)

A child with a history of aspiration of a foreign body who shows increasing respiratory distress is in immediate danger of choking. Attempts to remove the foreign body should be made instantly. **Do not hesitate.**

Obstruction can occur at several levels. The tongue can fall back and obstruct the pharynx, or a foreign body (such as a piece of fruit) can lodge in the upper airway. Croup and epiglottitis can also cause upper airway obstruction. Coins and peanuts are notorious causes of aspiration and subsequent choking. Ask the child's caretaker explicitly for a history of choking. Foreign body should be suspected in cases of sudden respiratory distress associated with coughing, gagging, stridor, cyanosis, or wheezing. **Do not try to remove the foreign bodies in the upper airway by blind finger sweep, it may result in pushing back of foreign body into the airway or may cause serious bleeding.**

The treatment differs depending on whether there is a foreign body causing respiratory obstruction or some other cause for the obstruction or respiratory distress. If child is able to cough or cry it indicates partial obstruction, **consider referral where bronchoscopy facility is available.** If a foreign body is causing the obstruction it is life threatening and needs immediate interventions. Different methods are used for clearing up foreign body in infants and children.
Management of conscious infant (Fig 2.8)

- Lay the infant on your arm or thigh in a head down position and support the head by firmly holding the jaw.
- Give 5 blows to the infant's back with heel of hand between the shoulder blades.
- If obstruction persists, turn infant over and give 5 chest thrusts with 2 fingers, one finger breadth below nipple level in midline.
- If obstruction persists, check infant's mouth for any foreign body which can be removed.
- If necessary, repeat sequence until the foreign body is expelled or the patient becomes unconscious. If he becomes unconscious start CPR.

Figure 2.8: Slapping the back to clear airway obstruction in a choking infant

Management of conscious child: Abdominal thrusts (Heimlich maneuver) ≥ 1 year (Fig 2.9)

- The child may be sitting or standing.
- Stand or kneel behind the child and encircle his torso by putting both arms directly under axillae.
- Place the thumb side of one fist against the victim’s abdomen in the midline slightly above the navel and well below the tip of the xiphoid process.
- Place the other hand over the fist and pull upwards into the abdomen, repeat this
  - Heimlich maneuver 5 times.
- If the obstruction persists, check the child's mouth for any foreign body which can be removed.
If necessary, repeat this sequence until the foreign body is expelled or the patient becomes unconscious.

After you have performed this procedure you should check inside the mouth for any foreign body. Obvious foreign bodies should be removed. Secretions should be cleared from the throat. The breathing should be checked again.

If necessary, repeat this sequence until the foreign body is expelled or the patient becomes unconscious.

2.2.7 : Management of a choking child (who is unconscious)

If you do not definitely feel a pulse, begin CPR starting with chest compressions (C-A-B sequence).

**Chest Compressions**
If you do not confidently detect a pulse or other signs of circulation or if heart rate is less than 60/min in an infant or child with signs of poor perfusion even after adequate oxygenation and ventilation, provide chest compressions coordinated with ventilations. Recheck pulse after 2 minutes. The child should be supine on a hard-flat surface.

**Chest compression in the infant**
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 2.11).

- This is preferred method when 2 or more health workers are available
- Stand at the infant's feet or side
- Place your thumbs side by side over lower half of sternum, encircle the infant’s chest and support the infants back with the fingers of both hands.
- Use both thumbs to depress the sternum.

![Figure 2.10: Chest Compression-Thumb Technique](image)

**b. 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 sternum (avoiding compressing on or near the xiphoid process), while the other hand is used to support the baby's back (unless the baby is on a very firm surface) *figure 2.11*.

![Figure 2.11 2-Finger Technique](image)

**High quality CPR**

- 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 antero-posterior diameter of the chest.
- **“Push fast”**: push at a rate of at least 100 compressions per minute.
- **Release completely** to allow complete recoil of the chest by completely releasing the pressure but maintaining contact with the compression site.
- **Minimize interruptions** in chest compressions.
- The ratio of chest compressions and ventilation should be **15:2 if there are two rescuers**. Two effective breaths should be given after every 15 chest compressions. With a single rescuer the ratio of chest compressions and ventilation should be 30:2. *(box 2.4)*
Box 2.4: High quality CPR

- Rate at least 100/min
- Compression depth to at least 1/3 AP diameter of the chest, about 1.5 inches (4 cm) in infants and 2 inches (5 cm) in children
- Allow complete chest recoil after each compression
- Minimize interruptions in chest compressions
- Avoid excessive breaths

*Chest compressions for the child (1 year or above)*

- Place the heel of one hand over the lower half of the sternum. Lift your fingers to avoid pressing on the ribs (*figure 2.12*)
- Depress the sternum ⅓ to ½ of the depth of the chest. This corresponds to approximately 4-5 cm. Compress at the rate of approximately 100 times per minute.
- The compression to ventilation ratio remains same as described for infants.

*Figure 2.12: Chest Compression for the Child 1 year or above*

*See annex 18 for checklist of steps of chest compression*

*Chart 2.4: Sequence of Actions for a Choking Child*
2.2.7: Give Oxygen

For all children who have any problem with their airway or breathing, always give oxygen first, while you continue to assess for other problems. Oxygen therapy should be guided by pulse oximetry.

- When the child has only respiratory distress, oxygen supplementation is recommended at SpO2 < 90%.
- Children presenting with other emergency signs with or without respiratory distress should receive oxygen therapy if their SpO2 is <94%. When a pulse oximeter is not available or pulse oximeter does not pick saturation (shock, hypothermia) the necessity for oxygen therapy should be guided by clinical signs and should be continued till emergency signs persist. Oxygen therapy can be stopped when a child no longer has emergency signs and maintains a peripheral capillary oxygen saturation ≥90% in room air.

Sources of oxygen to treat hypoxemia

There are two possible sources of oxygen: oxygen concentrators and oxygen-filled cylinders

- Oxygen concentrators work by pumping room air through a zeolite canister to remove nitrogen, thus concentrating the oxygen. The device is of moderate cost, requires little maintenance, and, once purchased, produces oxygen continuously at low cost. A continuous electrical supply is required, however, to operate the pump.
- Oxygen cylinders are easy to use, requiring only a flow meter and appropriate tubing, and can operate even when there is no electrical supply. The oxygen in cylinders is, however, relatively expensive and maintaining a constant supply is often difficult, especially at peripheral hospitals and health centers. They are useful during transportation.

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.
- If the child is unconscious, manage airway and do suction to maintain the airway.
- In an alert child with respiratory difficulty allow him to remain in a position of comfort because they will assume a position that promotes optimal airway patency and minimizes respiratory effort.

It is important to have the proper equipment to control oxygen flow rates.

Severely ill children with signs of obstructed breathing, central cyanosis, severe respiratory
distress or signs of shock or who are unconsciousness should receive oxygen initially by nasal prongs at a standard flow rate (0.5 – 1 L/min for infants and 2-4 L/min for older children) or through an appropriately sized face mask (flow rate > 4 L/min) to reach a peripheral capillary oxygen saturation ≥ 94%.

1. **Nasal Prongs**

Nasal prongs are the preferred method of delivery in most circumstances, as they are safe, non-invasive, reliable and do not obstruct the nasal airway.

![Figure 2.13: Nasal prongs correctly positioned and secured](image)

**Nasal prongs** are short tubes inserted into the nostrils. Place them just inside the nostrils and secure with a piece of tape on the cheeks near the nose (Fig 2.13 and Fig 2.14). Care should be taken to keep the nostrils clear of mucus, which could block the flow of oxygen. Prongs come in different sizes for adults and children. Nasal prongs are best for delivering oxygen to young infants and children with severe croup or pertussis; do not use a nasal catheter as they provoke paroxysms of coughing.

![Figure 2.14: Nasal Prongs with Tubing](image)

Nasal prongs are preferred method for oxygen administration because of minimal wastage of oxygen by this method.
2. **Oxygen mask**: The soft vinyl pediatric mask is often poorly tolerated by infants & toddlers but may be accepted by older children. A flow rate of 6 liters/minute should be kept and titrated with SpO₂ monitoring.

3. **Oxygen hood (Head box)**: A clear plastic shell that encompasses the patients head. It is very well tolerated by infants; allow easy access to the chest, trunk and limbs and permits control of inspired oxygen. A high flow rate is required (10 liters/minute). As a rule, a hood is too small to use with children older than approximately 1 year.

4. **Nasal catheter** is made from tubing of 6 or 8 FG size such as a nasogastric tube or suction catheter. The tubing is inserted into either nostril a distance equivalent to that from the child's nostril to the inner eyebrow. It must then be firmly secured using tape, and connected to the oxygen. The tip of the catheter should NOT be visible below the uvula. Set a **flow rate of 0.5-1 litres for infants and 1-2 litres/ min for older children**. Remove and clean the nasal catheter or prongs at least twice a day.

**For standard flow oxygen therapy, humidification is not needed. In an emergency setting** when a flow > 4 L/min through nasal cannulae is required for more than 1-2 h, effective heated humidification should be added.

**Monitoring during Oxygen Therapy**

Monitor the child at least every 2-4 hourly to identify and correct any problems, including:

- Oxygen saturation, by pulse oximeter
- Position of nasal prongs
- Leaks in the oxygen delivery system
- Oxygen flow rate
- Airway obstructed by mucus (clear the nose with a moist wick or by gentle suction)

**Duration of Oxygen Therapy**

Oxygen therapy can be stopped when a child no longer has ETAT emergency signs and maintains a peripheral capillary oxygen saturation ≥ 90% in room air. When the child is stable and improving, take the child off oxygen for 15 min. If the SpO₂ readings in room air remain ≥ 90%, discontinue oxygen but check again 30 min later and every 4 hourly thereafter on the first day off oxygen to ensure that the child remains stable.
CHAPTER 2.3: CIRCULATION

2.3.1. Assess the circulation status
After the airway has been opened, to assess if a child has a circulation problem you need to know:
- Does the child have cold hands?
- Is the capillary refill time (CRT) longer than 2 seconds?
- Is the pulse weak and fast?
- Is severe acute malnutrition present?

2.3.1(a) Are the child’s hands cold?
To assess the circulation, take the child's hand 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 feel cold, you need to assess the capillary refill.

2.3.1(b) Is the CRT>2 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 an infant for 5 seconds (Fig 2.15). CRT is the time from release of pressure to complete return of the pink color. Normally it is less than 3 seconds. If it is >2 seconds then this is prolonged.

While checking the CRT in a limb, lift it slightly above heart level. Lifting of the limb helps in assessing arteriolar capillary refill and not venous stasis. Lifting is not required when tested on forehead or sternum. Capillary refill is prolonged in shock because the body tries to maintain blood flow to vital organs and reduces the blood supply to less important parts of the body like the skin (peripheral vasoconstriction). This sign is reliable except when the room temperature is low, as cold environment can cause a delayed capillary refill.

2.3.1(c) Is the pulse weak and fast?
Check the child’s pulse (take at least 5 seconds but no more than 10 seconds). Check for the carotid pulse in a child. In infants, check brachial pulse. If the infant is lying down,
you may check the femoral pulse. If you do not definitely feel a pulse within 10 seconds, start chest compressions.

**Locating the Central Pulse**

- For palpating a carotid pulse, locate the trachea, using 2 or 3 fingers, slide these 2-3 fingers into the groove between the trachea and the muscles at the side of the neck. Feel for pulse at least 5 seconds but no more than 10 seconds
- For palpating brachial pulse in an infant, place 2 fingers on inside of the upper arm, between the elbow and the shoulder
- For palpating femoral pulse, place 2 fingers in the inner thigh, midway between the hip bone and the pubic bone and just below the crease, where the thigh meets the abdomen.

When a child or infant has a pulse, but is not breathing effectively, rescuers should give breaths without chest compressions. This is rescue breathing. In infants and children, if, despite adequate oxygenation and ventilation, the pulse is <60/min with signs of poor perfusion, start cardio pulmonary resuscitation (CPR), starting with chest compression (C-A-B sequence).

The central pulse (a pulse nearer to the heart) should be felt. If this is strong and not obviously fast, then the pulse is adequate and no further assessment is needed. In an infant the best place to feel pulse is at the middle of the upper arm medially (brachial pulse) as shown in Fig 2.16. If the child is lying down, feel for the femoral pulse in the groin. Locate the superior border of the pubic symphysis in the mid line of the body. Feel the bony prominence in the anterior limit of the iliac crest. The femoral pulse can be found midway between these two bony points (the mid-inguinal point). In an older child, feel for the carotid pulse in the neck. Pulse is fast if rate is > 160/min in an infant and >140/min in children above 1 year.

![Figure 2.16: Palpating the brachial artery](image)

Note that it is not recommended to check blood pressure to assess for shock during the ETAT because of two reasons:

Low blood pressure is a late sign in children and may not help to identify early (compensated) shock cases. Normal BP readings will not exclude compensated type of shock. However, Blood Pressure measurement helps identify hypotensive shock, when systolic BP is less than 5th percentile for age.
2.3.1(d) Assessment of nutritional status of the child

Nutritional assessment of the child is done at this point as child with severe acute malnutrition in shock should be managed in a different manner.

- **Calculate the age of the child**
- **Check weight and height** (See chapter 7)
- **Plot the weight and height on the weight for height chart and interpret the findings** (See annex 6 for growth charts)
  - Select the appropriate Growth Chart i.e. weight for height/length based on the child's sex.
  - Growth measurements will be plotted on the selected charts.

**Interpret the finding of the plotted weight**

- Z score of +2 to -2 is normal
- Z score of -2 to -3 is suggestive of moderate abnormality
- Z score of less than -3 is suggestive of severe abnormality

For example: A 2 years old boy with Weight- 8 kg and Height- 100 cm (Fig. 2.17 and Fig. 2.18)

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**Fig 2.17: Plotting weight on Growth Chart**
7.1.1. Check for pitting edema on both feet
Oedema in a child with SAM starts from the dependent part i.e. feet in a mobile child. As the severity of oedema increases, it extends to the legs. In severe cases, it may also be seen on upper limbs and face (anasarca).

To check for edema, grasp both feet so that they rest in your hands with one thumb on top of each foot. Press your thumbs gently for a few seconds (approx. 10). Child has bilateral pitting oedema if pit (dents) remains in both feet when you lift your thumbs. (Fig. 2.19)
7.1.2. Measure MUAC
Use Shakir’s tape. Measuring MUAC is not used in children less than 6 months of age.

**According to color calibration**
- Red- Severe malnutrition
- Yellow- Moderate malnutrition
- Green- No malnutrition

**According to single cut-offs**
- <11.5 cm- Severe malnutrition
- ≤11.5 <12.5- Moderate malnutrition
- >12.5- Normal

**Presence of these features suggests severe acute malnutrition if one sign present**
- Wt for height Z score < 3SD
- MUAC < 11.5 cm
- Bilateral pitting edema in legs

**Definition and classification of Shock**
Shock is a critical condition that results from inadequate delivery of oxygen and nutrients, to meet tissue metabolic demand and is characterized by inadequate peripheral and end-organ perfusion. Shock can occur with a normal, increased or decreased systolic blood pressure. In children, most cases of shock has low cardiac output; however, in some types of shock (e.g. caused by sepsis or anaphylaxis), cardiac output may be high. All types of shock can result in impaired function of vital organs, such as the brain (decreased level of consciousness) and kidneys (low urine output).

**Types of Shock:**
- **Hypovolemic shock** (due to fluid loss from diarrhoea, vomiting, third space loss in intestinal obstruction, dengue, burn or DKA or blood loss from trauma or bleeding disorder)
- **Cardiogenic shock** (due to impaired cardiac contractility resulting from congenital or acquired heart diseases or myocarditis)
- **Obstructive shock** (due to obstructed blood flow resulting from pneumothorax or cardiac tamponade)
- **Septic shock** (due to capillary leak and inappropriate distribution of blood volume, resulting from severe infections)
- **Anaphylactic shock** (due to severe allergic reaction) & **Neurogenic shock** (inappropriate distribution of blood volume and flow)

The commonest 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 children with shock and without severe acute malnutrition.

2.3.2 Clinical progression of shock from compensated state to multi-organ failure
In the initial phase of any type of shock, compensatory mechanism sets in, in the form of tachycardia and increased peripheral vascular resistance to increase the blood supply to the vital organs like brain, heart and kidneys. When blood is diverted from peripheral
circulation, hands and legs become cold and clammy and capillary refill will be slow. Peripheral pulses become fast but weak and child looks pale.

Pulse pressure, which is the difference between systolic and diastolic pressure, helps to identify the type of shock. In hypovolemic and cardiogenic shock, pulse pressure becomes narrow while it is wide in distributive shock like septic shock and anaphylactic shock.

When shock is not corrected in this early, compensated phase, it goes into decompensated phase in which blood pressure falls.

For quick estimation of hypotension in a child, use the following formula.

**Systolic BP < 70 + (age in years x 2) mmHg**

This applies for 1-10 years of age. In infants systolic BP < 70 mmHg is hypotension while in term neonates < 60 mmHg is hypotension. After 10 years, SBP < 90 mmHg is hypotension.

When there is hypotensive shock, the blood supply to the end organs becomes compromised. Child becomes irritable, then drowsy or lethargic and then unconscious. Urine output decreases. This is the phase when multi organ dysfunction and failure can occur.

Peripheral pulses may be absent and even ventral pulse can be weak or absent and heart rate begins to fall. When shock is not corrected even at this phase, child deteriorates rapidly and can die within an hour due to cardiac arrest.

### 2.3.4 Treatment of Shock:

If the child has cold hands and a CRT >2 seconds, and a fast & weak pulse, then he or she is in shock. Treatment of shock requires teamwork and following actions need to be started simultaneously

1. If the child has any bleeding, apply pressure to stop the bleeding (do not use tourniquet)
2. Management of airway and Breathing-Maintain a patent airway and support breathing as described in ETAT section. Give 100% oxygen and provide positive pressure ventilation if there is no spontaneous breathing.
3. Establish IV access at an appropriate site or intra-osseous access. Begin fluid resuscitation & start specific treatment for the condition leading to shock. Follow aseptic technique to insert the intravenous cannula.
4. Correction of underlying metabolic, electrolyte and acid base abnormalities. Check and correct hypoglycemia, hypocalcemia and acidosis. Make sure the child is warm.
5. Monitoring: Assess the effectiveness of fluid resuscitation and inotropic therapy by frequent monitoring of:
   - Heart rate
- Pulse rate
- Level of consciousness
- Temperature
- SpO2
- Blood pressure
- Urine output - May need continuous catheterization to monitor urine output

6. Laboratory studies: Take blood samples for emergency laboratory tests including
   - CBC
   - Blood glucose
   - Serum electrolytes (sodium, potassium, calcium)
Other investigations if facilities are available:
   - CRP
   - Chest X-ray
   - Blood culture

7. Medications: Use vasopressors like dopamine.

8. Referral - If no improvement after dopamine at 20 mcg/kg/min

Refer to annex 19 for checklist of insertion of intravenous cannulation
Refer to annex 20 for checklist of intramuscular injection
Refer to annex 21 for checklist of intraosseous insertion
Refer to annex 22 for checklist of urinary bladder catheterization

2.3.5 Administering IV Fluids Rapidly For Shock in a Child Without Severe Malnutrition (Chart 2.5)

Expansion of circulating blood volume is a critical component of treatment for any type of shock. Early volume replacement is important to prevent progression to refractory shock and multiple organ dysfunctions. Therefore, quickly establish vascular access in all patients with shock. Volume expansion is best achieved with isotonic crystalloid solutions such as normal saline (NS) as they are easily available and effectively expand the intravascular volume.

As only approximately one fourth of administered solution remains in the intravascular compartment, large quantity of crystalloid solution must be administered in hypovolemic children. (See Box 2.7) Large quantity of fluids may cause problems in severely malnourished or children with cardiogenic shock.

Colloid solutions (e.g. hemacel, 5% albumin, blood, and fresh frozen plasma also are efficient volume expanders but are not easily available or may cause hypersensitivity reactions and other complications. If the signs of poor perfusion persist despite adequate fluid bolus, start inotrope (Dopamine).
How to give Dopamine

Amount of dopamine in (mg) to be added in 50 ml NS=
3 x ugm/kg/min x weight in kg divided by ml/hr

This gives the amount in mg. if divided by 40 this gives the amount in ml.
- Example: Giving 10mcg/kg/minute for a 10kg child at rate of 10 ml/hr
- Amount of dopamine (mg) to be added in 50 ml NS = 3x10x10 divided by 10= 30 mg To convert this dose into amount to ml of dopamine: 30/40
- 0.75ml
- Add 0.75ml of dopamine to 49.25ml to make 50ml of total fluid
- 10ml/hour of this fluid gives 10mcg/kg/minute. This is equal the rate of 10 microdrops/minute

Refer annex 23 for checklist for the detail procedure of preparation and administration of Dopamine.

Refer annex 24 for checklist for the detail procedure of Blood Transfusion.

Box 2.7: Initial fluid therapy in a child with shock

When signs of shock are detected, rapidly administer a fluid bolus of 20 ml/kg of Normal Saline as fast as possible (over 5-10 mins) and assess child’s response (pulse rate, capillary refill, breathing rate). Placement of a 3-way stopcock in the IV tubing system can facilitate rapid fluid delivery as fluids can be pushed by syringe or applying pressure over the plastic fluid bottle.

If you reassess the circulation and find a definite improvement at any stage, the pulse has slowed or the capillary refill has improved, you can prescribe maintenance fluids along with deficit fluid if needed and move onto the next stage of triage.

If the child is still in shock, consider giving additional fluid 20 ml/kg over 5-10 minutes: Consider giving 10 ml/kg bolus over 20-30 minutes in neonates suspected cardiogenic shock and septic shock. In neonates only 30 ml/kg of total boluses can be given.
Chart 2.5: How to Give IV Fluids Rapidly for 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.

Insert an intravenous line and draw blood for emergency laboratory investigations.

- Give Ringer’s lactate or normal saline.
- Infuse first bolus 20ml/kg over 5-10 mins.

Reassess Child

- No improvement/No deterioration
  - Repeat Second Bolus of 20 ml/kg
  - No Improvement

- Improvement
  - If improvement with fluid bolus at any stage:
    - Fluid responsive shock
      - Observe and continue maintenance and deficit fluids
  - Fluid Refractory shock
    - Manage as septic shock
      - Add broad spectrum antibiotics
      - Start dopamine infusion at 10 mcg/kg/min and assess every 15min
      - Increase by 5 mcg/kg/min if no response up to 20mcg/kg/min

  - If deterioration (increase in RR>5 and HR>15) Stop fluid, consider cardiogenic or septic shock.

# Signs of improvement: Good volume and slowing pulse rate and faster capillary refill.
2.3.6 Administering IV Fluids for Shock In A Child With Severe Malnutrition (Chart 2.6)

Shock in children with severe malnutrition is difficult to assess and manage. Malnutrition not only affects the muscles but also other internal organs. The heart become very weak and may fail if it has to pump large volumes of fluid. Fluid accumulates in the lungs (pulmonary oedema) and makes breathing difficult with the child getting worse or even critical. Therefore, a child who is severely malnourished should not be treated by rapid IV infusion of fluid.

Children with severe malnutrition should be managed with different type of fluid and a different rate of administration and need close monitoring. Sometimes children with severe malnutrition have circulatory signs suggesting shock, but have septic shock rather than hypovolemia. In children with SAM it is preferable to administer fluids orally or through nasogastric tube.

Only if the child is lethargic or unconscious and cannot swallow or tolerate an NG tube (e.g. vomiting), use IV fluids ½-strength normal saline (N/2) with 5% glucose or Ringer Lactate with 5% dextrose at 15 ml/kg in 1 hr. Monitor child closely by checking the pulse and breathing rate every 5 minutes. Discontinue the intravenous infusion if either of these increase (pulse by 15/minute, respiratory rate by 5/minute). If the child shows signs of improvement, then switch to oral or nasogastric rehydration.

If the child fails to improve after the first 15 ml/Kg IV, assume the child has septic shock and manage as per management guidelines for children with severe acute malnutrition.
Chart 2.6: How to Give IV Fluids for Shock in a Child with Severe Acute Malnutrition

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

- Insert an IV line (and draw blood for emergency laboratory investigations)
- Weigh the child (or estimate the weight) to calculate the volume of fluid to be given

Give 5ml/kg 10% Glucose IV

Give IV fluid 15ml/kg over 1 hour of either Half-normal saline with 5% glucose or Ringer’s lactate*

Measure the pulse and breathing rate at the start and every 5-10min

- Signs of improvement (PR and RR fall)
  - Switch to oral or nasogastric rehydration with ORS, 10 ml/kg/h up to 10 hours
  - Initiate re-feeding with starter F-25

- If the child fails to improve after the first 15ml/kg IV

- If the child deteriorates, during the IV rehydration (RR increases by 5/min or PR by 15 beats/min), Stop the infusion and reassess

  Assume
  The child has septic shock

  - Give maintenance IV fluid (4ml/kg/h)
  - Start antibiotic treatment
  - Start dopamine
  - Initiate re-feeding as soon as possible

* If profuse diarrhoea, repeat 15ml/kg of Ringer’s lactate/NS
2.3.7 Monitoring Children Who Are Not In Shock BUT Have Signs of Circulatory Impairment

The presence of one or two of three signs i.e. cold extremities, CRT >2 seconds and a weak and fast pulse indicates nonspecific circulatory impairment that could be due to conditions other than circulatory shock. For example, cold extremities and prolonged capillary refill may be due to exposure to cold and a fast pulse may be due to pain or distress.

These children should not be given rapid infusions of fluids but should receive maintenance fluids, appropriate for their age and weight. In the absence of shock, rapid intravenous infusions of fluids may be particularly harmful in children with severe febrile illness, severe pneumonia, severe malaria, meningitis, severe acute malnutrition, severe anemia, congestive heart failure with pulmonary edema, congenital heart disease, renal failure and diabetic ketoacidosis.

Children with any sign of impaired circulation, i.e. cold extremities, or prolonged capillary refill or a weak and fast pulse, should be prioritized for full assessment and treatment and reassessed within 1 hour.

2.3.3 Fluid Management

Sick children often need maintenance fluids, if enteral feed is not possible or contraindicated in conditions like severe pneumonia.

The total daily fluid requirement of a child is calculated from the following formula: First 10 Kg -100 ml/kg
Next 10 kg - 50 ml/kg
Next each additional kg- 20 ml/kg.

For example, an 8 kg infant receives 8 x 100 ml = 800 ml per day, a 15 kg child (10 x 100) + (5 x 50) = 1250 ml per day.

Choice of intravenous fluids

- **Resuscitation**: Children who are severely dehydrated or with signs of shock should be resuscitated with isotonic IV solutions (normal saline 0.9% or Ringer's lactate lactate).
- **Intravenous maintenance fluid**: Children who require IV fluids for maintenance should be managed with Ringer's lactate solution with 5% dextrose (Add 50 ml 50% dextrose to 500 ml of RL) or 0.9% normal saline with 5% glucose or half-normal saline (0.45% sodium chloride) with 5% glucose
Give the sick child more than the above amounts if he or she has fever (increase by 10% for every 1 °C of fever).

**Monitoring fluid intake**

Pay careful attention to maintain adequate hydration in very sick children, who are not accepting orally. If there is no contraindication, feeds, may be given through nasogastric tube.

If fluids have to be given IV, it is important to

- monitor infusion closely Check for urine output which is the most sensitive indicator of fluid status in a child
  - Normal urine output in infants is 1-2 ml/kg/hr and in children is 1 ml/kg/hr
  - Urinary catheterization is done in children who are very sick or unable to void urine
- Check for features of fluid overload
  - Tachycardia, tachypnea
  - Hepatomegaly
  - Basal crepts
  - Edema

If it is impossible to monitor the IV fluid infusion closely, the IV route should be used only for the management of severe dehydration, septic shock, delivering IV antibiotics and for children for whom oral fluids are contraindicated (such as those with perforation of the intestine or other surgical abdominal problems).
CHAPTER 2.4: COMA AND CONVULSION

Now we shall look at the second and third components in which C represents “coma and convulsion”.

2.4.1 Various levels of consciousness

Coma, lethargy, and convulsions indicate impaired neurological state. Impaired consciousness implies a significant alteration in the awareness of self and of the environment, with varying degrees of wakefulness.

Coma is characterized by the total absence of arousal and of awareness.

Encephalopathy describes a clinical syndrome of altered mental status, manifesting as reduced consciousness or altered behavior.

Acute Encephalitis Syndrome, clinically a case of acute encephalitis syndrome is defined as person of an age, at any time of year with the acute onset of fever and a change in mental status (including symptoms such as confusion, disorientation, coma or inability to talk) AND/OR new onset of seizures (excluding simple febrile seizure).

2.4.2 Assessment of neurological status

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

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

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 up to voice or being shaken or to pain is unconscious.

To assess the level of consciousness of a child, 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 considered 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.

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. Convulsion can be recognized 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. Therefore, observe the infant carefully for convulsion.

2.4.3 Treatment of coma and convulsion

Treatment of coma and convulsions are similar and will be described together. Airway is managed in a manner similar to treating any child with an airway or breathing problem. This has been discussed earlier. Give oxygen to all children with \( \text{SpO}_2 < 94\% \)

(a) Coma

Any unconscious child who is breathing and keeping the airway open should be placed in the recovery position (Fig 2.22). This position helps to reduce the risk of vomitus entering the child’s lungs. It should only be used in children without any trauma.

![Fig 2.20: Recovery Position of Unconscious Child](image)

Child

If neck trauma is not suspected:
- 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

If trauma is suspected:
- Stabilize the child while lying on the back
- Use the “log roll” technique as shown in Fig 2.21 to turn the child on the side if the child is vomiting
**Log roll**

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. 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.

![Image of Log Roll]

**Fig 2.21: Log Roll-Stabilizing the Neck of the Patient while Moving the Body**

2.4.3 (b) Convulsion

If the child is having a convulsion, do not attempt to hold him/her down or put anything in the child's mouth. If the child vomits turn the child on his/her side to avoid aspiration. If the convulsion has stopped and the airway is clear, the child can be placed in the recovery position. Check blood sugar and if hypoglycemia give IV glucose. In young infant also consider giving IV calcium. If seizure persistant give anticonvulsants.

Management of convulsion in neonates:

- 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
- 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
- Caution- Do not use diazepam for control of convulsion in neonates < 2 weeks

**Management of convulsion for child beyond neonatal period:**

Diazepam is the first drug to stop convulsion in a child. Diazepam can be given by the intravenous or rectal route (see box 2.6). 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. Base the dose on the weight of the child if available. The dose of diazepam is 0.5mg/kg (0.1 ml/kg) rectally or 0.25mg/kg (0.05 ml/kg) intravenously (Max. total dose: < 5year: 5 mg, ≥ 5 year: 10mg). This is a useful guideline in an emergency situation when you may not have a chance to weigh the child. Display the guideline on wall of your department.

**Table 2.1: Dosages of diazepam**

<table>
<thead>
<tr>
<th>Age / weight</th>
<th>Diazepam given rectally</th>
<th>Diazepam 10 mg/2 ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 weeks to 2 months (&lt;4 kg)</td>
<td>0.3 ml</td>
<td>0.15 ml</td>
</tr>
<tr>
<td>2 - &lt;4 months (4 - &lt;6 kg)</td>
<td>0.5 ml</td>
<td>0.25 ml</td>
</tr>
<tr>
<td>4 - &lt;12 months (6 - &lt;10 kg)</td>
<td>1.0 ml</td>
<td>0.5 ml</td>
</tr>
<tr>
<td>1 - &lt;3 years (10 - &lt;14 kg)</td>
<td>1.25 ml</td>
<td>0.60 ml</td>
</tr>
<tr>
<td>3 - &lt;5 years (14 – 19 kg)</td>
<td>1.5 ml</td>
<td>0.75 ml</td>
</tr>
</tbody>
</table>

Administer diazepam injection solution per rectum by a tuberculin syringe preferably with a catheter. Hold the buttocks together for a few minutes. Flush the catheter with 2ml of normal saline after administering diazepam.

If convulsions continue after 10 min, give a second dose of diazepam (or give diazepam IV at 0.5 ml/kg = 0.25 mg/kg if IV infusion is running).

Diazepam can affect the child’s breathing, so it is important to reassess the airway and breathing regularly.

Do not give more than two doses of diazepam.
Box 2.6: Give Diazepam to Stop Convulsions

- Turn the child to his/her side and clear the airway (recovery position).
- Give 0.5mg/kg diazepam injection solution per rectum using a small syringe without a
  - Needle (like a tuberculin syringe) preferably using a catheter. Flush the
catheter, after
  - Giving drug.
- Check for low blood sugar
- Give oxygen
- If convulsions have not stopped after 10 minutes repeat diazepam dose

<table>
<thead>
<tr>
<th>AGE or WEIGHT</th>
<th>DIAZEPAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 months up to 6 months (5-7 kg)</td>
<td>0.5 ml</td>
</tr>
<tr>
<td>6 months up to 12 months (7-&lt;10 kg)</td>
<td>1.0 ml</td>
</tr>
<tr>
<td>12 months up to 3 years (10-&lt;14 kg)</td>
<td>1.5 ml</td>
</tr>
<tr>
<td>3 years up to 5 years (14-19 kg)</td>
<td>2.0 ml</td>
</tr>
</tbody>
</table>

Midazolam (Intravenous/intramuscular 0.15-0.2 mg/kg or intranasal 0.3 mg/kg) may be used in place of diazepam. (Maximum IV dose: 6 month-5-year age = 6 mg; >6 years age = 10 mg).

In children with established status epilepticus, i.e. seizures persisting after two doses of benzodiazepines, intravenous valproate, intravenous Phenobarbital or intravenous phenytoin can be used, with appropriate monitoring. The choice of these drugs depends on local resources, including availability and facilities for monitoring. If available, intravenous valproate is preferred to intravenous Phenobarbital or intravenous phenytoin because of its superior benefit-risk profile.

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 (not a solution containing dextrose) and given slowly over 20 mins (not more than 1 mg/kg phenytoin per minute). Alternatively, Phenobarbitone can be used in a dose of 15-20 mg/kg IV (in 20 ml 5% dextrose or saline) or IM. Seek help of a senior or more experienced person, if available.

Intramuscular Phenobarbital remains an option in settings where intravenous infusion or monitoring is not feasible. Phenytoin and valproate should not be given intramuscularly. Seek help of a senior or more experienced person, if available.

Follow management guidelines for status epilepticus if seizure persists (Chart 2.7).
Chart 2.7: Management algorithm for status epilepticus in children

1. Establish ABCs: Establish IV access, draw blood for laboratory investigations, give IV glucose if hypoglycaemia or blood sugar could not be tested. Give IV calcium in infants < 3 months.

2. IV diazepam 0.2 mg/kg
   (If no IV access use PR diazepam 0.5 mg/kg or buccal/nasal/IM midazolam 0.2 mg/kg)

3. Repeat Diazepam once more if seizure continues (5-10mins) if seizure not controlled or recurrence.

4. IV phenytoin 20 mg/kg (10mg/ml solution prepared in normal saline slowly over 30 minutes)
   (Consider transfer to PICU facilities)

5. IV valproate (1:1 diluted NS 20-40 mg/kg over 1-5 minutes; given as continuous infusion at a rate of 5mg/kg/hr, if required)
   OR
   IV phenobarbitone 15-20 mg/kg over 20 minutes
   (Re-assess airway again; consider tracheal intubation if the airway is compromised or the patient develops respiratory depression)

6. Seizure persisting

7. Transfer to PICU set-up is mandatory as the child has refractory SE and will need intensive monitoring.
2.4.3 (c) Insertion of an Oropharyngeal (Guedel) Airway

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 5). An appropriate sized airway goes from the angle of mouth to the angle of the jaw when laid on the face with the raised curved side (convex) up (“the right side up”).

*Infant*

Select an appropriate sized airway

- Position the child to open the airway, 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

*Child*

- Select an appropriate sized oropharyngeal airway
- Open the child's airway, taking care not to move the neck if trauma suspected
- Using a tongue depressor, insert the airway “upside down” (concave side up) until the tip reaches the soft palate
- Rotate through 180° and slide back over the tongue
- Re-check airway opening
- Use a different sized airway or reposition if necessary
- Give oxygen

Fig 2.22a: Guedel airway of different sizes  Fig 2.22 b: Selecting right size of an airway
2.4.3(d) Suctioning

Suctioning of secretions, blood, and vomitus may be necessary to maintain a patent airway. Portable suction devices are easy to transport but may not provide adequate suction power. Large-bore, non-collapsible suction tubing should always be joined to the suction unit and appropriately sized suction catheters should be available. In children presenting with acute seizures or status epilepticus where intravenous administration is available, either intravenous diazepam or intravenous midazolam should be used to terminate the seizure.

2.4.3 (e) 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)

2.4.3 (f) Supportive Care in Patient with convulsion or coma

After stabilization of airway, breathing and circulation, other supportive care measures must be instituted along with the empirical treatment as mentioned above.

(a) Maintenance intravenous fluids: Fluid therapy should be targeted to maintain euvoolemia and normoglycaemia, and to prevent hyponatremia. Give isotonic fluids. Serum sodium should be monitored if possible, and abnormalities of serum sodium should be corrected slowly.

(b) Management of raised intracranial pressure: Raised intracranial pressure is a common
cause of death in children with viral encephalitis. It is important to recognize and promptly manage signs of raised ICP - hypertension, bradycardia, irregular respiration, irregular pupils. A common mistake in the emergency departments is to mistake decerebrate posturing for seizures, and inappropriately treat with anti-epileptic drugs.

Mannitol should be given with loading dose 5 ml/kg/dose followed by 2.5 ml/kg/dose 6 hourly, up to 48 hours.

Furosemide at the dose of 1-2 mg/kg 12 hourly may be added to mannitol.

(c) Maintain euglycaemia: Identify and treat hypoglycemia with intravenous dextrose (5 ml/kg 10% dextrose and monitor glucose after 30 minutes which if normal, give fluid containing dextrose. Blood glucose should be monitored and both hypo- and hyperglycaemia should be avoided.

(d) Treatment and prevention of seizures: A benzodiazepine should be given (Lorazepam 0.1 mg/kg, diazepam 0.3 mg/kg, or midazolam 0.1 mg/kg) to terminate seizure followed by phenytoin loading (20 mg/kg). Even if there is no history or clinical evidence of seizure, empirical anti convulsants may be considered in children with deep coma or features of raised intracranial pressure.

(e) Prevention of complications or rehabilitation: Regular posture change must be done to prevent the development of bed sores. Passive movements of major joints and measures to prevent contractures are important.

2.4.4 Indication for referral

- Seizures not controlled with 2nd line antiepileptics like phenytoin, phenobarbitone, and valproate.
- Seizure and LOC following head trauma- Need of CECT
- Cause of coma/convulsion not known after stabilization
- Cause of coma/convulsion known but cannot be managed- Diabetic ketoacidosis, unknown poisoning, Viral encephalitis
CHAPTER 2.5: DEHYDRATION

The letter D in the ABCD pneumonic stands for severe 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.

2.5.1 Assessing and classifying dehydration

Most of the diarrhoeal deaths occur due to dehydration. Hence, the hydration status of the child determines the immediate management. For all children with diarrhoea, their hydration status should be assessed & classified as severe dehydration, some dehydration or no dehydration (Table 2.2).

i. LOOK at the general condition - Is the child lethargic or unconscious? Restless and irritable?

If the child is not alert but responds to voice, he or she is lethargic. If the child is restless and irritable all the time or every time s/he is touched and handled, then this is the restless and irritable sign. If an infant who is irritable initially, becomes calm when breastfeeding but again becomes restless and irritable when he stops breastfeeding then he has the sign "restless and irritable".

ii. LOOK for sunken eyes.

The eyes of a child who is dehydrated may look sunken. Decide if you think the eyes are sunken. In case of doubt, ask the mother if she thinks her baby's eyes look unusual.

iii. PINCH the skin of the abdomen. Does it go back: Very slowly (longer than 2 seconds)

Ask the mother to place the child on the examining table so that s/he is lying flat on the back with arms at the sides and legs straight. Or ask the mother to hold the young infant or child so s/he is lying flat in her lap.

Locate the area on the child's abdomen halfway between the umbilicus and the side of the abdomen. To do the skin pinch, use your thumb and first finger. Do not use your fingertips because this will cause pain. Place your hand so that when you pinch the skin, the fold of skin will be in a line with the child's body and not across the child's body. Firmly pick up all of the layers of skin and the tissue under them. Pinch the skin for one second and then release it. When you release the skin, look to see if the skin pinch goes back:

- Very slowly (longer than 2 seconds)
- Slowly
- Immediately
If the skin stays up for even a brief time after you release it, decide that the skin pinch goes back slowly.

![Image: Checking skin pinch](image)

**Fig2.25: Checking skin pinch**

iv. **OFFER the child fluid - Is the child not able to drink or drinking poorly?**

**Drinking eagerly, thirsty?**

Ask the mother to offer the child some water in a cup or spoon. Watch the child drink. A child is *not able to drink* if he is not able to suck or swallow when offered a drink.

A child has the sign *drinking eagerly, thirsty* if it is clear that the child wants to drink. When the water is taken away, see if the child is unhappy because he wants to drink more. If the child takes a drink only with encouragement and does not want to drink more, he does not have the sign "drinking eagerly, thirsty" and has **normal thirst**.

v. **Assess if the child has severe acute malnutrition.**

In a child had acute severe malnutrition, presence of watery diarrhea or vomiting should be treated as presence of dehydration

Now use these 4 clinical signs for classifying dehydration (*Table 2.2*)
<table>
<thead>
<tr>
<th>Classification</th>
<th>Signs or symptoms</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Severe dehydration</strong></td>
<td>Two or more of the following signs:</td>
<td>If no severe acute malnutrition&lt;br&gt;Give fluids for severe dehydration (Plan C)&lt;br&gt; If child also has another severe classification:&lt;br&gt;Hospitalize.&lt;br&gt; If severe acute malnutrition&lt;br&gt;Should be treated with ORS unless child has signs of shock and is lethargic or has lost consciousness&lt;br&gt; 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.&lt;br&gt; If child is 2 years or older and there is cholera in your area, give Ciprofloxacin for cholera</td>
</tr>
<tr>
<td></td>
<td>Lethargy / unconsciousness&lt;br&gt; Sunken eyes&lt;br&gt; Unable to drink or drinks poorly&lt;br&gt; Skin pinch goes back very slowly (&gt; 2 seconds)</td>
<td></td>
</tr>
<tr>
<td><strong>Some dehydration</strong></td>
<td>Two or more of the following signs:&lt;br&gt; Restlessness, irritability&lt;br&gt; Sunken eyes&lt;br&gt; Drinks eagerly, thirsty&lt;br&gt; Skin pinch goes back slowly</td>
<td>Give fluids for some dehydration (Plan B)&lt;br&gt; If the child also has a severe classification:&lt;br&gt;Hospitalize.&lt;br&gt; After rehydration, advise mother on home care&lt;br&gt; Follow up in 5 days if not improving</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>No dehydration</strong></td>
<td>Not enough signs to classify as some or severe dehydration</td>
<td>Give extra fluids, zinc supplements, advise to continue feeding at home (Plan A)&lt;br&gt; Advice mother when to return immediately.&lt;br&gt; Follow up in 5 days if not improving</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.5.2 Management of Children with Severe Dehydration and no Severe acute malnutrition (Box 2.7)

Box 2.7: IV Rehydration

- 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

<table>
<thead>
<tr>
<th>AGE</th>
<th>First give 30ml/kg in:</th>
<th>Then give 70 ml/kg in:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants (under 12 months)</td>
<td>1 hour*</td>
<td>5 hours</td>
</tr>
<tr>
<td>Children (12 months up to 5 years)</td>
<td>30 minutes*</td>
<td>2 ½ hours</td>
</tr>
</tbody>
</table>

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

- Reassess the child every 15-20 min till a strong radial pulse is detectable. Thereafter reassess the hydration status after every 1-2 hours. If hydration status is not improving, give the IV drip more rapidly. Monitor number of stools, vomiting and urine output.

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

- Also give ORS (about 5ml/kg/hour) as soon as the child can drink: usually after 3-4 hours (infant) or 1-2 hours (children)
- 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. **

**All children with severe dehydration should be observed in the facility for at least 6 hours after successful rehydration (not enough signs to classify as either some or severe dehydration).

2.5.3 Treatment of Severe dehydration in a child with severe acute malnutrition (See table 2.3)

Table 2.3 . Amount of ReSoMal for rehydration in malnutrition

<table>
<thead>
<tr>
<th>How often to give ORS (ReSoMal)*</th>
<th>Amount to give</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every 30 minutes for first 2 hours</td>
<td>5 ml/kg weight</td>
</tr>
<tr>
<td>If still dehydrated- Alternate hours for up to 10 hours</td>
<td>5-10 ml/kg*</td>
</tr>
</tbody>
</table>

*How to prepare ReSoMal if not available- dissolving one sachet (1litre) of low- osmolarity oral rehydration salt in 2Litre water (instead of 1Litre) and adding and dissolving 50g of glucose/sugar and 30 ml of potassium chloride injection containing (40 mEq/L of potassium)

**Starter (F-75) diet &ORS is given in alternate hours (e.g. Starter at 2, 4,6hours & ORS at 3, 5,
7) until the child is rehydrated

**The amount offered in this range should be based on child’s willingness to drink and amount of ongoing losses in stool.**

**Check for improved hydration status and overhydration every half hour for the first two hours and then hourly**

![Fig 2.26: Carefully monitor amount infused as shown below](image)

<table>
<thead>
<tr>
<th>Time (hr)</th>
<th>Volume (ml)</th>
<th>Estimated Volume (ml)</th>
<th>Volume Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00 am</td>
<td>1000 ml</td>
<td>800 ml</td>
<td>200 ml</td>
</tr>
<tr>
<td>12:00 pm</td>
<td>---</td>
<td>600 ml</td>
<td>400 ml</td>
</tr>
<tr>
<td>1:00 pm</td>
<td>---</td>
<td>400 ml</td>
<td>600 ml</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>---</td>
<td>200 ml</td>
<td>800 ml</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>---</td>
<td>0 ml</td>
<td>1000 ml</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>1000 ml</td>
<td>800 ml</td>
<td>1200 ml</td>
</tr>
</tbody>
</table>

* For each new bottle/pack, initial or added

2.5.4 Nasogastric Rehydration: Use this if child is not lethargic/unconscious, but is not accepting orally or IV rehydration is not possible.

- Use a sterile NG tube 8-10F size for children less than 2 years and 10-12 F for children 2-5 years.
- Place the patient on his or her back, with the head slightly raised. Older children and adults may prefer to sit up.
- Measure the length of tube to be inserted by placing the tip just above the navel. Then stretch the tubing over the back of the ear and forward to the tip of the nose. Mark the tube with a piece of tape where it touches the end of the nose. This mark shows the length of tubing needed to reach from the tip of the nose to the stomach.
- Moisten the tube with a water-soluble lubricant or plain water; do not use oil.
- Pass the tube through the nostril having larger opening. Gently advance it until the tip is in the back of the throat. Each time the patient swallows, advance the tube another 3.5cm. If the patient is awake, ask him or her to drink a little water.
- If the patient chokes, coughs repeatedly or has trouble breathing, the tube has probably passed into the trachea. Pull it back 2cm–4cm until the coughing stops and the patient is comfortable. Wait a minute, and then try to insert the tube again.
- Advance the tube each time the patient swallows until the tape marker reaches the
nose. If the patient is comfortable and not coughing, the tube should be in the stomach.

- Look into the patient's mouth to be certain that the tube is not coiled in the back of the throat. Confirm that the tube is in the stomach by attaching a syringe and withdrawing a little stomach fluid. You could also do this by placing a stethoscope just above the navel. Inject air into the tube with an empty syringe. Listen for the air entering the stomach.
- Fasten the tube to the face with tape and attach IV tubing that is connected to a clean IV bottle containing ORS solution. Regulate the infusion to a rate of 20 ml/kg per hour, or less with careful monitoring.
- If an IV bottle is not available, a syringe (with the barrel removed) can be attached to the tube and used as a funnel. Hold the syringe above the patient’s head and pour ORS solution into it at regular intervals.

See annex 25 for insertion of nasogastric tube

Figure: 2.29 Measurement of Nasogastric Tube
Fig 2.28: Technique for Nasogastric Rehydration
CHAPTER 2.6: HYPOTHERMIA AND HYPOGLYCEMIA

Although Airway, Breathing, Circulation, Coma, Convulsion and Severe Dehydration are the life threatening problems that should be addressed in ETAT, coexisting hypothermia and hypoglycemia may add to the poor outcome especially in small infants and severely malnourished children. So these two will be addressed here initially.

Hypothermia

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 36.5°C or who is cold to touch (where thermometer is not available), maintain thermal environment as given below.

- 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 child.
- Keep the baby under a radiant warmer and re-warm 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.
Chart 2.1 Discusses triage and management of all sick children

<table>
<thead>
<tr>
<th>Treat</th>
<th>Do not move neck if cervical spine injury possible. Keep the child warm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AIRWAY AND BREATHING</strong></td>
<td></td>
</tr>
<tr>
<td>- Not breathing or</td>
<td>• IF NOT BREATHING OR GASPING</td>
</tr>
<tr>
<td>- Obstructed breathing or</td>
<td>- Rule out neck trauma</td>
</tr>
<tr>
<td>- Central cyanosis or</td>
<td>- Manage airway</td>
</tr>
<tr>
<td>- Severe respiratory distress</td>
<td>- Start basic life support</td>
</tr>
<tr>
<td>ANY SIGN POSITIVE</td>
<td>• IF FOREIGN BODY ASPIRATION</td>
</tr>
<tr>
<td></td>
<td>- Manage airway in choking child</td>
</tr>
<tr>
<td></td>
<td>• IF NO FOREIGN BODY ASPIRATION</td>
</tr>
<tr>
<td></td>
<td>- Manage Airway</td>
</tr>
<tr>
<td></td>
<td>- Give oxygen</td>
</tr>
<tr>
<td></td>
<td>- Make sure child is warm</td>
</tr>
<tr>
<td><strong>CIRCULATION</strong></td>
<td></td>
</tr>
<tr>
<td>Cold hand with:</td>
<td>• If the child has any bleeding, apply pressure to stop the bleeding. Do not use a tourniquet</td>
</tr>
<tr>
<td>- Capillary refill longer than 3 seconds, and</td>
<td>- Give oxygen</td>
</tr>
<tr>
<td>- Weak and fast pulse</td>
<td>- Make sure child is warm</td>
</tr>
<tr>
<td>IF POSITIVE</td>
<td>• IF NO SEVERE ACUTE MALNUTRITION</td>
</tr>
<tr>
<td></td>
<td>Insert IV* and begin giving fluids rapidly</td>
</tr>
<tr>
<td></td>
<td>• IF SEVERE ACUTE MALNUTRITION</td>
</tr>
<tr>
<td></td>
<td>If lethargic or unconscious:</td>
</tr>
<tr>
<td></td>
<td>- Insert IV line and give fluids</td>
</tr>
<tr>
<td></td>
<td>- Give IV Glucose</td>
</tr>
<tr>
<td></td>
<td>If not lethargic or unconscious:</td>
</tr>
<tr>
<td></td>
<td>- Give glucose orally or by NG tube</td>
</tr>
<tr>
<td></td>
<td>- Proceed immediately to full assessment and treatment</td>
</tr>
<tr>
<td><strong>COMA/CONVULSING</strong></td>
<td></td>
</tr>
<tr>
<td>- Coma or</td>
<td>• Manage airway</td>
</tr>
<tr>
<td>- Convulsing (now)</td>
<td>• Position the unconscious child (if head or neck trauma is suspected, stabilize the neck first)</td>
</tr>
<tr>
<td>IF COMA OR CONVULSING</td>
<td>• Give oxygen</td>
</tr>
<tr>
<td></td>
<td>• Check and correct hypoglycemia</td>
</tr>
<tr>
<td></td>
<td>• Give IV calcium if infant &lt;3 months</td>
</tr>
<tr>
<td></td>
<td>• If convulsion continue give anti-convulsant</td>
</tr>
<tr>
<td></td>
<td>• Make sure the child is warm</td>
</tr>
<tr>
<td><strong>SEVERE DEHYDRATION (ONLY IN CHILD WITH DIARRHOEA)</strong></td>
<td></td>
</tr>
<tr>
<td>Diarrhoea plus any two of these:</td>
<td>• IF NO SEVERE ACUTE MALNUTRITION</td>
</tr>
<tr>
<td>- Lethargy</td>
<td>- Insert IV line and begin giving fluid (NS/Ringer) rapidly</td>
</tr>
<tr>
<td>- Sunken eyes</td>
<td>• IF SEVERE ACUTE MALNUTRITION</td>
</tr>
<tr>
<td>- Very slow skin pinch</td>
<td>- Do not give IV fluids, give ORS (ReSoMal)</td>
</tr>
<tr>
<td>DIIARRHOEA plus TWO SIGNS POSITIVE</td>
<td>- Proceed immediately to full assessment and treatment</td>
</tr>
</tbody>
</table>

If there are no emergency signs look for priority signs: These children need prompt assessment and treatment

| **PRIORITY SIGNS** |  |
| • Tiny baby (<2 months) |  |
| • Temperature very high |  |
| • Trauma or other urgent surgical condition |  |
| • Pallor (severe) |  |
| • Poisoning |  |
| • Pain (Severe) |  |
| • Respiratory distress |  |
| • Restless, continuously |  |
| • Irritable or lethargic |  |
| • Referral (urgent) |  |
| • Malnutrition: Visible serve wasting |  |
| • Oedema of both feet |  |
| • Burns (major) |  |

*If not able to insert peripheral IV, insert an external jugular or intraosseous line. 0.5 m/kg every 30 mins for 2 hours

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

Urgent: Proceed with assessment and further treatment according to the child’s priority
Chart 2.2 Discusses triage of newborn

**Triage of a sick or at risk newborn who presents at Health Facility**

- **Weight <1500g**
- Hypothermia (temp<36°C, 96.8°F)
- Apnea or gasping respiration
- Severe respiratory distress (rate>70, severe retractions, grunt)
- Central cyanosis
- Shock (cold periphery, CRT>3 secs, weak & fast pulse)
- Coma, convulsions

- **Weight 1500-1800g or >4000g**
  - Cold stress (temp 36.5°C - 36°C, 97.7°F-96.8°F)
  - Respiratory distress (rate ≥ 60, no retractions)
  - Irritable/restless/jittery
  - Abdominal distension
  - Severe jaundice
  - Severe pallor
  - bleeding from any sites
  - major congenital malformations

- **Weight >1800g-2500g**
  - Transitional stools
  - Posseting (regurgitation)
  - Minor birth trauma
  - Superficial infections
  - Minor malformations
  - Jaundice
  - All cases not categorized as Emergency/Priority

**SEE FOR—**
- Temperature
- Airway
- Breathing
- Circulation
- Coma/Convulsion
- Weight

**Classification**

- **Emergency Signs**
  - Initiate Emergency Treatment
- **Priority Signs**
  - Assess and act rapidly signs
- **Non-urgent Signs**
  - Access and Counsel

**Newborns Classified as “Emergency” require urgent intervention and emergency measures. All Such Newborns will be admitted to SNCU after initial stabilization.**

**Newborns classified as “Priority” are sick and need rapid assessment and admission to SNCU. Newborns classified as non-urgent do not require urgent attention but require further assessment and counseling.**
Chart 2.3 Discusses assessment and treatment of emergency signs in newborn

<table>
<thead>
<tr>
<th>ASSESS FOR EMERGENCY SIGNS</th>
<th>TREAT EMERGENCY SIGNS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TEMPERATURE</strong></td>
<td>Cold to touch (abdomen)</td>
</tr>
<tr>
<td>• Warm hypothermic babies rapidly re-warm if there is severe hypothermia (&lt;32°C, 89.6°F) up to 35°C, 95°F and then gradual re-warming.</td>
<td></td>
</tr>
<tr>
<td>• Maintain the blood glucose.</td>
<td></td>
</tr>
<tr>
<td>• Make sure neonate is warm</td>
<td></td>
</tr>
<tr>
<td><strong>AIRWAY AND BREATHING</strong></td>
<td>Not breathing or gasping or Central cyanosis or</td>
</tr>
<tr>
<td>Severe respiratory distress</td>
<td></td>
</tr>
<tr>
<td>• Respiratory rate &gt;60/min</td>
<td></td>
</tr>
<tr>
<td>• Severe lower chest in-drawing</td>
<td></td>
</tr>
<tr>
<td>• Apnoeic spells</td>
<td></td>
</tr>
<tr>
<td>• Grunting</td>
<td></td>
</tr>
<tr>
<td>• Unable to feed</td>
<td></td>
</tr>
<tr>
<td>• Manage airway</td>
<td></td>
</tr>
<tr>
<td>• Provide tactile stimulation if apneic</td>
<td></td>
</tr>
<tr>
<td>• If still apneic or gasping provide PPV</td>
<td></td>
</tr>
<tr>
<td>• Give Oxygen</td>
<td></td>
</tr>
<tr>
<td>• Make sure neonate is warm</td>
<td></td>
</tr>
<tr>
<td><strong>CIRCULATION</strong></td>
<td>Capillary refill longer than 3 seconds and weak and fast pulse (&gt;160)</td>
</tr>
<tr>
<td>• Give oxygen</td>
<td></td>
</tr>
<tr>
<td>• Insert IV line and give 10 ml/kg normal saline over 30 min</td>
<td></td>
</tr>
<tr>
<td>• Proceed immediately to full assessment and treatment</td>
<td></td>
</tr>
<tr>
<td>• Make sure neonate is warm</td>
<td></td>
</tr>
<tr>
<td><strong>CONVULSIONS</strong></td>
<td>Convulsions</td>
</tr>
<tr>
<td>• Manage airway</td>
<td></td>
</tr>
<tr>
<td>• Check &amp; correct hypoglycemia</td>
<td></td>
</tr>
<tr>
<td>• Give anticonvulsant (Medazolam)</td>
<td></td>
</tr>
<tr>
<td>• Make sure neonate is warm</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 2.7: BASIC LIFE SUPPORT

2.7.1. Introduction

Pediatric basic life support (BLS) is not simply a scaled-down version of that provided for adults, although, where possible, guidelines are the same for all ages to aid teaching and retention. Some of the techniques employed need to be varied according to the size of the child. A somewhat artificial line is generally drawn between infants (less than 1-year-old) and children (between one year and puberty), and this chapter follows that approach.

Once the child has been approached safely and a simple test for unresponsiveness has been carried out, assessment and treatment follow the familiar ABC pattern. The overall sequence of basic life support in pediatric cardiopulmonary arrest is summarized in Chart 2.8

Most causes of pediatric cardiorespiratory arrest are due to hypoxia. It means that oxygen delivery rather than defibrillation or chest compression is the critical step in children. This underlines the major differences with the adult algorithm, which follows C-A-B (Circulation-Airway-Breathing) algorithm.

*Note: PALS (Pediatric Advanced Life Support) algorithm follows C-A-B sequence even in children. The A-B-C sequence described in this chapter has been derived from APLS (Advanced Pediatric Life Support) Fifth Edition.*

By applying the basic techniques described, a single rescuer can support the vital respiratory and circulatory functions of a collapsed child with no equipment. Basic life support is the foundation on which advanced life support is built. Therefore, it is essential that all advanced life support providers are proficient at basic techniques, and that they are capable of ensuring that basic support is provided continuously and well during resuscitation.

<table>
<thead>
<tr>
<th>Table 2.4: Difference in Basic Life Support in Infants and Children</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Airway</strong></td>
</tr>
<tr>
<td>Head-tilt position</td>
</tr>
<tr>
<td>Breathing</td>
</tr>
<tr>
<td>Pulse check</td>
</tr>
<tr>
<td>Landmark</td>
</tr>
<tr>
<td>Technique</td>
</tr>
<tr>
<td>CPR ratio</td>
</tr>
</tbody>
</table>
Chart 2.8: Basic Life Support Algorithm (Checklist)

*Ask for Defibrillator (AED) wherever available

**Check pulse (take no more than 10 seconds**

- **Definite pulse**
  - Give 1 breath every 3 seconds
  - Add chest compressions of pulse remains < 60/min with poor perfusion despite adequate oxygenation and ventilation

- **No Definite pulse**
  - One Rescuer: Begin cycles of 30 CHEST COMPRESSIONS and 2 BREATHS
  - Two Rescuer: Begin cycles of 15 CHEST COMPRESSIONS and 2 BREATHS

  - Reassess pulse after 2 minutes

- **No Pulse palpable**
  - Call for help
  - Continue chest compression along with ventilation
  - Use AED, if available
  - Consider transfer to PICU

- **Definite pulse**
  - < 60/min
    - Not breathing or gasping
      - Continue bag & mask ventilation with oxygen, 1 breath every 3 sec
      - Reasses every 2 min
      - Breathing spontaneously
      - Stop compression and ventilation
      - Put in recovery position
      - Give oxygen
      - Continue further assessment
  - ≥60/min

*Ask for Defibrillator (AED)

*Use annex 26 for checklist for steps of Basic Life Support*

*Use annex 27 for checklist to record ETAT case*
SECTION 3: NEWBORN CARE
3.1. CARE OF NORMAL NEWBORN AT BIRTH

3.1.1. Basic needs of a newborn
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

3.1.2. Immediate Newborn Care
Most babies would require routine care; 5-10% may need assistance to establish adequate breathing and therefore will need resuscitation.

Immediately after delivery dry the baby with pre warm cloth and assess whether baby is breathing or crying, if yes go for routine newborn care.

Routine newborn care after birth includes

- Place the baby on the mother’s abdomen
- Dry the baby with a warm clean sheet. Do not wipe off vernix.
- Clamp the cord after 1-3 min and cut with a sterile instrument.
- Tie the cord with a sterile tie/cord clamp.
- 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 as soon as possible (within 1 hour)
  - Assist for good positioning, attachment and effective suckling.
  - If needed, assist for expression of breast milk.
- Apply 4 % chlorhexidine gel over umbilical stump wearing gloves
- Cover the baby’s head with a cloth. Cover the mother and baby with a warm cloth
- Determine the sex and place an identity label on the baby
- Give Inj. Vit K1 1mg IM (0.5 mg for < 1000 grams baby and 1 mg for rest)
- Record the baby’s weight Monitor the baby
  - Monitor baby every 15 min for next 1 hour and 2 hourly for next 6 hours (more frequently if needed)
    - Breathing
    - Grunting
    - Chest indrawing
    - Fast breathing
    - Heart rate
    - Color
    - Warmth
- Bleeding from the cord
- Examine the baby quickly for malformation /birth injury. Quick but thorough clinical screening is essential to identify any life threatening congenital anomalies eg. Meningomyelocele, trachea-oesophageal fistula, anal atresia and omphalocele.

3.1.3. After immediate newborn care
- Write records of newborn and immediate newborn care.
- Report to an appropriate person.
- Explain findings to mother and family (normal and abnormal)

3.3. EXAMINATION OF NEWBORN
*Perform newborn examination as per annex 28 checklist for newborn examination in inpatient ward*

3.4 CRITERIA FOR ADMISSIONS TO SNCU, TRANSFER TO STEP-DOWN UNIT AND DISCHARGE
Any newborn with following criteria should be immediately admitted to the SNCU:
- Birth weight <1800 gm or gestation <34 weeks)
- Large baby (4 kg or more)
- Perinatal asphyxia
- Apnea or gasping
- Refusal to feed
- Respiratory distress (Rate 60 or more/min or grunt/retractions)
- Severe jaundice (Appears<24 hrs/stains palms & soles/lasts>2 weeks)
- Hypothermia less than 36.5°C (97.7°F), or hyperthermia (≥37.5°C, ≥99.5°F)[If not improved with initial management]
- Central cyanosis
- Shock (cold periphery with CRT>3 seconds and weak & fast pulse)
- Coma, convulsions or encephalopathy
- Abdominal distension
- Diarrhoea/dysentery
- Bleeding
- Major malformations
Criteria for transfer from SNCU to the Step-down to mother’s side

- Babies whose respiratory distress is improving and do not require oxygen supplementation to maintain oxygen saturation
- Babies on antibiotics for completion of duration of therapy
- Low birth weight babies (less than 1800 g), who are otherwise stable (for adequate weight gain)
- Babies with jaundice requiring phototherapy but otherwise stable whenever feasible
- Babies admitted for any condition but are now thermodynamically and hemodynamically stable

1 In places where there is set up for intermediate care facilities

Criteria for discharge from SNCU to home

- Baby is able to maintain temperature without radiant warmer
- Baby is hemodynamically stable (normal CRT, strong peripheral pulses)
- Baby accepting breast feeds well
- Baby has documented weight gain for 3 consecutive days; and the weight is more than 1.5 kg (for preterm and low birth weight)
- Primary illness has resolved

In addition to the above, mother should be confident of taking care of the baby at home.
3.5 MANAGEMENT OF PRETERM AND LOW BIRTH WEIGHT BABIES

3.5.1. Two clinical types of LBW
1. Preterm or premature (< 37 weeks of gestation)
2. Small for gestational age (SGA) or intrauterine growth retardation or restriction (IUGR) or Small for date (SFD)

3.5.2. Classification of LBW:
- Low birth weight: Birth weight less than 2500gms irrespective of the gestational age.
- Very low birth weight: Birth weight less than 1500gms irrespective of the gestational age.
- Extremely low birth weight: Birth weight less than 1000gms irrespective of the gestational age.

3.5.3. Problems of Preterm:

**Immediate problems:**
- Birth Asphyxia
- Hypoglycemia
- Hypothermia
- Hypocalcemia
- Apnoea
- Feeding difficulties
- Infections
- Hyaline membrane disease (HMD)
- Apneic spells
- Intraventricular hemorrhage (IVH)
- Necrotizing enterocolitis (NEC)
- Metabolic acidosis
- Hyperbilirubinemia
- Fluid and electrolyte imbalance
- Patent ductus arteriosus

**Long term problems:**
- Anemia
- Retinopathy of prematurity [prevented by keeping O2 saturation 88-95%]
- Bronchopulmonary dysplasia [prevented by keeping O2 saturation 88-95%]
- Cerebral palsy
ASSISTED FEEDING OF LOW BIRTH WEIGHT BABIES

3.6.1. Newborns that require assisted feeding:
- Preterm <34 weeks or birth weight <1800 g
- Babies having mild respiratory distress
- Babies with inability to feed at breast or cup/paladai
- Oro-facial defects/malformations (cleft lip or palate)

3.6.2. Guidelines for the modes of providing fluids and feeding:

<table>
<thead>
<tr>
<th>Birth weight (grams)</th>
<th>&lt;1200</th>
<th>1200-1800</th>
<th>&gt;1800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestation (weeks)</td>
<td>&lt;30</td>
<td>30-34</td>
<td>&gt;34</td>
</tr>
<tr>
<td><strong>Initial feeding</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NG feeding, if not</td>
<td>Intravenous fluids try</td>
<td>NG feeding, try paladai if not sick</td>
<td>Breastfeeding, if unsatisfactory, give paladai feeds</td>
</tr>
<tr>
<td>sick</td>
<td>NG feeding</td>
<td>paladai if not sick</td>
<td></td>
</tr>
<tr>
<td><strong>After 1-3 days</strong></td>
<td>NG feeding</td>
<td>Cup/paladai</td>
<td>Breastfeeding</td>
</tr>
<tr>
<td><strong>Later (1-3 weeks)</strong></td>
<td>Cup/ paladai</td>
<td>Breastfeeding</td>
<td>Breastfeeding</td>
</tr>
<tr>
<td><strong>After some more time (4-6 weeks)</strong></td>
<td>Breastfeeding</td>
<td>Breastfeeding</td>
<td>Breastfeeding</td>
</tr>
</tbody>
</table>

Breast milk is the ideal feed for low birth weight babies.

Those unable to feed directly on the breast can be fed expressed breast milk (EBM) by gavage or cup or paladai.

Measure pre-feed abdominal girth just above the umbilical stump. Do not attempt pre-feed aspirates.
3.7. GRADING AND MANAGEMENT OF HYPOTHERMIA

Baby who is cold to touch both centrally and peripherally if temperature is less than 36.5°C (97.7°F)

Grading of hypothermia

- Normal temperature: 36.5 to less than 37.5°C (97.7°F to <99.5°F)
- Cold stress: 36 to less than 36.5°C (96.8°F to <97.7°F)
- Moderate hypothermia: 32 to less than 36°C (89.6°F to <96.8°F)
- Severe hypothermia: <32°C (<89.6°F)

(This standard classification differs from the classification of CB-IMNCI)

Management of hypothermia

- Record actual body temperature
- Re-warm a hypothermic baby as quickly as possible:
  - Severe hypothermia – Radiant warmer
  - Mild to moderate hypothermia – Kangaroo mother care or Radiant warmer

If hypothermic still persists despite taking above measures, infection should be suspected

Management of severe hypothermia

1. Keep under radiant warmer
2. Reduce further heat loss
3. Infuse IV 10% Dextrose @ 60ml/kg/day
4. Inject Vitamin K₁
5. Provide oxygen

Baby must be kept warm at all times right from birth.
3.8. MANAGEMENT OF HYPOGLYCEMIA

3.8.1. Definition: Hypoglycemia in newborns is defined as blood glucose levels less than 45 mg/dl.

Flowchart 7: Identify a baby with hypoglycemia

Suspect

- Small for gestational age
- Large for gestational age
- Infant of diabetic mother
- Preterm babies
- RH haemolytic disease
- Mother taking hypoglycemic agents
- Sick babies - Jitterness, cyanosis, seizure, apnoic episodes, tachypnea, weak or high pitched cry, floppiness or lethargy, poor feeding, eye rolling, severe hypothermia

Check blood glucose at 1 hour of birth / at first contact

Blood glucose 25-45mg/dl & asymptomatic

Breastfeeding or expressed breast milk by cup

Monitor blood glucose after 1 hours or before next feed

- > 45 mg/dl
- 25-45 mg/dl
- < 25 mg/dl

Increase frequency (if breast-fed) or Increase volume of feed (if cup fed)

Follow Flowchart 2

Monitor blood glucose before next feeds; Discontinue monitoring if blood glucose is 45 mg/dl or more on two consecutive measurements

For Infant of diabetic mothers glucose monitoring schedule is as 1,2,3,6,12,24,36 and 48 hours.
Management of baby with blood glucose <25 mg/dl or symptomatic hypoglycemia

- GIR - Glucose Infusion Rate

Blood glucose <25 mg/dl OR
Blood glucose 25-45 mg/dl and symptoms of hypoglycemia

Give bolus of 2 ml/kg 10% dextrose IV over 2-5 minutes.
If no IV access, give same by nasogastric tube.
Continue IV 10% dextrose at daily maintenance rate (GIR* 6 mg/kg/min)

Check blood glucose after 30 min

Blood glucose <25 mg/dl or symptomatic

Repeat bolus 10% dextrose 2 ml/kg
Increase infusion rate to 8 mg/kg/min.

Measure blood glucose after 30 min*

If blood glucose <45 mg/dl, increase
Infusion rate to 10 mg/kg/min

Repeat measurement after 3 hours,

If Blood glucose <45 mg/dl
Refer for level III care

If Blood glucose >45 mg/dl

Blood glucose >45 mg/dl

Continue dextrose infusion at same rate

Monitor blood glucose every 3 hours

If blood glucose >45 mg/dl or more on 2 consecutive measurements start decreasing glucose infusion by 2 mg/kg/min.

Increase oral feeding gradually

Stop IV fluids when oral feeding reaches at least 2/3rd of daily requirement. Allow baby to breast feed. Stop monitoring when 2 pre-feed values are >45 mg/dl on full feed.

**Check glucose level 30 minutes after each bolus
3.9: INTRAVENOUS FLUID THERAPY

Indication for IV fluid therapy

- Birth weight <1200g
- Birth weight >1200g and sick
  - Severe respiratory distress (RR ≥ 70/ RR ≥ 60 and with severe retraction or grunting)
  - Unconscious or lethargic
  - Intolerance to gastric feed
  - Abdominal distension and/or vomiting (bilious/bloody)
  - Uncontrolled seizure
- Gestation week <30 weeks

Choice of intravenous fluids

- Determine required volume of fluid as per birth weight and age (Table 3.9.2)
- Use 10% Dextrose for initial 48 hours of life
- After 48 hours, if baby is passing urine, use commercially available IV fluids such as 10% Dextrose + 1/5 NS
- If the remixed solution is not available, to make 100ml of 10% Dextrose + 1/5 NS + 5 ml kcl in 500 ml
  - Take normal saline (NS) 20 ml
  - Add remaining fluid volume as 10% dextrose
  - Add 1 ml KCL/100 ml of prepared fluid

3.9.2. Fluid requirements of newborns

<table>
<thead>
<tr>
<th>B. WT (kg)</th>
<th>Fluid rate (ml/kg/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours</td>
</tr>
<tr>
<td></td>
<td>24</td>
</tr>
<tr>
<td>&lt;1</td>
<td>100</td>
</tr>
<tr>
<td>1-1.5</td>
<td>80</td>
</tr>
<tr>
<td>&gt;1.5</td>
<td>60</td>
</tr>
</tbody>
</table>
3.10. ASSESSMENT AND MANAGEMENT OF JAUNDICE

3.10.1. Clinical assessment of severity if jaundice in a newborn

In a newborn that has not been treated earlier, Kramer's criteria are used to clinically estimate severity of jaundice.

Clinical assessment of jaundice
(Kramer’s staging)

Alert signs in a newborn with jaundice (any one sign of the following):
- Clinical jaundice in first 24 hrs of life
- Total Serum Bilirubin (TSB) increasingly by >5 mg/dl/day or 0.5 mg/dl/hour
- TSB>15 mg/dl
- Conjugated serum bilirubin > 2 mg/dl
- Clinical jaundice persisting for > 2 week in full term and > 3 weeks in preterm neonates

3.10.2. Management of hyperbilirubinemia:
- Estimate total serum bilirubin in a baby with clinical jaundice at risk for hyperbilirubinemia
- Decide for phototherapy/exchange transfusion based on
  - Gestation
  - Postnatal age in hours
  - Presence or absence of risk
Figure 3.2: Normograph for initiating phototherapy (for newborns >35 weeks)

For newborns > 35 weeks:
- Consult Normograph 1 to identify requirement for phototherapy
- Consult Normograph 2 to identify requirement for exchange transfusion

- Use of bilirubin. Do not subtract direct reacting or conjugated bilirubin
- Risk factors: isoimmune hemolytic disease, G&PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis, or albumin <3.0 g/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.

Figure 3.3: Normograph for instituting exchange transfusion (newborns with gestation >35 weeks)
• The dashed line for the first 24 hours indicates 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 (85mol/L) above these lines.
  □ Risk factors-isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis.
  □ Measure serum albumin and calculate B/A ration (see legend)
  □ Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin
  □ If infants is well and 35-37 6/7 wk (median risk) can individualize TSB levels for exchange based on actual gestational age.

For newborn ≤ 35 weeks:
Consult table given below for identifying requirement for phototherapy or exchange transfusion.

Guidelines for phototherapy and exchange transfusion (for newborns with gestation ≤35 weeks)

<table>
<thead>
<tr>
<th>Weight (Grams)</th>
<th>Serum bilirubin levels (mg/dl)</th>
<th>Phototherapy, if TSB</th>
<th>Exchange transfusion, if TSB</th>
</tr>
</thead>
<tbody>
<tr>
<td>500-750</td>
<td></td>
<td>5-8</td>
<td>12-15</td>
</tr>
<tr>
<td>750-1000</td>
<td></td>
<td>6-10</td>
<td>&gt;15</td>
</tr>
<tr>
<td>1000-1250</td>
<td></td>
<td>8-10</td>
<td>15-18</td>
</tr>
<tr>
<td>1250-1500</td>
<td></td>
<td>10-12</td>
<td>17-20</td>
</tr>
<tr>
<td>1500-2500</td>
<td></td>
<td>15-18</td>
<td>20-25</td>
</tr>
</tbody>
</table>

Note: For exchange transfusion required refer baby to higher center (level III)

3.10.3. Precautions for phototherapy
• Baby should be naked
  o Eyes and genitals should be covered
• Newborn should be kept at a distance of not more than 45 centimeters or 18 inch below the light source
  o They can be kept as close to the phototherapy units as possible
• Frequent feeding every 2 hours and change of posture should be promoted
• Once under phototherapy, clinical assessment is not reliable. Serum bilirubin must be monitored
• Change the posture
(Baby requiring exchange transfusion should be referred to level III)
3.11. ASSESSMENT AND MANAGEMENT OF RESPIRATORY DISTRESS

Respiratory distress in a newborn as defined as Respiratory rate ≥60/min and/or any of the following signs:
- Grunting
- Retractions
- Cyanosis

Assessment of severity of respiratory distress using Downe’s score

<table>
<thead>
<tr>
<th>Score</th>
<th>Respiratory rate</th>
<th>Cyanosis</th>
<th>Air entry</th>
<th>Grunting</th>
<th>Chest retraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>&lt;60/min</td>
<td>Nil</td>
<td>Normal</td>
<td>None</td>
<td>Nil</td>
</tr>
<tr>
<td>1</td>
<td>60-80/min</td>
<td>In room air</td>
<td>Mild</td>
<td>On auscultation with stethoscope</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>&gt;80/min</td>
<td>In &gt;40% O₂</td>
<td>Marked</td>
<td>Audible with naked ear</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

Score of ≥ 4 for at least 2 hours during the first 8 hours of life denotes clinical respiratory distress.
Score of ≥ 6 is an indication for CPAP/bag & mask/intubation.

Monitoring of a newborn with respiratory distress (2-4 hourly)
- Clinical assessment with respiratory distress charting
- Start oxygen
  - If the baby's respiratory distress score is ≥ 4
  - Give oxygen at a high flow rate (5-10L/min by hoodbox)
- Continuous pulse oximetry is desirable. Change probe site regularly to avoid pressure sores
- Maintain saturations between 88-92% in preterm and 90-95% in term neonates. Titrate oxygen flow as per SpO₂
- Treat underlying condition
- If improves start feeding
- If baby’s respiratory distress score persistently ≥6 or central cyanosis or oxygen saturation < 90% with 10L of free flow oxygen by hoodbox, consider Nasal CPAP

- Despite use of nasal CPAP if the baby’s respiratory distress score is ≥ 6.
  - Organize transfer to a tertiary hospital for assisted ventilation and further diagnostic evaluation.
  - Give first dose of antibiotics (Ampicillin and gentamicin) prior to transfer
Device for oxygen delivery

<table>
<thead>
<tr>
<th>Nasal prong</th>
<th>O₂ Hood</th>
<th>CPAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Use appropriate size prongs</td>
<td>• Choose appropriate sized hood</td>
<td>• See below how to make CPAP</td>
</tr>
<tr>
<td>• Appropriate sized prong fits into nostrils without balancing columella or ala nasai</td>
<td>• Use transparent hood</td>
<td></td>
</tr>
<tr>
<td>• Flow rates: 0.5 to 1 L/min for preterm and 1 to 3L/min for term</td>
<td>• Flow rate &gt; 6 L/min</td>
<td></td>
</tr>
</tbody>
</table>

MAKING CPAP

**Indication**- Respiratory distress in neonates and infants not responding to oxygen therapy

**Complications**- Pneumothorax, nasal cavity drying

**Procedure**-

• Make all the equipment ready
  ➢ Nasal prongs that snugly fits into the nostrils
  ➢ A tube to connect to the nasal prongs to dip in the water
  ➢ A clean bottle filled with distilled water upto the level of the pressure to be given- 5-6 cm
  ➢ Adhesive tape
  ➢ Oxygen cylinder/ concentrator
• Take the nasal prongs and cut one end of the tubing
• Attach the connecter tubing to the cut end of the nasal prongs that is exiting out of the baby and tie the other end that goes to the oxygen and secure with tape
• Dip the end of the connecter tubing into the distilled water which is measured upto the level of the pressure (5-6 cm of water) to be given.
• Attach the inlet of nasal prongs to the oxygen delivery device
• Apply the nasal prongs to the baby’s nostrils and secure with tape
• Watch for presence of bubbling in the distilled water

*See annex 39 for checklist for making CPAP*
3.12. ASSESSMENT AND MANAGEMENT OF NEONATAL SEPSIS

Neonatal sepsis is one of the three major causes of neonatal mortality. Sepsis is largely preventable.

**High risk factors associated with development of sepsis**
1. Low birth weight (<2500g) or preterm baby
2. Febrile illness in mother during or within two weeks of delivery
3. Foul smelling and/or meconium stained liquor
4. Prolonged rupture of membrane (>18hr)
5. Single unclean or more than three vaginal examinations during labor
6. Prolonged labor (>24 hours both stages) and difficult delivery with instrumentation
7. Birth asphyxia and difficult resuscitation

Foul smelling liquor alone can be considered as having sepsis and warrants initiation of antibiotic therapy. Presence of at least three of the above mentioned risk factors is considered to be infected and requires investigation and treatment with appropriate antibiotics therapy.

**Clinical manifestations of neonatal sepsis**
- Non-specific: Hypothermia or fever, lethargy, refusal to suckle, poor cry, not arousable, comatose
- Gastrointestinal: Abdominal distension, diarrhoea, vomiting, poor weight gain
- Hematological system: Severe jaundice, pallor, petechiae, purpura, bleeding
- Cardiovascular: poor perfusion, shock, bleeding and sclerema
- Respiratory: Cyanosis, tachypnea, chest retractions, grunt, apnea/gasping
- CNS: Fever, seizures, blank look, high pitched cry, excessive crying/irritability, neck retraction, bulging fontanel

**Laboratory diagnosis of a newborn with sepsis**

*Sepsis screening: Any of two tests that come positive out of the following five tests strongly indicate presence of sepsis:*
1. Leukopenia (LC/Total leukocyte count <5000/cubic mm)
2. Neutropenia (ANC/Absolute neutrophil count<1800/cubic mm)
3. Immature neutrophil to total neutrophil (I/T) ratio (>0.2)
4. Micro ESR (3 + age in days upto 7 days of life or >15 mm 1st hour)
5. Positive CRP

(NB: Gold standard for diagnosis of sepsis is blood culture)
**Approach to newborns at risk of sepsis**

**Neonate at risk of sepsis**

- Symptomatic
  - High suspicious
    - Sepsis screen
    - Blood culture
    - Start antibiotic
    - Duration according to clinical course *
  - Low suspicious
    - Sepsis screen
    - Blood culture
    - Repeat sepsis screen after 12 hr
    - Monitor clinically

- Asymptomatic
  - Do sepsis screen blood culture
  - Negative
    - Sepsis screen
    - Blood culture
    - Negative screen
    - Monitor clinically
  - Positive
    - Take blood culture and start antibiotic
    - Positive screen
    - Duration – according to clinical course & culture *

**Culture sterile – 7-10 days**  **Culture Positive – 10-14 days**

* Do lumbar puncture if meningitis suspected clinically; if positive then treat for 21 days

---

**Fig: 3.4: Approach to newborn at risk of sepsis**

**Antibiotic therapy of neonatal sepsis**

1. **Septicaemia or pneumonia**

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Each dose</th>
<th>Frequency</th>
<th>Route</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inj. Ampicillin and Inj. Gentamicin</td>
<td>50 mg/kg/dose</td>
<td>12 hourly</td>
<td>IV</td>
<td>7-10 days</td>
</tr>
<tr>
<td></td>
<td>5 mg/kg/dose</td>
<td>24 hourly</td>
<td>IV</td>
<td>7-10 days</td>
</tr>
</tbody>
</table>

2. **Meningitis**

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Each dose</th>
<th>Frequency</th>
<th>Route</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inj. Ampicillin and Inj. Gentamicin and Inj. Cefotaxime</td>
<td>100 mg/kg/dose</td>
<td>12 hourly</td>
<td>IV</td>
<td>3 weeks</td>
</tr>
<tr>
<td></td>
<td>2.5 mg/kg/dose</td>
<td>12 hourly</td>
<td>IV</td>
<td>2 weeks</td>
</tr>
<tr>
<td></td>
<td>50 mg/kg/dose</td>
<td>6 hourly</td>
<td>IV</td>
<td>3 weeks</td>
</tr>
</tbody>
</table>
Supportive care of a newborn with sepsis
1. Provide warmth, ensure consistency normal temperature
2. Start intravenous line
3. If CRT> 3 seconds, infuse normal saline 10 ml/kg over 30 minutes, repeat the same 1-2 times, if perfusion continues to be poor
4. Infuse 10% dextrose 2 ml/kg stat
5. Inject Vitamin K1 mg IM (if ≥ 1000 gm) and 0.5 mg if <1000 gm
6. Start oxygen by hood or mask, if cyanosed or grunting
7. Provide gentle physical stimulation, if apnoeic. Provide bag and mask ventilation with oxygen if breathing is inadequate
8. Avoid enteral feed if hemodynamically compromised, give maintenance IV fluids
9. Consider use of dopamine if perfusion is persistently poor

Rational Use of Antibiotics
- Indication of antibiotics
- Appropriate choice and correct combination antibiotics
- Correct regimen - dose, duration, frequency
- The cost effectiveness with adequate efficacy

Indication of antibiotics
The indication for starting antibiotics for at risk neonates with early onset sepsis are:
1. Presence of ≥ 3 risk factors for EoNNS
2. Presence of foul smelling liquor
3. Presence of 2 antenatal risk factors and a positive septic screen
4. Strong clinical suspicion of sepsis
The indication for starting antibiotics for at risk neonates with late onset sepsis are:
1. Positive septic screen and or
2. Strong clinical suspicion of sepsis

Choice of Antibiotics
Depends on
- Most probable etiological agent
- Bacterial isolate from culture
- Sensitivity pattern
- Hierarchy and combination

Empirical choice of antibiotics for treatment of neonatal sepsis

<table>
<thead>
<tr>
<th>Clinical situation</th>
<th>Septicaemia and Pneumonia</th>
<th>Meningitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRST LINE</td>
<td></td>
<td>Add Cefotaxime</td>
</tr>
<tr>
<td>Community acquired (resistance unlikely)</td>
<td>Ampicillin and Gentamicin</td>
<td></td>
</tr>
<tr>
<td>SECOND LINE</td>
<td>Ampicillin or Cloxacillin and Gentamicin or Amikacin</td>
<td>Add Cefotaxime</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Hospital acquired Some strain likely to be resistance</td>
<td>Cefotaxime or Piperacillin-Tazobactam or Ciprofloxacin and Amikacin Consider Vancomycin if MRSA suspected</td>
<td>Cefotaxime or Piperacillin-Tazobactam and Amikacin</td>
</tr>
</tbody>
</table>

The choice of antibiotics also depends upon the prevalent spectrum of organism generally isolated in that setup and its sensitivity pattern. The antibiotics should be changed accordingly on the basis of culture report wherever possible.

### Duration of course of antibiotics in neonatal sepsis

1. **Meningitis** *(with or without positive blood/CSF culture)*- 21 days
2. **Blood culture positive but no meningitis**- 14 days
3. **Culture negative, sepsis screen positive and clinical course consistent with sepsis**- 7-10 days
4. **Culture and sepsis screen negative, but clinical course compatible with sepsis**- 5-7 days

Antibiotics therapy of neonatal sepsis

#### 1. Sepsis or Pneumonia

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Each dose</th>
<th>Frequency</th>
<th>Route</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin</td>
<td>50mg/kg/dose</td>
<td>12hrly</td>
<td>IV, IM</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Cloxacillin</td>
<td>50mg/kg/dose</td>
<td>12hrly</td>
<td>IV</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>5mg/kg/dose</td>
<td>24hrly</td>
<td>IV, IM</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Amikacin</td>
<td>7.5mg/kg/dose</td>
<td>12hrly</td>
<td>IV, IM</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Cefotaxim</td>
<td>50mg/kg/dose</td>
<td>12hrly</td>
<td>IV, IM</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Piperacillin+ Tazobactam</td>
<td>50-100mg/kg/dose</td>
<td>12hrly</td>
<td>IV</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>50mg/kg/dose</td>
<td>12hrly</td>
<td>IV, IM</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>10-20mg/kg/dose</td>
<td>12hrly</td>
<td>IV, PO</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>15mg/kg/dose</td>
<td>12hrly</td>
<td>IV</td>
<td>7-10 days</td>
</tr>
</tbody>
</table>
II. Meningitis

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Each dose</th>
<th>Frequency &lt;7days age</th>
<th>Frequency &gt;7days age</th>
<th>Route</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin</td>
<td>100mg/kg/dose</td>
<td>12hrly</td>
<td>8hrly</td>
<td>IV, IM</td>
<td>21 days</td>
</tr>
<tr>
<td>Cloxacillin</td>
<td>50mg/kg/dose</td>
<td>12hrly</td>
<td>8hrly</td>
<td>IV</td>
<td>21 days</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>5mg/kg/dose</td>
<td>24hrly</td>
<td>24hrly</td>
<td>IV, IM</td>
<td>21 days</td>
</tr>
<tr>
<td>Amikacin</td>
<td>7.5mg/kg/dose</td>
<td>12hrly</td>
<td>12hrly</td>
<td>IV, IM</td>
<td>21 days</td>
</tr>
<tr>
<td>Cefotaxim</td>
<td>50mg/kg/dose</td>
<td>6hrly</td>
<td>6hrly</td>
<td>IV, IM</td>
<td>21 days</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>50mg/kg/dose</td>
<td>12hrly</td>
<td>8hrly</td>
<td>IV, IM</td>
<td>21 days</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>15mg/kg/dose</td>
<td>12hrly</td>
<td>8hrly</td>
<td>IV</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>50 mg/kg/dose</td>
<td>12hrly</td>
<td>12hrly</td>
<td>IV</td>
<td>7-10 days</td>
</tr>
</tbody>
</table>

Prevention of neonatal sepsis

- Use infection prevention practices while caring for mother and newborn.
- Treat mother’s infection adequately during pregnancy.
- Use clean delivery practices during labour and birth.
- Treat mother with antibiotics if she has prolonged rupture of membrane (>18 hours).
- Keep umbilical cord dry and uncovered.
- Teach mother and family infection prevention practices
  - Hand washing
  - Minimum visitors
  - Clean clothing
- Exclusive breast feeding.
- Adequate and timely immunization.
3.13. RESUSCITATION OF ASPHYXIATED NEWBORN

Within 60 sec

Birth
Dry thoroughly

Assess
Breathing OR Crying

YES
Routine Newborn Care

NO

Dry and maintain normal temperature,
Position airway, clear secretion if needed,
Dry and stimulate

Evaluate respiration

Apnea or Gasp ing

Yes

Provide positive pressure ventilation for 60 second and monitor SPO2

Assess HR

HR<100bpm

Yes

Check chest movement
Ventilation corrective measures if needed*

Assess HR

HR<60bpm

Yes

Chest compression coordinated with PPV at 3:1 ratio

Post resuscitation care

Targeted Pre-ductal SpO2 after birth
1min 60-65%
2min 65-70%
3min 70-75%
4min 75-80%
5min 80-85%
10min 85-95%

HR<60bpm

IV Adrenaline (1:10,000) 0.01-0.03mg/kg via UVC *

*see below for steps of UVC insertion
Steps for umbilical vein catheter (UVC) insertion

- Arrange all necessary equipment
- Follow aseptic technique of infection prevention
- Prepare the solution to be infused
- Restrain the baby by using a padded crucifix splint and put baby under radiant warmer
- Wear cap and mask
- Wash hands, wear sterile gown and put sterile gloves
- Prepare umbilicus and surrounding by washing in an around spiral motion with a swab or cotton ball form inward outwards with spirit, Povidone Iodine and spirit each time with different swab
- Allow it to dry
- Remove the gloves
- Wear another sterile gloves
- Drape area with sterile eye cloth
- Fill the catheter with normal saline using closed syringe attached to the end of the catheter and make sure that there is no air
- Cut the umbilicus stump with the sterile blade about 2 cm from the skin
- Hold the stump with toothed forceps and identify the vein.
- The umbilical stump has the two umbilical arteries, which are thicker-walled and the single umbilical vein, which usually has a wider opening
- Remove the clot and debris from the umbilical vein.
- Insert gently the catheter filled with saline and attached with syringe towards the head of the baby and to the baby’s right side
- As the catheter is advanced, periodically apply gentle suction with the syringe until blood flows back. Once blood flows back freely through the catheter (usually after the catheter is inserted 3 to 5 cm), do not advance the catheter any further
- If resistance is encountered while advancing the catheter, especially in the first 2 to 3 cm, do not continue. Remove the catheter and try again
- Tie the cord tie or suture around the stump of the umbilicus to hold the catheter in place and prevent bleeding around the catheter or from one of the arteries.
- Remove the syringe and connect the infusion set to the catheter, ensuring that there are no air bubbles in the set. Secure the catheter with suture material or adhesive tape to prevent it from being dislodged.

See annex 30 for checklist of Neonatal Resuscitation and annex 31 for checklist of equipment check
3.14 MANAGEMENT OF NEWBORN WITH SEIZURE

Identify and characterize seizures in newborn

Generalized convulsion
- Repetitive jerking movements of limbs and face
- Continuous extension and flexion of arms and legs, either Synchronous or asynchronous
- Apnea (cessation of breathing for more than 20 seconds)

Subtle convulsion
- Repetitive blinking, eye deviation or staring
- Repetitive movements of mouth or tongue
- Purposeless movement of limbs as if bicycling or swimming
- Apnea
- Baby may be conscious

Distinction of epileptic from non-epileptic phenomena (jitteriness)

Non epileptic phenomena are characterized by
- Can be provoked by stimulation
- Can be suppressed by gentle restraint
- Are not accompanied by autonomic changes (eg- tachycardia, tachypnea, hypoxia or apnea)
- Are not accompanied by abnormal eye movements?
Follow up after 1 month. If EEG/Neurological tests are normal, then taper in 7 days. If abnormal EEG or Neurological findings is not equal continue till 3 months as per protocol. adequacy of anticonvulsant therapy
Occasional subtle seizures not interfering with vital functions may be left alone if maximal doses of phenobarbitone and phenytoin have already been reached

Maintenance therapy
Monotherapy is the most appropriate strategy to control seizures. Attempts should be made to stop all anti-epileptic drugs and wean the baby to only phenobarbitone at 3-5 mg/kg/day. If seizures are uncontrolled or if clinical toxicity appears, a second AED may be added. The choice may vary from phenytoin (5-8 mg/kg/day IV or P.O in two divided doses). Bioavailability of Phenytoin may be reduced if the tablets are crushed.

Duration of therapy
Duration of therapy should be guided by cause, course, and neurological status of the baby.
3.15. MANAGEMENT OF A NEWBORN WITH HEMODYNAMIC COMPROMISE

Signs of hemodynamic compromise in a newborn

- Pallor
- Tachycardia
- Reduced pulse volume
- Decreased urine output

Action to be taken

- Assess for signs of respiratory distress
- Oxygen via nasal prong or oxygen hood or CPAP
- IPPV with bag and mask ventilation if signs of severe distress
- Obtain IV access
- Normal saline @10ml/kg IV over 15 to 20 minutes
- Reassess and repeat if required
- IV antibiotics (Ampicillin and Gentamycin) after obtaining blood for culture and sensitivity
- Full septic work up (Blood for CBC, culture and sensitivity, urine for RME and culture, lumber puncture)
- Proceed to further management of shock using ionotropic agents. Dopamine should be started if signs of shock persist after two fluid boluses.

<table>
<thead>
<tr>
<th>Day</th>
<th>Dose/frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1 initial dose</td>
<td>1mg/kg/dose q8h x 3 doses</td>
</tr>
<tr>
<td>Day 2 follow in 12 h with</td>
<td>0.5mg/kg/dose IV q12 h x 2 doses</td>
</tr>
<tr>
<td>Day 3 follow in 12 h with</td>
<td>0.25 mg/kg/dose IV q12h x 2 doses</td>
</tr>
<tr>
<td>Day 4 follow in 24 h with</td>
<td>0.125 mg/kg/dose IV x 1 dose</td>
</tr>
</tbody>
</table>

- If BP improves and other vasopressors have been weaned off, treatment may stop after 24 hours.

**Ionotropic Agents**

**Preparation before infusion**

<table>
<thead>
<tr>
<th>Inotrope</th>
<th>Commercially available concentration</th>
<th>Dilution Step 1</th>
<th>Dilution Step 2</th>
<th>Final concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dopamine</td>
<td>1ml=40mg</td>
<td>2ml of undiluted Dopamine +48ml NS or 5% Dextrose</td>
<td><strong>NEONATAL</strong></td>
<td>1.6mg/ml</td>
</tr>
</tbody>
</table>
Dose and Dose calculation:

**Dopamine**: 5-20 mcg/kg/min

Dose of Dopamine added to make 50 ml NS:
3 x ugm/kg/min x wt
ml/hr

**This amount divided by 40 gives the amount to add in ml**

**Example of Dopamine calculation:**
Weight of the baby 2.5 Kg, starting dose: 10 mcg/kg/min at infusion rate of 1 ml/hr
3x2.5x10/ 1= 75 mg/40= 1.8 ml in 48.2 ml NS at the rate to 1 ml/hr or 16 drops per minute via burette set provides dopamine at 10 ugm/kg/min

*See annex 32 for checklist for assessment and management of a newborn requiring special care*
SECTION 4: APPROACH TO A CHILD WITH COUGH OR DIFFICULTY IN BREATHING
4.1: INTRODUCTION

Cough and difficulty in breathing are common problems in young children. The causes range from mild, self-limiting illness to severe, life-threatening disease like pneumonia. Pneumonia is the single largest infectious cause of death in children under five years of age. This chapter provides guidelines for managing the under-five-children with cough and/or difficulty in breathing.

Before taking detailed history and examination, you must ensure that emergency treatment has been provided for the emergency signs detected using ETAT. After you have completed ETAT, following history & examination will help you in reaching a diagnosis in children presenting with cough or difficult breathing.

History

- Cough
  - Duration in days
  - Diurnal variation
  - Paroxysms with whoop or vomiting or central cyanosis

- Noisy breathing, difficulty in breathing
- Chest Pain
- History of choking or sudden onset of symptoms
- Fever – duration and details (See section
- History suggestive of measles (See section
- Past history- Similar episodes, history of use of salbutamol, history of allergy
- Known or possible HIV infection (See section
- Immunization: BCG; DPT; Haemophilus influenza type b or Pentavalent Vaccine, OPV/ IPV, PCV- 10, Measles- Rubella, JE vaccine
- Family history of asthma, allergy
- History of contact with tuberculosis

Examination

The symptoms and signs listed below are a guide to reach a diagnosis. Not all children will show every symptom or sign.

- General condition
  - Sick looking or well looking
  - Irritable or lethargic

- Vitals-
  - Heart rate- Tachycardia may be due to fever, shock, dehydration, congestive cardiac failure
• Respiratory rate- Count respiratory rate for full 1 minute when baby is calm and not feeding, look for chest indrawing, nasal flaring, head nodding, grunting, audible wheeze, stridor
  *HR may increase by 10 beats/min and RR may increase by 4 breaths/min for every 1-degree C rise in temperature
• Blood pressure- Hypotension due to septic shock or dehydration (See appendix for hypotension)
• SpO2 if available

➢ Head to toe examination
  • Subconjunctival hemorrhage
  • Throat – Congestion, enlarged & inflamed tonsils, membrane over tonsils
  • Cyanosis
  • Severe palmar pallor
  • Lymphadenopathy
  • Large skin boils or abscess or infected scabies
  • Skin rashes suggestive of measles

☐ Respiratory system examination-
☐ Inspection- signs of respiratory distress
☐ Palpation- Apex beat displaced or trachea shifted from midline
☐ Percussion- Dullness (Pleural effusion, pneumonia) or hyper- resonant(pneumothorax)
☐ Auscultation- Unequal air entry, no air entry, crackles, bronchial breath sounds, wheeze, stridor
☐ Cardiovascular system examination-
  • Heart murmurs
☐ Per Abdominal examination-
  • Enlarged liver and spleen
## 4.2: CLASSIFICATION OF CHILDREN WITH COUGH/ DIFFICULTY IN BREATHING

Cough and/or difficulty breathing may be classified into lasting $\leq 14$ days and lasting $>14$ days as given in Table 4.1.

**Table 4.1: Classification of cough/ Difficulty in breathing**

<table>
<thead>
<tr>
<th>Cough $\leq 14$ days</th>
<th>Cough $&gt;14$ days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respiratory</strong></td>
<td></td>
</tr>
<tr>
<td>Viral URTI</td>
<td>Bronchial Asthma</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>Croup</td>
<td>Pertussis</td>
</tr>
<tr>
<td>Epiglottitis</td>
<td>HIV</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>*Some causes of cough $\leq 14$ days may persist for $&gt;14$ days</td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td></td>
</tr>
<tr>
<td>Bronchiolitis</td>
<td></td>
</tr>
<tr>
<td>Bronchial Asthma Exacerbation</td>
<td></td>
</tr>
<tr>
<td>Foreign body</td>
<td></td>
</tr>
<tr>
<td><strong>Non-respiratory</strong></td>
<td></td>
</tr>
<tr>
<td>Congestive cardiac failure</td>
<td></td>
</tr>
<tr>
<td>Malaria</td>
<td></td>
</tr>
<tr>
<td>Severe anemia</td>
<td></td>
</tr>
<tr>
<td>Diabetic ketoacidosis</td>
<td></td>
</tr>
</tbody>
</table>

*Some causes of cough $\leq 14$ days may persist for $>14$ days*
4.3: COUGH/ DIFFICULTY IN BREATHING OF ≤14 DAYS DURATION

The cause of cough of ≤14 days duration can be due to self-limiting viral upper respiratory tract infection or severe life threatening illness like pneumonia. Box 4.1 and 4.2 gives definition of fast breathing and emergency/general danger signs respectively. Algorithm 4.1 gives the approach to cough/difficulty in breathing of ≤14 days.

**Box 4.1: Fast Breathing**

- ≥ 50 breaths/min in a child aged from 2 months upto 12 months
- ≥ 40 breaths/min in a child aged from 1 year upto 5 years

**Box 4.2: Emergency/General Danger Signs**

- Not breathing at all or gasping
- Obstructed breathing
- Central cyanosis
- Severe respiratory distress (RR>70 or grunting, head nodding, severe chest indrawing)
- Shock: Cold hands with Capillary refill > 3 seconds and weak and fast pulse
- Coma (lethargy or reduce level of consciousness)
- Convulsions
- Inability to breastfeed or drink due to respiratory distress

*Many of these illnesses have already been covered in ETAT section and initial management would have been started.*
Algorithm 4.1: Assessment of a child with Cough/Difficult Breathing

A child with cough/ Difficulty breathing ≤14 days

- Presence of Emergency /General danger signs (Box SpO2 <90%)
  - Start emergency treatment immediately including oxygen
  - Check for wheeze or stridor

Wheeze present: Bronchiolitis, Bronchial asthma, WALRI, Pneumonia with wheeze

Stridor present: Croup, Epiglottitis, Diphtheria, Foreign body, anaphylaxis

No wheeze/ no stridor

History and Examination

Fast breathing

- No chest findings: DKA, severe anemia, malaria
  - Chest crepitations

- No chest findings: DKA, severe anemia, malaria
  - Physical crepitations, Hepatomegaly, murmur: Congestive Cardiac Failure\(\star\star\)

- No chest findings: DKA, severe anemia, malaria

After nebulisation if crepits more than wheeze- Pneumonia with wheeze

See box 4.3 for management of CCF

Box 4.3: Treatment of Congestive Cardiac Failure\(\ast\)

1. Provide oxygen
2. Keep child in propped up position
3. Provide 2/3 rd of maintenance fluid
4. Inj. Lasix 1-2 mg/kg stat if blood pressure maintained
5. Refer to higher centre
4.4: SEVERE PNEUMONIA

Severe pneumonia is defined as cough and/or difficult breathing in a child with at least one of the following conditions:

- Central cyanosis
- Severe respiratory distress
  - Respiratory rate >70/min
  - Head nodding, grunting, severe chest indrawing
  - Inability to breastfeed or drink due to respiratory distress
- Emergency/General danger signs like coma, convulsion, shock

On auscultation, you may get following signs:

- Crackles
- Bronchial breath sounds
- Decreased breath sound over effusion or empyema
- Abnormal vocal resonance (decreased over a pleural effusion or empyema, increased over lobar consolidation)
- If the child has wheezing, give salbutamol nebulization 1 time or MDI therapy should be given before classifying the child as severe pneumonia or pneumonia.

Investigations

- Obtain a chest X-ray in all children with severe pneumonia to identify complications and decide treatment.
- Complete blood count (Hb, TLC, DLC, Platelet count), blood culture if available

Treatment: See Algorithm 4.2 for management of severe pneumonia

1. Oxygen therapy:

- Give oxygen to all children with oxygen saturation <90% (<94% if they also have other emergency signs like shock etc.).
- Use nasal prongs/face mask/hood box as the methods of oxygen delivery to young infants; If not better, start Continuous positive airway pressure if available.
- Use a pulse oximetry to guide oxygen therapy (to keep oxygen saturation > 90%). If a pulse oximeter is not available, continue oxygen until the clinical signs of hypoxia (such as inability to breastfeed or breathing rate ≥ 70/min) are no longer present.
2. Antibiotic therapy

Give antibiotics

- Injection Ampicillin 50 mg/kg/ dose IM or IV every 6 hours.
- Give Injection Cloxacillin 25 mg/kg/dose every 6 hours if staphylococcal pneumonia is suspected (See box 4.4)
- Injection Gentamicin 5 mg/kg IM or IV once a day if the child is severely malnourished.
- If the child does not show signs of improvement within 48 hours, switch to Ceftriaxone 50 mg/kg/ dose twice daily or Cefotaxime 50 mg/kg/dose every 6 hours
- Shift to oral drugs as soon as the child is able to take orally
  - Injection Ampicillin and Cloxacillin can be shifted to oral Amoxicillin 40 mg/kg/dose twice a day and Cloxacillin 25 mg/kg/dose four times daily respectively.
  - Injection Gentamycin can be shifted from intravenous to intramuscular injection once a day
- Total duration of antibiotics in severe pneumonia
  - Clinical response within 48 hours: 7 days
  - Clinical response after 48 hours: 10 days

**Box 4.4: When to suspect Staphylococcus aureus pneumonia**

It is important to have high index of suspicion for staphylococcal infection as the initial choice of antibiotic does not cover this less common but a more severe infection adequately. Staphylococcal pneumonia is suspected if any child with pneumonia has:

- Rapid progression of the disease, or
- Presents in septic shock
- Pneumatocele, or Pneumothorax, or Effusion on chest radiograph, or
- Large skin boils or abscess or infected scabies or
- Post-measles pneumonia, which is not responding within 48 hours to the initial therapy.

3. Supportive care

- Remove any thick secretions at the entrance to the nasal passages or throat, which the child cannot clear by gentle suction.
- Manage fever (See section)
- Provide maintenance IV fluid if child cannot accept oral feeds. Stop IV fluids gradually when the child is accepting orally satisfactorily.
- If wheeze is present, give Nebulization Salbutamol (<14kg- 0.5 ml≥14 kg-
1 ml to make 3 ml with NS) or MDI Salbutamol 2 puff

- There is no role of Cough Syrup (may be harmful)
- Ensure vaccination/ Nutritional advice

4. **Monitoring:**

- The child should be checked by a nurse at least every 3 hourly and by a doctor at least twice daily
- Monitor vitals, intake/ output

- In the absence of complications, there should be signs of improvement like breathing slower, less indrawing of the lower chest wall, less fever, improved ability to eat and drink better oxygen saturation in next 48 hours.

5. **Other alternative diagnosis and treatment**

- If the child has not improved after 48 hours or if the child’s condition has worsened, repeat Chest X-ray.
  - Check for complications (See section
  - Reassess for possibility of Staphylococcal pneumonia
  - Consider tuberculosis if cough and fever persists for more than 2 weeks
Chart 4.2 Management of children with severe pneumonia

- Admit
- Give oxygen if SpO₂ < 90%* or CPAP
- Give IV fluids/NG feeds
- Get a chest X-ray
- IV Ampicillin **
- Treat wheeze, if present

Monitor at least every 3 hours for appearance of new emergency / general danger signs / complications (Count RR, Check SpO₂)

Reassess at 48 hours
- Improved
- No improvement and no deterioration despite adequate therapy

Complete antibiotics for 7-10 days/ days***

* < 94% in presence of other emergency signs
** Add Gentamicin only if child is malnourished and if staphylococcal infection is suspected, give Cloxacillin
*** Shift to oral drugs as soon as the child is able to take orally

- Review your diagnosis
- Review for wheeze
- Review: Rule out air leak or empyema by repeat X-ray; look for any new complication & treat appropriately.
- Give Injectable third generation cephalosporin (Cefotaxime or ceftriaxone) 10 days.
- If Staphylococcal infection is confirmed or very likely then give antistaphylococcal antibiotics e.g. Cloxacillin. If already started earlier, refer for specialty care
- Refer for ventilatory support if oxygenation is not maintained or there is no improvement with above mentioned treatment
6. Discharge

Children with severe pneumonia can be discharged when:

- Respiratory distress has resolved.
- There is no hypoxaemia (oxygen saturation ≥ 90% on room air)
- They are feeding well.
- They are able to take oral medication or have completed a course of parenteral antibiotics.
- The family is counseled when to return.

At discharge, give feeding advice, vaccinations that are due, address risk factors like malnutrition, indoor air pollution and parental smoking.
4.5: PNEUMONIA

A child is classified as pneumonia if he/she has cough and/or difficult breathing plus at least one of the following signs:

- Fast breathing: Age 2-12 months, >50/min
- Age 1-5 years, >40/min
- Lower chest wall indrawing

On auscultation, crackles may be present.

**Treatment**

- Treat child as outpatient. Advise to continue feeding.
- Treat wheeze with oral Salbutamol or MDI Salbutamol
- Antibiotic therapy
  - Give oral Amoxicillin
  - Give the first dose at the clinic and teach the mother how to give the other doses at home.
  - Give 40 mg/kg/ dose twice a day for 5 days
- Avoid unnecessary harmful medications such as cough syrups, medicated nose drops, steam inhalation.

Encourage the mother to feed the child.

**When to return:** Advise her to bring the child back after 2 days or earlier if the child becomes sicker or is unable to drink or breastfeed.
Algorithm 4.3: Systematic assessment of children with non-severe pneumonia at follow-up

Assess condition: has patient improved?  
Yes → Complete course of antimicrobial therapy  
No → Is the patient worse?  
Yes → Admit or Refer to higher level of care and treat as per severity (Box 4.5)  
No → Are antimicrobial agents being taken incorrectly?  
Yes → Correct administration and follow-up in 48 h  
No → Does child have a wheeze?  
Yes → Continue same antibiotics and Add bronchodilators  
No → Suspect tuberculosis, HIV/AIDS, or signs of severe malnutrition  
Yes → Perform investigation and provide appropriate management  
No → Continue same antibiotic: for 24 hours more

Reassess: Is there improvement?  
Yes → Complete the treatment  
No → Admit and give second line antibiotics like Ceftriaxone or refer

Box 4.5: Indication for admission

Age < 6 months  
Multiple lobe involvement  
Immunocompromised state  
Toxic appearance (See section of fever)  
Hypoxia  
Dehydration  
Vomiting or inability to tolerate oral fluids or medications  
No response to appropriate oral antibiotic therapy  
Inability of caregivers to administer medications at home  
Inability to come for follow up
4.6: COMPLICATIONS OF PNEUMONIA

1. Pleural Effusion and Empyema

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

- Pain in chest during breathing
- On examination, the chest is dull to percussion, breath sounds are reduced or absent over the affected area.
- Fever persists despite antibiotic therapy for >72 hours

A chest X-ray shows fluid on one or both sides of the chest.

Treatment of Pleural effusion/ Empyema

- Antibiotic therapy-
  - Start with Ampicillin and Cloxacillin. If already on Ampicillin, switch to Ceftriaxone and add Cloxacillin.
  - Refer to higher center
  - If referral is not possible and child improves, continue antibiotic
    - Usually intravenous antibiotic therapy shall be needed for 10-14 days.
    - When the child improves, continue with Cloxacillin orally, 4 times a day.
      Continue treatment for a total of 4-6 weeks.

- Chest drainage: Management of fluid in the pleural cavity depends on the character of the fluid obtained. If there is pus in the pleural cavity then a chest thoracotomy with chest tube drain is must, unless the collection is very small. If not available, child needs to be referred as giving antibiotics is not sufficient.

- Supportive therapy: Every child should receive oxygen and other supportive therapy as needed (nutritional support, and antipyretics/analgesic if required)

2. Sepsis

3. Pneumothorax
4.7: UPPER RESPIRATORY INFECTION

These are common, self-limiting viral infections that require only supportive care. Antibiotics should not be given. Most episodes end within 14 days. Cough lasting 14 days or more should be evaluated for other causes like TB, Asthma, Pertussis.

**Treatment**

- Treat the child as an outpatient.
- Soothe the throat and relieve the cough with a safe remedy, such as a warm, sweet drink.
- Manage fever
- Clear secretions from the child’s nose before feeds with a cloth soaked in water that has been twisted to form a pointed wick. Use nasal saline drops if nasal block.
- Give age appropriate feed plus extra breast milk or fluids if there is fever. Small frequent drinks are more likely to be taken and less likely to be vomited.
- Indication for antibiotics
  - Streptococcal pharyngitis (Enlarged congested tonsils with pus point)
  - Acute supportive otitis media (ASOM) (See fever)

Do not give unnecessary or harmful medications such as cough syrups, medicated nose drops, steam inhalation.
4.8: CHILD PRESENTING WITH WHEEZE

Wheeze is a high-pitched whistling sound on expiration usually heard by auscultation, occasionally audible without stethoscope in severe cases. It is caused by narrowing of the distal airway. To decide whether the child has wheeze or not, do auscultation with a stethoscope.

In children below 2 years of age the most common cause of wheeze is bronchiolitis. Some children may have wheeze with recurrent lower respiratory infections also, called wheeze associated lower respiratory infection (WALRI). A proportion of these children may have wheeze in absence of viral infection and they may be diagnosed as asthma. Algorithm for assessment of children with wheeze is given in Algorithm 4.4.

History
- Recurrent episodes of wheeze/ respiratory difficulty
- Night-time or early morning shortness of breath, cough or wheeze
- Cough aggravated by exertion (laughing, crying, running etc.)
- Response to Salbutamol nebulization or MDI
- Personal/ family history of allergy or asthma

Examination
- Wheezing on expiration
- Signs of hyperinflation like pushed down liver and spleen
- Signs of respiratory distress (signs of severe respiratory distress are same as given in severe pneumonia)

Check responses to rapid-acting bronchodilator
- If the cause of the wheeze is not clear or if the child has fast breathing or chest indrawing in addition to wheeze, give a rapid-acting bronchodilator and assess after 1 hour. The response to a rapid-acting bronchodilator helps to determine the underlying diagnosis and treatment.
- Give the rapid-acting bronchodilator by one of the following methods:
  - nebulized salbutamol OR
  - salbutamol by a metered dose inhaler with spacer device
- Assess the response after 1 hour. Signs of improvement are:
  - less respiratory distress (easier breathing)
  - less low chest walls indrawing
  - improved air entry
- If no response to rapid acting bronchodilators, look for other causes like foreign body aspiration.

Use checklist 33 for use of Metered Dose Inhaler (MDI)
Assessment of Children with wheezing

Does this child have recurrent (>3) episodes?

- No

**Clinical features**
- First episode of wheeze in a child aged < 2 years
- Preceding upper respiratory illness and/or rhinorrhea, usually with mild fever
- Nasal discharge, which can cause severe nasal obstruction.
- Hyperinflation of the chest
- Fine crackles and/or wheeze on auscultation of the chest

**Bronchiolitis**

- PNEUMONIA WITH WHEEZE

**Clinical features**
- Children with cough and fever and rapid breathing who do not have qualifying features for Bronchiolitis, WALRI and Asthma can have pneumonia with wheeze
- Crepts more than wheeze

- *WALRI* – Wheeze associated with lower respiratory infection

**Clinical features**
- Children usually less than 3 years with recurrent episodes of wheezing.
- Typically associated with upper respiratory tract infection
- No family history of asthma or atopy

**ASTHMA**

- *WALRI* – Wheeze associated with lower respiratory infection

**Clinical features**
- Children usually more than 3 years with recurrent episodes of wheezing.
- May have interval symptoms between the episodes too
- May have family history of asthma or atopy

**Chart 4.4: Assessment of Children with wheezing**
<table>
<thead>
<tr>
<th>Suspect for foreign body aspiration in a child with wheeze, if there is one or more of the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of sudden onset of choking</td>
</tr>
<tr>
<td>Unilateral or localized wheeze</td>
</tr>
<tr>
<td>Wheeze with poor or no response to bronchodilators</td>
</tr>
<tr>
<td>Asymmetric air entry on chest examination</td>
</tr>
<tr>
<td>Segmental or lobar pneumonia that fails to respond to antibiotic therapy</td>
</tr>
</tbody>
</table>

Refer such a child to a facility hospital where bronchoscopy for diagnosis and removal is possible. Emergency management of a child developing obstructed breathing or apnoea following foreign body aspiration has already been discussed in ETAT section.
4.9: BRONCHIOLITIS

Bronchiolitis is a lower respiratory viral infection, which is typically most severe in young infants, occurs in annual epidemics and is characterized by airways obstruction and wheezing. It is most commonly caused by respiratory syncytial virus. Infants and young children with bronchiolitis may present with a wide range of clinical symptoms and severity from mild distress to impending respiratory failure.

Typical features of bronchiolitis include
- age less than 2 years
- preceding upper respiratory illness and/or rhinorrhea
- mild fever
- unpredictable response to a rapid-acting bronchodilator
- hyperinflation of the chest, with increased resonance to percussion
- lower chest walls indrawing
- fine crackles and wheeze on auscultation of the chest
- difficulty in feeding, breastfeeding or drinking owing to respiratory distress
- nasal discharge, which can cause severe nasal obstruction.

Risk factors for severe disease include age less than 12 weeks, prematurity, underlying cardiopulmonary disease, or immunodeficiency.

Management

1. Oxygen
   - Give oxygen to all children with severe respiratory distress or oxygen saturation ≤ 90%.
   - The recommended method for delivering oxygen is by nasal prongs. If not improved, may need CPAP.
   - The nurse should check, every 3 hour, that the prongs are in the correct position and nostrils are not blocked with mucus.

2. Other treatment
   - In case of severe disease, particularly if the child has personal or family history of atopy, beta 2 agonists like Salbutamol by nebulized route 0.5 ml with 2.5 ml NS if wt ≤ 14 kg and 1 ml in 2 ml NS if wt > 14 kg (0.15 mg /kg minimum1.25 mg) can be given. However, as the response to bronchodilators in bronchiolitis is not predictable continued or more frequent usage should be done, only if there is a clinical response after 15-30 minutes of inhalation with initial doses.
   - If not better, Nebulized epinephrine (2 ml of inj. Epinephrine 1:1000 solution in 2 ml of normal saline) may decrease distress or improve oxygenation. The dose can be repeated 4 hourly for 1-2 days depending on the severity and response.
   - Routine antibiotics have no role but may be used in young infants or in a really sick looking infant as the distinction from pneumonia may be difficult.
3. **Supportive care**
   - Manage fever
   - Encourage breastfeeding and oral fluids.
   - Nasogastric feeding should be considered in any patient who is unable to maintain oral intake or hydration (expressed breast milk should be given).
   - Give intravenous fluids if needed but avoid over hydration.

4. Gentle nasal suction should be used to clear secretions in infants where nasal blockage appears to be causing respiratory distress.

   **Monitoring**
   - A hospitalized child should be assessed by a nurse every 3 hourly and by a doctor at least twice a day.
   - Monitor vitals. Watch for signs of respiratory failure, i.e. increasing hypoxia and respiratory distress leading to exhaustion.
   - Monitor input/output.

**Complications**
If the child fails to respond to oxygen therapy or the child’s condition worsen suddenly, obtain a chest X-ray to look for evidence of pneumothorax. If severe respiratory distress is persistent, consider transfer to a facility with ventilation facility.

**Infection control**
Bronchiolitis is very infectious and dangerous to other young children in hospital with other conditions. The following strategies may reduce cross-infection:

- Hand-washing by health personnel between patients, no sharing of nebulizer tubes and oxygen tubing
- Clinicians should encourage exclusive breastfeeding for at least 6 months to decrease the morbidity of respiratory infections.

**Discharge**
- An infant with bronchiolitis can be discharged when respiratory distress (no fast breathing/chest indrawing and maintaining SPO2 > 90 % on room air) and hypoxaemia have resolved and the infant is feeding well.
- At discharge, advise parents against smoking and indoor pollution.
4.10: BRONCHIAL ASTHMA

Asthma is a chronic inflammatory condition with reversible airways obstruction generally seen in children more than 3 years of age. It is characterized by recurrent episodes of wheezing, cough, and difficult breathing, which responds to treatment with bronchodilators and anti-inflammatory drugs.

If the diagnosis is uncertain, give a dose of a rapid-acting bronchodilator. A child with asthma will often improve rapidly with such treatment, showing signs such as slower respiratory rate, less chest walls indrawing and less respiratory distress. However, a child with severe asthma may require several doses in quick succession before a response is seen. Severity of attack may be graded as mild to moderate, severe or life threatening as given in Table 4.2.

**Table 4.2: Classification of severity & grading of bronchial asthma attack**

<table>
<thead>
<tr>
<th>Mild-Moderate</th>
<th>Severe or Life threatening</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ Talks in phrases</td>
<td>➢ Talks in words</td>
</tr>
<tr>
<td>➢ Prefers sitting to lying</td>
<td>➢ Central cyanosis</td>
</tr>
<tr>
<td>➢ Respiratory rate increased but accessory muscles not used</td>
<td>➢ Sits hunched forwards</td>
</tr>
<tr>
<td>➢ Oxygen saturation ≥ 92% on room air</td>
<td>➢ Accessory muscles in use</td>
</tr>
<tr>
<td>➢ Agitated</td>
<td>➢ Oxygen saturation &lt; 92% on room air</td>
</tr>
<tr>
<td></td>
<td>➢ Drowsy, confused or silent chest</td>
</tr>
<tr>
<td></td>
<td>➢ Pulse rate &gt; 200 bpm (0-3 yrs) or &gt; 180 bpm (4-5 yrs)</td>
</tr>
</tbody>
</table>

**Box 4.7: Treatment of Asthma**

➢ Two forms of treatment:
  - Treatment of exacerbations- Will be discussed in detail
  - Controller treatment- Should be referred to a higher centre for controller treatment if
    o Asthma symptoms more than twice a month
    o Waking due to asthma more than once a month
    o Any asthma symptoms with any risk factor for exacerbation like needing oral corticosteroid for asthma within the last 12 months, ever in intensive care unit for asthma

**Treatment of exacerbations**

➢ Mainstay of drug therapy is bronchodilators and steroids.
➢ Child with severe and life threatening attack, should be admitted in hospital.
➢ Child with mild to moderate attack should be treated in hospital and then discharged with medications for treatment at home.
➢ The types of drug used, their doses are largely governed by the severity of the attack (see below).
Algorithm 4.5: Management of severe/ life threatening asthma

Severe/ Life threatening asthma

Maintain ABC
Start IVF and admit
Oxygen therapy to keep SpO2 >90%
Salbutamol nebulization- <15 kg- 0.5 ml >15 kg- 1 ml to make 3 ml in NS or MDI spacer 2 puffs, repeated every 20 minutes and Nebulisation with Ipratropium bromide 250 ugm every 20 minutes 3 times
Inj. hydrocortisone 10 mg/kg stat
Injection Adrenaline Subcutaneously 0.01 ml/lg of 1:1000 (maximum dose 0.5 ml) every 20 mins three times can be given if there is silent chest or inhaled drug treatment is not possible or there is associated anaphylaxis or angioedema

Monitor closely every 20-30 mins and reassess

Improving

Deteriorating

Transfer to higher center for ICU care

Continue Salbutamol every 4-6 hourly, Ipratropium every 8 hourly
Continue steroids- Inj hydrocortisone 5 mg/kg 6 hourly. Change to oral prednisolone 1-2 mg/kg/day when can take orally (max-60 mg)
Follow the principle of "last in- first out"
Omit Ipratropium inhalation in next 12- 24 hours
Reduce the Salbutamol inhalation to 4-6 hourly
Plan discharge and refer to higher center for assessment for need of controller therapy
At discharge, send home on
- Syrup Salbutamol or MDI Salbutamol
- Prednisolone for 5-7 days
- Follow up within 2 days
Algorithm 4.6: Management of mild/moderate asthma attack

Mild/Moderate attack

**Oxygen therapy** for target SpO2 94-98%
**Salbutamol**
MDI - 2 puffs every 20 mins for 1 hour
**Nebuliser**
**Prednisolone** - 1-2 mg/kg (max 40 mg)

Reassess after 1 hour

**Improving**
- Assess for discharge after 4 hours
- No respiratory distress
- SpO2 >94% in room air
- At discharge send home on Syrup Salbutamol or MDI Salbutamol
- Prednisolone for 3-5 days
- Follow up within 2 days

**Deteriorating**
- Treat as severe/life threatening asthma
Monitoring

➢ A child with severe/life threatening attack should be monitored every 20-30 mins for first 1 hour and hourly till next 4 hours to assess for improvement or deterioration.
➢ Record vitals especially the respiratory rate, and watch especially for signs of respiratory failure – increasing hypoxia and respiratory distress leading to exhaustion.
➢ Monitor input/output

Complications

➢ If the child fails to respond to the above therapy, or the child’s condition worsens suddenly, obtain a chest X-ray to look for evidence of pneumothorax. Be very careful in making this diagnosis as the hyperinflation in asthma can mimic a pneumothorax on a chest X-ray.

Discharge and Follow-up

➢ The patient is considered for discharge when:
  ➢ The patient is stable (able to eat and drink without problems and does not need oxygen) and there is sustained relief in respiratory complaints.
  ➢ Need for Controller and referral has been assessed
  ➢ Inhaler technique has been reviewed and corrected.
  ➢ Parents have been explained
    • Signs of recurrence and worsening of asthma
    • To avoid factors that precipitate exacerbation (e.g. smoking, exposure to smoke etc.)
    • Ask them to come for follow-up after 48 hours.
4.11. CONDITIONS PRESENTING WITH STRIDOR

Stridor is a harsh noise during inspiration, which is due to narrowing of the air passages in the oropharynx, sub glottis or trachea. If the obstruction is below the larynx, stridor may also occur during expiration.

Table 4.3: Differential diagnosis in a child presenting with stridor

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>In favour</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Croup</td>
<td>➢ Barking cough&lt;br&gt;➢ Respiratory distress&lt;br&gt;➢ Hoarse voice&lt;br&gt;➢ Low grade fever</td>
<td>See section 4.11a</td>
</tr>
<tr>
<td>Epiglottitis</td>
<td>➢ Soft stridor&lt;br&gt;➢ Toxic look&lt;br&gt;➢ Little or no cough&lt;br&gt;➢ Drooling of saliva&lt;br&gt;➢ Inability to drink</td>
<td>Needs immediate intubation or tracheostomy. Refer to higher center Prior to referral, Inj Ceftrixone 50 mg/kg/dose stat or Cefotaxime 50 mg/kg/dose stat.</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>➢ Bull neck appearance due to enlarged cervical nodes and oedema&lt;br&gt;➢ Congested throat&lt;br&gt;➢ Grey pharyngeal membrane&lt;br&gt;➢ Blood-stained nasal discharge&lt;br&gt;➢ No Pentavalent vaccination</td>
<td>See section 4.11 b</td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td>➢ History of allergen exposure&lt;br&gt;➢ Wheeze&lt;br&gt;➢ Shock&lt;br&gt;➢ Urticaria and oedema of lips and face</td>
<td>See section 4.11 c</td>
</tr>
</tbody>
</table>
4.11a: Treatment of Croup-

Keep baby calm, do not do throat examination

Admit to hospital if severe croup- Spo2 <90%, stridor at rest and respiratory distress

- **Steroid** – Single dose Inj Dexamethasone (0.6 mg/kg) I/M or IV
- **Epinephrine (adrenaline)** – Nebulized Epinephrine (1:1000 solution) 0.4 ml/kg Maximum 5 ml
- **Oxygen therapy**
- **Intubation or Tracheostomy** in children with incipient obstruction so need referral after above treatment.

If no above signs, treat as mild croup with

- Home care (fluid, feeding, when to return)
- **Oral corticosteroids** - (single dose of dexamethasone or equivalent) can be given if patient is brought/referred to hospital

4.11b Diphtheria

Diagnosis

Carefully examine the child’s nose and throat and look for a grey, adherent membrane.
Great care is needed when examining the throat, as the examination may precipitate complete obstruction of the airway.
A child with pharyngeal diphtheria may have an obviously swollen neck, termed as bull’s neck.

Treatment 1. **Antibiotics**

- Any child with suspected diphtheria should be given a daily deep IM injection of procaine benzyl penicillin at 50 mg/kg (maximum, 1.2 g) daily for 10 days.
- If not available give erythromycin for 14 days.

2. **Antitoxin**

- Give 40000 U diphtheria antitoxin (IM or IV) if available, because delay can increase the risk for mortality.
- As there is a small risk for a serious allergic reaction to the horse serum in the antitoxin, an initial intradermal test to detect hypersensitivity should be carried out, as described in the instructions, and treatment for anaphylaxis should be available.
3. Oxygen

- Avoid using oxygen unless there is incipient airway obstruction. Such cases should be referred to a higher health facility where tracheostomy may be performed. Signs such as severe lower chest wall in drawing and restlessness are more likely to indicate the need for tracheostomy (or intubation) than oxygen.

Monitoring

- The child’s condition, especially respiratory status, should be assessed by a nurse every 3 hrs. and by a doctor twice a day. The child should occupy a bed close to the nursing station, so that any sign of incipient airway obstruction can be detected as soon as it develops.

Complications

- Myocarditis, flaccid paralysis of limbs, palatal palsy may occur 2-7 weeks after the onset of illness.

Preventive measures

- The child should be nursed in a separate room by staffs who are fully vaccinated against diphtheria.
- Give all vaccinated household contacts a diphtheria toxoid booster and prophylaxis (oral erythromycin 10 days)

4.11 c: Anaphylaxis

Anaphylaxis is a severe allergic reaction, which may cause upper airway obstruction with stridor, lower airway obstruction with wheezing or shock or all three. Common causes include allergic reactions to antibiotics, to vaccines, to blood transfusion and to certain foods, especially nuts. Consider the diagnosis if any of the following symptoms is present and there is a history of previous severe reaction, rapid progression or a history of asthma, eczema or atopy.
### Management of Anaphylaxis

<table>
<thead>
<tr>
<th>Components</th>
<th>Severity</th>
<th>Treatment</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airway</td>
<td>Complete obstruction</td>
<td>Basic Life Support IM Adrenaline</td>
<td>0.01ml/kg of 1:1000. Repeat 5 mins</td>
</tr>
<tr>
<td></td>
<td>Partial obstruction/Stridor</td>
<td>IM Adrenaline followed by Nebulised Adrenaline if needed</td>
<td>As above 2.5-5ml of 1:1000 Adrenaline</td>
</tr>
<tr>
<td>Breathing</td>
<td>Apnoe</td>
<td>Basic Life Support IM Adrenaline</td>
<td>As above</td>
</tr>
<tr>
<td></td>
<td>Wheeze</td>
<td>IM Adrenaline Nebulised Salbutamol and treat as asthma Consider Nebulised Adrenaline</td>
<td>As above</td>
</tr>
<tr>
<td>Circulation</td>
<td>No Pulse</td>
<td>Basic Life Support IM Adrenaline</td>
<td>As above</td>
</tr>
<tr>
<td></td>
<td>Shock</td>
<td>IM Adrenaline NS/ RL bolus Keep patient supine or 45 deg if breathing difficulty</td>
<td>As above 20 ml/kg</td>
</tr>
<tr>
<td>Others</td>
<td>Remove allergen</td>
<td>Inj hydrocortisone or oral prednisolone H1 antihistamines like cetirizine, chorpheniramine H2 antihistamines like ranitidine</td>
<td>5 mg/kg 1mg/kg 1 mg/kg/dose</td>
</tr>
</tbody>
</table>

Reference: Clinical Practice guidelines of The Royal Children’s Hospital, Melbourne, Canadian Paediatric Society guidelines
### 4.12: CONDITIONS PRESENTING WITH CHRONIC COUGH

A chronic cough is an unremitting cough that lasts ≥ 14 days. Many conditions may present with a chronic cough such as TB, pertussis, foreign body or asthma.

#### Table 4.5: Differential diagnosis in children presenting with chronic cough

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>History</th>
<th>Examination</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TB</strong></td>
<td>Weight loss (&gt;5% loss in last 3 months)</td>
<td>Lymphadenopathy</td>
<td>See annex 8 and for details refer to national tuberculosis guidelines</td>
</tr>
<tr>
<td></td>
<td>Anorexia, easy fatigability</td>
<td>Crepitations on chest examination</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic or intermittent fever</td>
<td>Hepatosplenomegaly</td>
<td></td>
</tr>
<tr>
<td></td>
<td>History of contact with tuberculosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Asthma</strong></td>
<td>History of recurrent wheeze</td>
<td>Hyperinflation of chest</td>
<td>See section of asthma</td>
</tr>
<tr>
<td></td>
<td>Hyperinflation of the chest</td>
<td>Prolonged expiration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prolonged expiration</td>
<td>Wheeze</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduced air entry (in very severe airway obstruction)</td>
<td>Good response to bronchodilators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good response to bronchodilators</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pertussis/ Pertusis</strong></td>
<td>Paroxysms of cough followed by whoop, vomiting, cyanosis or apnoea</td>
<td>Subconjunctival hemorrhage</td>
<td>Oral erythromycin (12.5 mg/kg four times a day) for 10 days or Azithromycin at 10 mg/kg (maximum 500 mg) on the first day, then 5 mg/kg (Maximum 250 mg) once a day for 4 days. Provide oxygen and supportive care</td>
</tr>
<tr>
<td><strong>like illness</strong></td>
<td>Not received Pentavalent vaccination.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No fever</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV</td>
<td>Known or suspected maternal or sibling HIV infection</td>
<td>Oral or oesophageal thrush</td>
<td>Refer to national guidelines on HIV</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------------------------------</td>
<td>--------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td></td>
<td>Weight/Height less than &lt;2SD</td>
<td>Skin infection with herpes zoster (past or present)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic parotitis,</td>
<td>Generalized lymphadenopathy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic ear discharge</td>
<td>Clubbing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chronic fever</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Persistent diarrhoea</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*For case discussion of approach to cough refer to exercise 1 (Annex 35)*
SECTION 5: APPROACH TO A CHILD PRESENTING WITH DIARRHOEA
5.1: DIARRHOEA

Diarrhoeal diseases are a leading cause of morbidity and mortality among under-five children. Although diarrhoeal deaths have significantly declined in recent years; it remains unacceptably high in developing countries.

**Diarrhoea is defined as the passage of three or more loose or watery stools per 24 hours.** However, recent change in consistency and character of the stools is more important than the number of stools. A breast fed baby may normally pass as many as 8-10 semi formed, pasty stools daily that does not amount to diarrhoea.

5.2: TYPES OF DIARRHOEA

Two clinical forms of diarrhoea have been identified – acute diarrhoea and persistent diarrhoea

1. **Acute diarrhoea**- Duration of < 14 days
   a. **Watery**
   
   b. **Dysentery**- Presence of visible blood in the stools and is usually associated with abdominal cramps and fever. The most common cause of dysentery is Shigella bacteria. Amoebic dysentery is not common in young children.

2. **Persistent diarrhoea**-Duration of >/=14 days. Up to 20% of episodes of diarrhoea become persistent. Persistent diarrhoea often causes nutritional problems and contributes to deaths in children.
   Dehydration occurs when these losses are not adequately replaced and there are deficits of water and electrolytes.
   During diarrhoea, malnutrition is caused by decreased food intake and nutrient absorption and increased requirement which can make diarrhoea more severe, prolonged and frequent. So the intake of nutrient rich foods during and after diarrhoea should be emphasized.
5.3: APPROACH TO A CHILD PRESENTING WITH DIARRHOEA

**History**
Inquiries should be made about:
- Frequency and consistency of stools in last 24 hours
- Number of days of diarrhoea
- Visible blood in stools
- Tenesmus (abdominal cramps)
- Vomiting
- Fever
- Urine output
- Eagerness to drink, lethargy, seizures, abdominal distension, floppiness

In addition, following history helps in the management:
- Treatment received – ORS, Zinc or other drug treatment
- Feeding history- breastfeeds, formula, use of bottle, dilution of feeds etc.

**Examination**
Look for:
- Signs of dehydration (as described in Table 5.1)
- Blood in stools
- Signs of severe malnutrition
- Abdominal distension, hypotonia

**Investigations:**
Investigations are not useful in majority of acute diarrhoea cases. Following investigations may help in specific conditions:
- **Stool routine and microscopy:** Can be done in bloody diarrhoea
- **Hanging drop** in suspected cholera
- **Stool Culture & sensitivity:** May help in Persistent diarrhoea, immunosuppressed children
- **Serum electrolytes: (if available)**
  - **Sodium** - If excessive irritability persists after rehydration or history of convulsion is present.
  - **Potassium** - If child is hypotonic and has abdominal distension

- **Renal function tests** - should be done if there is low (<0.5ml/kg/hr) or nil urine output over more than 6 hours after rehydration

### 5.4: ASSESSING DEHYDRATION

For all children with diarrhoea, their hydration status should be assessed & classified as severe dehydration, some dehydration or no dehydration (Table 5.1).

Now use these 4 clinical signs for classifying dehydration (Table 5.1)

**Table 5.1: Assessment and classification of dehydration**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Signs or symptoms</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Severe Dehydration</strong></td>
<td>Two or more of the following signs:</td>
<td>Plan C (Table 5.2)</td>
</tr>
<tr>
<td></td>
<td>□ Lethargy / unconsciousness</td>
<td>Admit if other indication for admission is present as given below.</td>
</tr>
<tr>
<td></td>
<td>□ Sunken eyes</td>
<td>If child is 2 years or older and there is cholera in your area, treat for cholera</td>
</tr>
<tr>
<td></td>
<td>□ Unable to drink or drinks poorly</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Skin pinch goes back very slowly &gt; 2 seconds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(See Fig. 5.1)</td>
<td></td>
</tr>
<tr>
<td><strong>Some Dehydration</strong></td>
<td>Two or more of the following signs:</td>
<td>Plan B (Table 5.2)</td>
</tr>
<tr>
<td></td>
<td>□ Restlessness, irritability</td>
<td>Admit if other indication for admission is present as given below.</td>
</tr>
<tr>
<td></td>
<td>□ Sunken eyes</td>
<td>After rehydration, advise mother on home care</td>
</tr>
<tr>
<td></td>
<td>□ Drinks eagerly, thirsty</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Skin pinch goes back slowly</td>
<td></td>
</tr>
<tr>
<td><strong>No Dehydration</strong></td>
<td>Not enough signs to classify as some or severe dehydration</td>
<td>Plan A (Table 5.2)</td>
</tr>
</tbody>
</table>
Figure 5.1: Checking skin pinch

Indications for hospitalization in acute watery diarrhoea

- Presence of emergency signs (e.g. Not breathing, gasping or severe respiratory distress, unconsciousness, convulsion, shock or severe dehydration)
- Persistent vomiting - >3 times /hour
- High purge rate - > 10 ml/kg/hr or more than 10 stools per day
- Inability or refusal to drink
- Decreased urine output
- Abdominal distension
- Children with severe acute malnutrition.
- Children with associated co-morbid conditions which require inpatient management e.g. severe pneumonia.
- Age less than 2 months with some dehydration
5.5: MANAGEMENT OF CHILDREN WITH DEHYDRATION

5.5 a: Management of dehydration can be done by using the WHO protocol- Plan A, B and C (Table 5.2)

Table 5.2: WHO protocol for management of dehydration

<table>
<thead>
<tr>
<th>Degree of dehydration</th>
<th>Fluid management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe (Plan C)</td>
<td>IV fluid- RL or NS</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Infants (under 12 months)</td>
<td>1 hour*</td>
</tr>
<tr>
<td>Children (12 months up to 5 years)</td>
<td>30 minutes*</td>
</tr>
</tbody>
</table>

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

- Reassess the child every 15-20 min till a strong radial pulse is detectable. Thereafter reassess the hydration status after every 1-2 hours. -If hydration status is not improving, give the IV drip more rapidly.
- Monitor number of stools, vomiting and urine output.
- Also give ORS (about 5ml/kg/hour) as soon as the child can drink: usually after 3-4 hours (infant) or 1-2 hours (children)
- 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. **
- All children with severe dehydration should be observed in the facility for at least 6 hours after successful rehydration (not enough signs to classify as either some or severe dehydration).
If IV access not possible, see section 5.5 a for nasogastric rehydration

Some (Plan B)
- Administer 75ml/kg body weight of ORS over a period of 4 hours- Spoon, cup, dropper, syringe without needle.
- If the child wants more, give more.
- Allow breastfeeds in between
- Reassess after 4 hours, classify dehydration
- If vomits repeat ORS after 10 mins

No (Plan A)
- 4 Rules of Plan-A treatment:
  - Rule-1: Give more fluids than normal.
    For ongoing loss give
    For children < 2 years, about 50–100 ml after each loose stool
For children ≥ 2 years, about 100–200 ml after each loose stool

**Rule-2:** Continue feeding (including breastfeeding)

**Rule-3:** Give zinc supplements
- 2-6 months: 10 mg once a day for 10 days
- >6 months: 20 mg once a day for 10 days

**Rule-4:** Bring the child back after 5 days if diarrhoea is persisting or earlier if s/he has any of the danger signs (thirsty, irritable/restless, fever, high purge rate, repeated vomiting, blood in stool, eating or drinking poorly, lethargic)

### 5.5 b: When to refer patient to higher center?
- Any electrolyte imbalance like abnormality in sodium, potassium
- Deranged renal function like increased urea, creatinine
- No urine output after fluid resuscitation

Initiate treatment and refer to higher center with ongoing treatment on the way: continue NG or oral rehydration or IV rehydration.

### 5.5 c: When to treat for cholera?

In areas where cholera is endemic and a child above 2 years comes with severe dehydration cholera should be suspected and stool should be tested for hanging drop and culture if available.

**Fluid management**
Different from others as high purging rate and monitoring should also be done frequently

**Choice of fluid**
- NS bolus if patient presents with shock or anuria
- If not in shock administer RL with 3.5 ml of KCl in 500 ml of fluid

**Rate of fluid**
Deficit fluid (10 *wt*% dehydration) should be given over 4 hours Reassessed after 4 hours and again repeated according to the % dehydration

**Table 5.3: Antimicrobial therapy**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doxycycline</td>
<td>2-4 years: 50 mg</td>
<td>Single dose</td>
</tr>
<tr>
<td></td>
<td>4-5 years: 100 mg</td>
<td></td>
</tr>
<tr>
<td>Erythromycin</td>
<td>12.5 mg/kg/dose four times a day</td>
<td>3 days</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>20 mg/kg</td>
<td>Single dose</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>20 mg/kg</td>
<td>Single dose</td>
</tr>
</tbody>
</table>
Monitoring during treatment of diarrhoea:
- Daily weight
- Vitals including blood pressure
- Input - IV fluids, oral intake
- Output - Urine output, stool frequency and amount

5.6: DYSENTERY

Dysentery is diarrhoea with 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.

Box 5.1: Indications for hospitalization in children with dysentery

- Age less than 12 months
- Presence of dehydration
- H/O Measles in last 3 months
- Presence of severe acute malnutrition
- Presence of complications – shock, abdominal distension, convulsion etc.
- Fails to respond to two commonly used oral drugs

1. Antimicrobial therapy
It is given for 5 days. The choice of antibiotics used is given in Table 5.4.

Table 5.4: Antimicrobial therapy-

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Doses</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Ciprofloxacin</td>
<td>15 mg/kg/dose twice daily &lt;6 months- ½ tab (250 mg) &gt;6 months- 1 tab(250mg)</td>
<td>1st line</td>
</tr>
<tr>
<td>Oral Azithromycin</td>
<td>10 mg/kg/dose once daily</td>
<td>2nd line</td>
</tr>
<tr>
<td>Oral Cefixime</td>
<td>5 mg/kg/dose twice daily</td>
<td>3rd line</td>
</tr>
<tr>
<td>Inj Ceftriaxone</td>
<td>40-50 mg/kg/dose twice daily</td>
<td>If there is indication for admission</td>
</tr>
</tbody>
</table>

2. Correct & prevent dehydration as described earlier.

3. Prescribe a zinc supplement as done for children with watery diarrhoea.

4. Treat fever
   Re-evaluation after 2 days and see for improvement- disappearance of fever, less blood in stools, fewer stools, improved appetite, decreased abdominal pain and improved activity

5. Monitor for complications:
   - Abdominal distension- toxic ileus
- Hemolytic uremic syndrome (HUS) - decreased urine output, easy bruising, pallor and altered consciousness which needs early referral to higher center.
- Seizures - Electrolyte imbalance, meningitis, shigellosis (Shigella toxin affecting brain)
- Intussusception - Increased irritability, red currant jelly stool, abdominal distension.
  Refer to higher center
- Rectal prolapse - Reduction of prolapse, refer to higher center

5.7: PERSISTENT DIARRHOEA

Persistent diarrhoea is diarrhoea, with or without blood, which starts acutely and lasts 2 weeks or more. When there is some or severe dehydration, persistent diarrhoea is classified as “severe”. In recent years persistent diarrhoea has emerged as major cause of mortality accounting for more than one-third of all diarrhoea deaths. With better management of dehydration, deaths due to persistent diarrhoea have reduced.

<table>
<thead>
<tr>
<th>Box 5.2: Indications for hospitalization in persistent diarrhoea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admit child with persistent diarrhoea if:</td>
</tr>
<tr>
<td>• Dehydrated (severe persistent diarrhoea), or</td>
</tr>
<tr>
<td>• Has associated severe malnutrition or severe illness, or</td>
</tr>
<tr>
<td>• Failure of routine OPD management for persistent diarrhoea</td>
</tr>
</tbody>
</table>

5.7a: Steps of management

1. Assess, classify, treat & prevent dehydration

2. Associated systemic infection: Combination of parenteral Ampicillin and gentamicin is usually effective for sepsis, pneumonia and UTI. Antibiotics should be changed as per culture sensitivity report if it is available.

3. Presence of gross blood in stools: Treat as for dysentery

4. Amoebiasis: Give oral Metronidazole 15 mg/kg/dose, 3 times a day for 7 days only if

   - Microscopic examination of fresh feces 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.

5. Giardiasis: Give oral metronidazole 5 mg/kg/dose, 3 times a day, for 7 days if trophozoites of Giardia lamblia are seen in the feces.
7. Give zinc supplements for 14 days

8. Nutritional Management:
Various diets are recommended in persistent diarrhoea.
Given below 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.
Treat and refer

1. The Initial Diet A: [Reduced lactose diet, milk rice gruel, milk sooji gruel, rice with curd, dalia]

<table>
<thead>
<tr>
<th>Table 5.5: Reduced lactose diet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ingredients</strong></td>
</tr>
<tr>
<td>Milk</td>
</tr>
<tr>
<td>Sugar</td>
</tr>
<tr>
<td>Oil</td>
</tr>
<tr>
<td>Cooked rice/ sooji/ Puffed rice powder</td>
</tr>
<tr>
<td>Water</td>
</tr>
</tbody>
</table>

**Preparation**

- Mix milk, sugar, rice together
- Add boiled water & mix well
- Add oil

The feed can now be given to the child

2. 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.
Table 5.6: Lactose free diet with reduced starch

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Measure</th>
<th>Approximate quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg white</td>
<td>3 level tsp</td>
<td>15 g</td>
</tr>
<tr>
<td>Glucose</td>
<td>¾ level tsp</td>
<td>3 g</td>
</tr>
<tr>
<td>Oil</td>
<td>1 level tsp</td>
<td>4 g</td>
</tr>
<tr>
<td>Cooked rice/ Puffed rice powder</td>
<td>2 level tsp</td>
<td>7 g</td>
</tr>
<tr>
<td>Water</td>
<td>¾ cup</td>
<td>To make 100 ml</td>
</tr>
</tbody>
</table>

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.

Table 5.7: Monosaccharide based diet

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Measure</th>
<th>Approximate quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken / Egg white</td>
<td>2 ½ level tsp / 5 level tsp</td>
<td>12 g / 25 g</td>
</tr>
<tr>
<td>Glucose</td>
<td>¾ level tsp</td>
<td>3 g</td>
</tr>
<tr>
<td>Oil</td>
<td>1 level tsp</td>
<td>4 g</td>
</tr>
<tr>
<td>Water</td>
<td>½ - ¾ cup</td>
<td>To make 100 ml</td>
</tr>
</tbody>
</table>

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.
5.7b: Response to diet

Given in Box 5.3 and 5.4 are features suggestive of good response to diet and failure to respond to diet therapy. The most important criterion is weight gain. Ensure at least three successive days of increasing weight (>5gm/kg/day) before you conclude that weight gain is occurring. Give additional fruits like banana, papaya 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 110Kcal/ kg/ day. Children may then return home, but follow them up regularly to ensure continued weight gain and compliance with feeding advice.

**Box 5.3: Good response to diet**

- Adequate food intake
- Weight gain > 5 gm/kg/day
- Fewer diarrhoeal stools
- Absence of fever & better activity

**Box 5.4: Failure to respond to diet**

- An increase in stool frequency (usually to >10 watery stools a day), often with a return of signs of dehydration
- Failure to establish weight gain within 7 days

8. Give supplementary multivitamins and minerals

Give supplement vitamins and minerals, twice the RDA for at least 2 weeks (Box 5.5). Introduce iron supplements only after the diarrhoea has ceased. Provide vitamin A (single large dose) if the child has not received it as pre-referral treatment.

**Vitamin A Single dose**

- < 6 months = 50,000 IU
- 6 - 12 months = 1,00,000 IU
- > 12 months = 2,00,000 IU
Box 5.5: Recommended Daily Allowances

<table>
<thead>
<tr>
<th>One RDA for a child aged 1 year is:</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ Folate 50 mcg</td>
</tr>
<tr>
<td>➢ Zinc 10 mg</td>
</tr>
<tr>
<td>➢ Vitamin A 400 mcg</td>
</tr>
<tr>
<td>➢ Iron 10 mg</td>
</tr>
<tr>
<td>➢ Copper 1 mg</td>
</tr>
<tr>
<td>➢ Magnesium 80 mg</td>
</tr>
</tbody>
</table>

Monitoring

Check the following parameters daily during hospital stay

- Body weight
- Temperature
- Food intake
- Number of diarrhoeal stools

5.8: 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. ORT corner can also be used for correcting feeding problems.

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)
- Bottles/ utensils that will measure correct amount of water for mixing the ORS packet, including some containers like those that mother will have at home.
- Cups, spoons
- Cards or pamphlets (such as a Mother’s Card) that remind mothers how to care for a child with diarrhoea.
- Soap (for hand washing)
- Waste basket
- Food available (so that children may be offered food or eat it 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, hand washing, the use of latrines, and when to take the child to the clinic. The 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.

Refer to annex 35 exercise b for exercises on management of child presenting with diarrhoea
SECTION 6: CASE MANAGEMENT OF CHILDREN PRESENTING WITH FEVER
6.1. INTRODUCTION

Fever is a common presenting complaint and common cause of hospital admission. It is defined as axillary temperature of more than 37.5\(^\circ\) C. The causes of fever are usually benign like URTI and viral fever but some causes can be life threatening. The consequences of delayed or missed diagnosis can be serious and over treatment may be hazardous too. As discussed in ETAT section, look for emergency signs and initiate treatment before taking detailed history and examination.

Following history and examination may help you in reaching a diagnosis:

**History**

- Fever- Onset, duration, continuous or intermittent, response to general measures or medication
- Associated signs and symptoms- cough, cold, loose stools, blood in stools, pain on passing urine, increase in frequency of urine, convulsions, headache vomiting, excessive irritability or inconsolable crying, stiff neck or neck pain, skin rash, ear pain
- Recent use of antibiotics
- Recent vaccination within 48 hrs and vaccination history
- Recent travel or residency area
- History of other family members, exposure to sick individuals
- Previous illnesses like immunodeficiency and chronic illness
- Activity level, feeding, urine and stool

**Examination**

- Initial impression: Potentially life- threatening features like compromised airway, breathing and circulation and decreased level of consciousness.
- Features suggesting a toxic/ ill looking child like pallor or cyanosis, lethargy, inconsolably irritable, tachycardia, tachypnoea.
- Vital signs- Temperature, heart rate, respiratory rate, capillary refill time, blood pressure
- General: drowsiness or altered consciousness, pallor, jaundice, lymphadenopathy, edema, dehydration
- Head and neck: bulging fontanel, stiff neck, discharge from ear, swelling or tenderness in mastoid region
- Chest: reduced air entry, added sounds
- Abdomen: distension, tenderness, enlarged liver or spleen
- Limbs: swelling, redness, warmth, difficulty in moving joint or limb
- Skin: pyoderma, hemorrhagic rashes like purpura, petechial, maculopapular rash
6.2. DIFFERENTIAL DIAGNOSIS AND MANAGEMENT OF FEVER

6.2.1 You can classify fever cases into two major categories

➢ Acute fever- Fever ≤ 7 days
  ○ Fever without localized signs-
    ▪ Sick looking
    ▪ Not sick looking
  ○ Fever with localized signs
  ○ Fever with rash

➢ Prolonged fever- Fever > 7 days with daily fever

6.2.2 Fever without localized signs and sick looking

Sick looking- Any of the following symptoms

➢ Pale/ mottled/ blue skin, lips or tongue
➢ No or poor response to social cues
➢ No smile
➢ Does not wake or wakes to prolonged stimulation
➢ Weak, high- pitched or continuous cry
➢ Rigors
➢ Poor feeding
➢ Age 3-6 months with temperature >39 deg C
➢ Age < 3 months with temperature >/= 38 deg C
➢ Fever for >/=5 days

Table 6.1: Causes of fever without localized signs and sick looking

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>History</th>
<th>Examinations</th>
<th>Investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria</td>
<td>Endemic zone</td>
<td>Anaemia</td>
<td>Positive blood film</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enlarged spleen</td>
<td>Positive rapid diagnostic test for malaria parasites</td>
</tr>
<tr>
<td>Septicaemia</td>
<td></td>
<td>Seriously ill Purpura, petechiae Shock</td>
<td>Leucocytosis with neutrophilia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hypothermia in a young infant or severely malnourished child</td>
<td>Thrombocytopenia Raised CRP, ESR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Positive blood culture</td>
</tr>
<tr>
<td>Typhoid</td>
<td>Pain abdomen</td>
<td>Seriously ill Shock Abdominal tenderness Confusion</td>
<td>Leucopenia</td>
</tr>
<tr>
<td></td>
<td>diarrhoea/constipation</td>
<td></td>
<td>Positive blood culture</td>
</tr>
</tbody>
</table>

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### Urinary tract infection

<table>
<thead>
<tr>
<th>Abdominal pain</th>
<th>Loin or suprapubic tenderness</th>
<th>White blood cells in urine Positive dipstick Positive urine culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crying during passing urine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequent passage of urine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary incontinence in previously continent child</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Fever associated with HIV

See section for HIV

---

### 6.2.3. Fever without localized signs and not sick looking

#### Table 6.2: Fever without localized signs and not sick looking

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>History</th>
<th>Examination</th>
<th>Investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viral fever</td>
<td>Not sick looking</td>
<td></td>
<td>No investigations, Follow up in 48 hrs</td>
</tr>
</tbody>
</table>

### 6.2.4: Fever with localized signs

#### Table 6.3: Fever with localizing signs

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>History</th>
<th>Examination</th>
<th>Investigations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meningitis</strong></td>
<td>Vomiting</td>
<td>Bulging fontanelle in infancy</td>
<td>Leucocytosis with neutrophilia Lumbar puncture-finding as given in table 6.6</td>
</tr>
<tr>
<td></td>
<td>Headache</td>
<td>Signs of meningeal irritation( Neck stiffness, Kernig’s , Brudzinski) in &gt; 18 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seizures</td>
<td>Meningococcal rash( petechiae or purpura)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Altered level of consciousness</td>
<td>Raised ICP( unequal posturing, rigid posture or posturing, focal limb paralysis, irregular breathing, hypertension)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inability to drink or breastfeed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pain at back of neck</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Irritability</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acute encephalitic syndrome</strong></td>
<td>Change in mental status</td>
<td>Change in mental status</td>
<td>Serology for JE</td>
</tr>
<tr>
<td></td>
<td>Seizures</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Otitis media</strong></td>
<td>Ear discharge</td>
<td>Red immobile ear drum on otoscopy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ear pain</td>
<td>Pus</td>
<td></td>
</tr>
<tr>
<td><strong>Mastoiditis</strong></td>
<td>Tender swelling behind the ear</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Osteomyelitis</strong></td>
<td>Limb pain</td>
<td>Swelling and redness over bone sites</td>
<td>Leucocytosis with neutrophila High ESR, CRP Positive blood culture X-ray- Positive after 14 days</td>
</tr>
<tr>
<td></td>
<td>Refusal to move the affected limb</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refusal to bear weight on leg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Septic arthritis</td>
<td>Joint swelling</td>
<td>Joint hot, tender swelling</td>
<td>Leucocytosis with neutrophilia High ESR, CRP Positive blood culture</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------</td>
<td>---------------------------</td>
<td>-------------------------------------------------------------------</td>
</tr>
<tr>
<td>Skin and soft tissue infection</td>
<td>Pus filled lesions Painful, red swelling over skins Fluctuating, painful, red swellings</td>
<td>Cellulitis Pustules Abscess</td>
<td>Leucocytosis with neutrophilia Positive blood culture Positive pus culture</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>Cough</td>
<td>Tachypnea Chest retractions Grunting Nasal flaring Crepitations</td>
<td>Leucocytosis with neutrophilia High CRP Positive blood culture Chest X-ray- infiltration, consolidation</td>
</tr>
<tr>
<td>Viral upper respiratory tract infection</td>
<td>Coryza, cough</td>
<td>No findings</td>
<td></td>
</tr>
<tr>
<td>Bronchiolitis</td>
<td>Coryza, cough</td>
<td>Chest- Wheezing</td>
<td></td>
</tr>
<tr>
<td>Sinusitis</td>
<td>Headache Foul smelling nasal discharge Nasal blockade</td>
<td>Tenderness over sinuses</td>
<td>X-ray- Haziness over sinuses</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>Anorexia Nausea Vomiting Yellowish discoloration of body</td>
<td>Jaundice Hepatomegaly</td>
<td>Elevated ALT Deranged PT</td>
</tr>
</tbody>
</table>

### 6.2.5: Fever with rash

<table>
<thead>
<tr>
<th>Table 6.4: Fever with rash</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diagnosis</strong></td>
</tr>
<tr>
<td><strong>Measles</strong></td>
</tr>
<tr>
<td><strong>Rubella</strong></td>
</tr>
<tr>
<td><strong>Viral infections</strong></td>
</tr>
<tr>
<td><strong>Typhus</strong></td>
</tr>
<tr>
<td>Dengue hemorrhagic fever</td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>Meningococcal</td>
</tr>
</tbody>
</table>

### 6.2.6. Fever more than 7 days

Table 6.5: Fever of more than 7 days

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>History</th>
<th>Examination</th>
<th>Investigations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any causes of fever &lt; 7 days except viral infections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Childhood malignancies</td>
<td>Loss of appetite Weight loss Increasing pallor Bleeding Neck masses Abdominal distension</td>
<td>Anemia Lymphadenopathy Petechiae Hepatosplenomegaly</td>
<td>Leucocytosis or Leucopenia Anemia Thrombocytopenia Peripheral blood smear- Blasts</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>Pneumonia &gt; 14 days Meningitis &gt; 14 days Abdominal distension Neck swellings Loss of appetite Weight loss History of contact with tuberculosis</td>
<td>Seizures, altered level of consciousness Ascites, pleural effusion Lymphadenopathy</td>
<td>Mantoux test Chest X-ray Elevated ESR Gene expert of sputum, fluids</td>
</tr>
<tr>
<td>Connective tissue disorders</td>
<td>Joint pain, swelling Rashes</td>
<td>Rashes Effusion Ascitis</td>
<td>Elevated ESR, CRP Leucocytosis Anaemia Leucopenia Albuminuria in urine Chest X-ray- Effusion</td>
</tr>
<tr>
<td>Infective endocarditis</td>
<td>Cough, shortness of breath</td>
<td>Murmur Splenomegaly</td>
<td>Leucocytosis Elevated ESR, CRP Chest X-ray- Cardiomegaly Positive blood culture Microscopic hematuria</td>
</tr>
<tr>
<td>Rheumatic fever</td>
<td>Cough, shortness of breath Joint pain/ swelling Abnormal body movements Rashes Recent streptococcal infection</td>
<td>Murmur Arthritis Chorea Rashes</td>
<td>Leucocytosis Elevated ESR, CRP Elevated ASO titre Chest X-ray- Cardiomegaly</td>
</tr>
</tbody>
</table>
6.2.7: Management of Fever

Fever is not an indication for antibiotic treatment and may help the immune defense against infection. However, high fever (≥ 38.5 °C or 101.3 °F) can have harmful effects such as:

- Reducing the appetite
- Making the child irritable
- Precipitating febrile convulsions in some children aged between 6 months and 5 years
- Increasing oxygen consumption (e.g. in a child with very severe pneumonia, heart failure or meningitis).

Treatment with oral paracetamol should be given if the baby has a fever of ≥ 38.5 °C. The dose of paracetamol is 15 mg/kg 6-hourly. Children with fever should be lightly clothed, kept in a warm but well-ventilated room, and encouraged to increase their oral fluid intake. Sponging with tepid water lowers the temperature during the period of sponging. All children with fever should be carefully examined for finding etiology. Ibuprofen/other NSAID/Aspirin should not be used due to risk of severe complications like Reye’s syndrome.
6.3. MENINGITIS

Meningitis is one of the important causes of mortality and brain damage in infants and children. Early diagnosis of meningitis is essential for effective treatment. Diagnosis is done by Lumbar puncture.

Lumbar puncture:

Indication- Examination of spinal fluid for suspected meningitis

Contraindications-
- Increased ICP- unequal pupils, rigid posture or posturing, focal limb or facial paralysis, irregular breathing, hypertension
- Bleeding diasthesis-Active bleeding, Thrombocytopenia<50,000 cells/uL , deranged PT/ APTT
- Overlying skin infection
- Cardiorespiratory instability

Procedure
- Keep all equipment ready
- Lumbar puncture needle of appropriate size
- Eye towel and sterile towels
- Antiseptic wipes
- Vials to collect the sample
- Aseptic precaution- Wear sterile gloves
- Position the child in lateral recumbent position with hips, knees and neck flexed.
- Prepare the skin in sterile fashion using betadine, betadine and spirit.
- Drape the area with eye towel and sterile towel
- Locate the desired intervertebral space by drawing an imaginary line between the top of the iliac crests
- Puncture the skin in the midline in the intervertebral space with needle angling slightly cephalad towards the umbilicus. Advance several millimetres at a time withdrawing the stylet each time to check for CSF flow. A pop may be felt as the dura is penetrated.
- If resistance is felt initially (hit bone), withdraw needle to skin surface and redirect angle slightly.
- Collect the samples for investigations.
- Remove the needle and give pressure over the prick site for few minutes.

See annex 34 for checklist of procedure on Lumbar Puncture
Table 6.6: CSF analysis

<table>
<thead>
<tr>
<th>Condition</th>
<th>WBC</th>
<th>Protein</th>
<th>Sugar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;5 &gt;/=75% lymphocytes</td>
<td>20-45</td>
<td>&gt;50 or 75% of serum glucose</td>
</tr>
<tr>
<td>Viral</td>
<td>&lt; 1000 Neutrophils early but</td>
<td>50-200</td>
<td>&gt;50 % of serum glucose</td>
</tr>
<tr>
<td></td>
<td>lymphocytes mostly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute bacterial meningitis</td>
<td>100-10000</td>
<td>Raised 100-500</td>
<td>Decreased usually &lt;40</td>
</tr>
<tr>
<td></td>
<td>Neutrophils predominate</td>
<td></td>
<td>&lt;50% serum glucose</td>
</tr>
<tr>
<td>Partially treated bacterial meningitis</td>
<td>5-10000 Neutrophils may predominate</td>
<td>Raised 100-500</td>
<td>Normal or decreased</td>
</tr>
<tr>
<td>Tuberculous meningitis</td>
<td>10-500</td>
<td>Raised 100-3000</td>
<td>Decreased &lt;50</td>
</tr>
<tr>
<td></td>
<td>Neutrophils early but lymphocytes predominate mostly</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Treatment**

1. **Antimicrobial therapy**

Start antibiotics immediately if meningitis is clinically suspected and the CSF is obviously cloudy or if lumbar puncture is not possible, contraindicated or traumatic.

Table 6.7: Antimicrobial therapy

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceftriaxone</td>
<td>50 mg/kg/dose IV or IM twice daily</td>
<td></td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>50 mg/kg/dose IV or IM four times daily</td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>25 mg/kg/dose IV four times daily</td>
<td></td>
</tr>
<tr>
<td>Gentamicin or Amikacin</td>
<td>7.5 mg/kg/ day once daily</td>
<td>Child &lt;3 months add to Ceftriaxone or Cefotaxime</td>
</tr>
<tr>
<td></td>
<td>15 mg/kg/day once daily</td>
<td></td>
</tr>
<tr>
<td>Ampicillin</td>
<td>75mg/kg/dose 6 hourly</td>
<td>Child &lt;3 months add to Ceftriaxone or Cefotaxime</td>
</tr>
</tbody>
</table>

*If Staphylococcus aureus meningitis is suspected (patients presenting with shock, penetrating head trauma, neurosurgical procedures, deep seated abscess, infective endocarditis) and if not improving with previous antibiotics within 48 hours

Duration of treatment - 10 to 14 days.

2. **General measures**

- To maintain airway in an unconscious or convulsing child, frequent suctioning, nurse on lateral side, NG tube to allow continuous drainage to prevent aspiration
Breathing- Oxygen support if desaturation or signs of respiratory distress
Circulation- Fluid, nutrition, treatment of shock
Treat hypoglycaemia
Treat fever

3. Treatment of seizure- IV or rectal diazepam/ IV midazolam followed by Inj Phenytoin 20 mg/kg loading dose followed by 5 mg/kg/ day twice daily. Stop phenytoin when patient is seizure free for 48 hours. Check glucose, sodium, calcium

4. Treatment of increased ICP
Present with Unequal pupil, rigid posture or posturing, focal limb paralysis, irregular breathing, hypertension, bradycardia can be done
Treated with head end elevation and Inj Lasix 1mg/kg and Inj Mannitol(20%) 5 ml/kg followed by 2.5 ml/kg/dose 6 hourly if child not in shock.

Monitoring- state of consciousness, respiratory rate, heart rate, blood pressure, pupil size, urine output, glucose, head circumference

Public health measures- Prophylaxis with Ciprofloxacin or rifampicin for exposure to patients with meningococcal meningitis

Discharge and follow up- Hearing assessment, developmental assessment

Consider Tubercular meningitis-
Fever persists for 14 days
Fever persists more that 7 days and there is a family member with tuberculosis
Chest X- ray suggests tuberculosis
Patient remains unconscious despite treatment for bacterial meningitis
The patient is known to have HIV or is exposed to HIV
CSF findings of moderately high white cell count, elevated protein and low glucose
Not responding to antibiotics

See Annex 8 for specific treatment of tubercular meningitis.

Poor response to treatment
Development of complications- Persistent fever ( subdural effusion), increasing head size( hydrocephalus)- Refer
Tubercular meningitis- Treat for tubercular meningits
Resistant organisms- Refer
Cerebral malaria in malaria endemic zone- Investigate and treat for malaria
6.4. SEPTICAEMIA

Septicaemia should be considered in a child with acute fever who is severely ill. It can occur with association with meningitis, pneumomia, urinary tract infection or any other bacterial infection. The common causative agents include Streptococcus pneumonia, Hemophilus influenza, Staphylococcus aureus, Meningococcus(Nesseria meningitides), enteric gram negative bacteria like Escherichia coli and Klebseilla pneumonia ( in patients with severe malnutrition). Staphylococcal sepsis presents with localized skin or bone infection and Meningococcal sepsis presents with petechiae or purpuric rashes and meningitis.

**T**reatment- Start with empirical broad spectrum antibiotics immediately

**Table 6.8: Antibiotic therapy**

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Dose</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inj Ampicillin with Inj Gentamicin</td>
<td>50 mg/kg/ dose 6 hourly 5-7.5 mg/kg/dose once daily</td>
<td>1st line therapy</td>
</tr>
<tr>
<td>Inj Ceftriaxone</td>
<td>50 mg/kg/dose twice daily</td>
<td>2nd line therapy</td>
</tr>
<tr>
<td>Inj Cloxacinillin</td>
<td>25 mg/kg/dose 6 hourly</td>
<td>If Staphylococcal sepsis suspected or patient has septic shock</td>
</tr>
</tbody>
</table>

**Supportive care** - Fever control, fluid and nutrition, glucose

**Monitoring** - Shock, urine output, bleeding, skin ulceration
### 6.5: TYPHOID FEVER

Consider typhoid fever if a child has fever > 38°C persisting for more than 3 days plus any of the following: vomiting, abdominal pain, loose stools, headache, malaise, loss of appetite or cough. It can present atypically in children as an acute febrile illness with shock and hypothermia. It may be confused with typhus fever where typhus fever is common.

**Treatment**

Antibiotics should be given for 10 days. Choice of antibiotics depends on local resistance pattern of Salmonella isolates. Change to 2nd line antibiotics if not responding in > 5 days.

#### Table 6.9. Choice of antibiotics for typhoid fever.

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Dose</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OPD</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral Ciprofloxacin</td>
<td>10mg/kg/dose twice daily for 10-14 days</td>
<td>1st line</td>
</tr>
<tr>
<td>Oral Ofloxacin</td>
<td>10 mg/kg/dose twice daily for 10-14 days</td>
<td>1st line</td>
</tr>
<tr>
<td>Oral Azithromycin</td>
<td>10 mg/kg/dose twice daily for 7 days</td>
<td>2nd line</td>
</tr>
<tr>
<td>Oral Cefixime</td>
<td>10 mg/kg/dose twice daily for 10-14 days</td>
<td>2nd line</td>
</tr>
<tr>
<td>Oral Chloramphenicol</td>
<td>25 mg/kg/dose four times daily for 10 days</td>
<td>2nd line</td>
</tr>
<tr>
<td><strong>Admitted</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inj Ceftriaxone</td>
<td>50mg/kg/dose twice daily for 10 days</td>
<td>Indication of admission: Seriously ill Not able to tolerate orally Not responding to oral treatment</td>
</tr>
<tr>
<td>Inj Chloramphenicol</td>
<td>25 mg/kg/dose four times daily for 10-14 days</td>
<td></td>
</tr>
</tbody>
</table>

**Supportive care**- Treatment of fever, nutrition, anaemia, shock

**Monitoring**- Vitals including blood pressure, input and output, anemia, level of consciousness, gastrointestinal perforation (abdominal distension, tenderness, vomiting), gastrointestinal bleeding (pallor, black stool or blood in stool)
6.6. URINARY TRACT INFECTION (UTI)

Urinary tract infection is common in infants and children. In young children, urinary tract infection often presents as nonspecific signs. Urine routine examination and culture is done to diagnose UTI. UTI can be divided into cystitis (involving bladder presenting with urinary symptoms) and pyelonephritis (involving kidneys presenting with high grade fever).

Urinary tract infection in children presents as nonspecific signs. Urine routine examination and culture is done to diagnose UTI. UTI can be divided into cystitis (involving bladder presenting with urinary symptoms) and pyelonephritis (involving kidneys presenting with high grade fever).

Choice of antibiotics

Depends on local sensitivity profile. (See Table 6.10) Antibiotics can be changed according to sensitivity report or if there is poor clinical response antibiotics used after 3 days and to oral antibiotics after child are afebrile.

Table 6.10. Choice of antibiotics for UTI

<table>
<thead>
<tr>
<th>Out patient department</th>
<th>Dose</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Ofloxacin</td>
<td>7.5 mg/kg/dose twice daily</td>
<td>1st line</td>
</tr>
<tr>
<td>Oral Ciprofloxacin</td>
<td>10 mg/kg/dose twice daily</td>
<td>1st line</td>
</tr>
<tr>
<td>Change to 2nd line according to culture report if available</td>
<td>Oral Cefixime</td>
<td>5 mg/kg/dose twice daily</td>
</tr>
<tr>
<td>Oral Cotrimoxazole</td>
<td>4 mg/kg/dose of trimethoprim equivalent twice daily</td>
<td>2nd line</td>
</tr>
</tbody>
</table>

Admission

Infants younger than 3 months
Septic
Vomiting
Not tolerating oral medications
Not responding to appropriate oral antibiotics after 3 days according to sensitivity

<table>
<thead>
<tr>
<th>Admission</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inj Ceftriaxone</td>
<td>40 mg/kg/dose twice daily or</td>
</tr>
<tr>
<td>Inj Amikacin</td>
<td>15 mg/kg/dose once daily or</td>
</tr>
<tr>
<td>Inj Gentamicin</td>
<td>7.5 mg/kg/dose once daily</td>
</tr>
</tbody>
</table>

Duration of antibiotics

Duration of antibiotics is 5 days for cystitis and 10 days for pyelonephritis. All patients with UTI should be evaluated with ultrasound abdomen to rule out anomalies of genitourinary tract.
**Supportive care** - Treatment of fever, nutrition, urine output, renal functions, rule out genitourinary tract abnormalities

**Referral** -

- Not responding to treatment with injectable antibiotics - resistance organisms, complications like abscess
- Recurrent UTIs - rule out genitourinary abnormalities like VUR
- Genitourinary abnormalities in ultrasound
# 6.7. MEASLES

Measles is a highly contagious viral disease with serious complications (such as blindness in children with pre-existing vitamin A deficiency) and high mortality. It is rare in infants < 3 months of age.

<table>
<thead>
<tr>
<th>Clinical features</th>
<th>Investigations</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non severe measles</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td></td>
<td>1. Vitamin A therapy- Check annex 36 for dose. Don’t provide if history of received within one month. Give on Day 0 and 1</td>
</tr>
<tr>
<td>Generalised maculopapular rash (Fig 6.1)</td>
<td>Measles/rubella antibodies</td>
<td>2. Manage fever.</td>
</tr>
<tr>
<td>Cough</td>
<td></td>
<td>3. Nutritional support- See section for malnutrition</td>
</tr>
<tr>
<td>Runny nose</td>
<td></td>
<td>4. Treat mouth ulcers as below</td>
</tr>
<tr>
<td>Red eyes</td>
<td></td>
<td>5. Eye care. For mild conjunctivitis with only a clear watery discharge, no treatment is needed. If there is pus, clean the eyes with cotton-wool boiled in water or a clean cloth dipped in clean water. Apply tetracycline/ciprofloxacin eye ointment three times a day for 7 days. Never use steroid ointment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Severe complicated measles</th>
<th>Above features with</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inability to drink or breastfeed</td>
<td>1. Vitamin A therapy- Check Annex 36 for dose. Give on Day 0, 1 and 2-4 weeks</td>
</tr>
<tr>
<td></td>
<td>vomits everything</td>
<td>2. Manage Fever</td>
</tr>
<tr>
<td></td>
<td>convulsions</td>
<td>3. Nutritional support</td>
</tr>
<tr>
<td></td>
<td>On examination, look for signs of complications, such as:</td>
<td>See section on malnutrition</td>
</tr>
<tr>
<td></td>
<td>lethargy or unconsciousness</td>
<td>Complications- Follow the guidelines given in other sections of this manual for the management of the following complications:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Pneumonia- (See section for pneumonia).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Otitis media (See section for otitis media)</td>
</tr>
</tbody>
</table>
• corneal clouding (See Fig. 6.2)
• deep or extensive mouth ulcers
• pneumonia
• dehydration from diarrhoea
• stridor due to measles croup
• severe malnutrition

3. Diarrhoea- See section for diarrhoea
5. Eye problems-
Conjunctivitis and corneal and retinal damage may occur due to infection, vitamin A deficiency or harmful local remedies.
In addition to giving vitamin A (as above), treat any infection present as given in non-severe measles
Use a protective eye pad to prevent other infections.
If there is no improvement, refer to an eye specialist
6. Mouth ulcers-
If the child can drink and eat, clean the mouth with clean, salted water (a pinch of salt in a cup of water) at least four times a day.
Apply 0.25% gentian violet or clotrimazole mouth paint to sores in the mouth after cleaning.
If the mouth ulcers are severe and/or smelly, give IM or IV benzylpenicillin (50 000 U/kg every 6 hours or IV inj. Ampicillin 50 mg/kg/dose four times a day and oral metronidazole (7.5 mg/kg three times a day) for 5 days.
If the mouth sores result in decreased intake of food or fluids, the child may require feeding via a nasogastric tube.
7. Neurological complications
Convulsions, excessive sleepiness, drowsiness or coma may be symptoms of encephalitis or severe dehydration.

8. Severe acute malnutrition: See section for malnutrition.

---

**Fig 6.1:** Distribution of measles rash. The left side of the drawing shows the early rash covering the head and upper part of the trunk; the right side shows the later rash covering the whole body.

**Fig. 6.2:** Corneal clouding: sign of xerophthalmia in vitamin A-deficient child (left side) in comparison with the normal eye (right side)

**Follow-up**

Severe complicated measles- Recovery after acute measles is often delayed for many weeks and even months, especially in children who are malnourished. Arrange for the child to receive the third dose of vitamin A before discharge, if this has not already been given.

Non-severe measles- Ask the mother to return with the child in 2 days to see whether the mouth or eye problems are resolving, to exclude any severe complications and to monitor nutrition and growth
Public health measures

If possible, isolate children admitted to hospital for measles for at least 4 days after the onset of the rash. Ideally, they should be kept in a separate ward from other children. For malnourished and immunocompromised children, isolation should be continued throughout the illness.

When there are measles cases in the hospital, vaccinate all other children > 6 months of age (including those seen as outpatients, admitted in the week after a measles case and HIV-positive children).

If infants aged 6–9 months receive measles vaccine, it is essential that the second dose be given as soon as possible after 9 months of age.

Check the vaccination status of hospital staff and vaccinate, if necessary.
6.8. MASTOIDITIS

Mastoiditis is a bacterial infection of the mastoid bone behind the ear. Without treatment it can lead to meningitis and brain abscess.

Diagnosis

Key diagnostic features are:

High fever and tender swelling behind the ear.

Treatment

1. Antimicrobial treatment

- Give Cloxacillin and Ceftriaxone until the child improves, for a total course of 10 days.

- If there is no response to treatment within 48 h or The child’s condition deteriorates, refer child to a surgical specialist to consider incision and drainage of mastoid abscesses or mastoidectomy.

- If there are signs of meningitis or brain abscess, give antibiotic treatment as outlined in section of meningitis, and, if possible, refer to a specialist hospital immediately.

2. Manage fever- See section of fever

Monitoring- The child should be checked by a nurse at least every 6 hours and by a doctor at least once a day. If the child responds poorly to treatment, such as decreasing level of consciousness, seizure or localizing neurological signs, consider the possibility of meningitis or brain abscess (See section for meningitis)
6.9. ACUTE OTITIS MEDIA

Diagnosis

This is based on a history of ear pain or pus draining from the ear (for < 2 weeks). On examination, confirm acute otitis media by otoscopy. The ear-drum will be red, inflamed, bulging and opaque, or perforated with discharge.

Fig 6.3: Acute otitis media: bulging, red ear-drum (on right) and normal ear-drum (on left)

Treatment

Treat the child as an outpatient.

1. Antimicrobial treatment:-
   Oral amoxicillin at 45 mg/kg twice a day for at least 10 days

2. If pus is draining from the ear, show the mother how to dry the ear by wicking. Advise the mother to wick the ear three times daily until there is no more pus.

3. Tell the mother not to place anything in the ear between wicking treatments. Do not allow the child to go swimming or get water in the ear.

4. Manage fever

Follow-up

Ask the mother to return after 5 days.

- If ear pain or discharge improved, treat for 5 more days with the same antibiotic and continue wicking the ear. Follow up in 5 days.
- If ear pain or discharge not better, treat with amoxicillin clavulanic acid 30 mg/kg/dose thrice daily for 5 days. If not improved in 5 days follow up admit and treat with Inj. Ceftriaxone 50 mg/kg/dose twice daily for 3 days.
6.10: CHRONIC OTITIS MEDIA

If pus has been draining from the ear for ≥2 weeks and no earache, the child has a chronic ear infection.

**Diagnosis**
- A diagnosis is based on a history of pus draining from the ear for ≥ 2 weeks. On examination, confirm chronic otitis media (where possible) by otoscopy.

**Treatment**
- Refer to specialist if the ear discharge is foul smelling.
- If the discharge is mucopurulent and non-smelly
  - Treat the child as an outpatient.
  - Keep the ear dry by wicking (see above).
  - Instill topical antibiotic drops containing quinolones with or without steroids (such as ciprofloxacin, norfloxacin, ofloxacin) twice a day for 2 weeks. Drops containing quinolones are more effective than other antibiotic drops.
  - Topical antiseptics are not effective in the treatment of chronic otitis media in children.
  - If the patient develops fever and earache, treat as acute otitis media and refer to specialist for further treatment.

**Follow-up**
- Ask the mother to return after 5 days. If the ear discharge persists:
  - Check that the mother is continuing to wick the ear. Do not give repeated courses of oral antibiotics for a draining ear.
  - Refer to specialist for further management.

![Mother wicking the ear of her child](image)

**Fig.6.4: Mother wicking the ear of her child**

Other cause of fever includes malaria, tuberculosis, dengue, kalazar and HIV. Refer to annex and national guidelines on management of the above topics.
6.11 MALARIA

Malaria continues to be a priority public health problem in Nepal. Plasmodium vivax and Plasmodium falciparum are responsible for most cases. The resistance to falciparum malaria and the development of mixed malaria infections have now created an even higher possibility of fatality if not detected and treated in time.

Serious complications may sometimes develop suddenly over a span of time as short as 12-24 hours and may lead to death, if not treated promptly and adequately. Use of appropriate antimalarial drugs is very important to save lives in malaria cases.

*For management of complicated malaria and malaria refer to national guidelines and refer to annex 10 for summary of treatment*

6.12: DENGUE

Dengue ranks as the most important, rapidly emerged mosquito-borne viral disease in recent years. Dengue viral infected child may be asymptomatic or symptomatic and clinical manifestations vary from undifferentiated fever to florid haemorrhage and shock. The clinical presentations depend on various factors such as age, immune status of the host, the virus strain and primary or secondary infection. Infection with one dengue serotype give lifelong immunity to that particular serotype. A second infection with a different serotype is more severe.

*For management of Dengue cases see national treatment protocol or check annexe 11*

6.13: KALAZAR

Visceral leishmaniasis (VL) or Kala-azar is a vector-borne disease caused in the Indian subcontinent by the protozoan parasite Leishmania donovani and transmitted by the sandfly, Phlebotomus argentipes.

The disease is characterized by prolonged fever (moderate, irregular), splenomegaly, anemia, and progressive weight loss and sometimes darkening of the skin. It is fatal if not treated and sometimes even when treated if it is not done timely.

*For management of Kalazar cases, see national protocol.*

*See annex 35 exercise c1, c2, c3 for Approach to childhood fever.*
SECTION 7: ASSESSMENT AND MANAGEMENT OF MALNUTRITION
INTRODUCTION

Malnutrition remains one of the most common causes of morbidity and mortality among children. You have already learnt about difference of management for children with SAM right from emergency management in Section 2. Feeding problems are one of the common causes of malnutrition.

(Refer to annex 7 for feeding recommendation, feeding problems and their possible solutions.

7.1 ASSESSMENT OF CHILD'S NUTRITIONAL STATUS

A child's growth provides important information on the adequacy of the child's nutritional status and health. Anthropometric measurements and plotting it on a growth chart is most commonly used method for determining nutritional status. There are separate standards for boys and girls.

7.1.1 Calculate the age of the child
7.1.2 Check weight and height
7.1.3 Plot the weight and height on the weight for height chart and interpret the findings
   - Select the appropriate Growth Chart i.e. weight for height/length based on the child’s sex.
   - Growth measurements will be plotted on the selected charts.
   - For example: A 2 years old boy with Weight- 8 kg and Height- 100 cm

Figure 7.1: Plotting weight on Growth Chart
Interpret the finding of the plotted weight

Figure 7.2: Interpretation of Growth Chart

- Z score of +2 to -2 is normal
- Z score of -2 to -3 is suggestive of moderate abnormality
- Z score of less than -3 is suggestive of severe abnormality

Figure 7.3: Various patterns observed on serial plotting on Weight for Age Chart

- Growing well: encourage mother to feed as before
- Growth curve flattening: urgent assessment needed
- Losing weight: urgent assessment needed
7.1.3. Check for pitting edema on both feet
Oedema in a child with SAM starts from the dependent part i.e. feet in a mobile child. As the severity of oedema increases, it extends to the legs. In severe cases, it may also be seen on upper limbs and face (anasarca). Table 7.1 gives the grades of edema

<table>
<thead>
<tr>
<th>Level</th>
<th>Classification</th>
<th>If yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>No depth on both legs</td>
<td>-</td>
</tr>
<tr>
<td>+</td>
<td>Mild</td>
<td>Both legs</td>
</tr>
<tr>
<td>++</td>
<td>Moderate</td>
<td>Both legs, hands and arms</td>
</tr>
<tr>
<td>+++</td>
<td>Severe</td>
<td>Both legs, hand and face</td>
</tr>
</tbody>
</table>

To check for edema, grasp both feet so that they rest in your hands with one thumb on top of each foot. Press your thumbs gently for a few seconds (approx. 10). Child has bilateral pitting oedema if pit (dents) remains in both feet when you lift your thumbs.

![Figure 7.4: Checking for pedal oedema](image)

Rule out other causes of edema like nephrotic syndrome and CCF.

7.1.4. Measure MUAC
Use Shakir’s tape. Measuring MUAC is not used in children less than 6 months of age. According to color calibration:

- Red- Severe malnutrition <11.5 cm- Severe malnutrition
- Yellow- Moderate malnutrition 11.5-12.5- Moderate malnutrition
- Green- No malnutrition >12.5- Normal
7.1.5. Check for severe wasting
Check for severe wasting by looking at the front and back view of the child.

**Look at the front view of the child and decide**

Is the outline of the child’s ribs easily seen?
Does the skin of the upper arms look loose?
Does the skin of the thighs look loose?

![Fig 7.5 Front view of severe wasting](image)

7.1.6. Assessment of appetite and medical complication
Test appetite with RUTF for children 6-59 months of age. Severe acute malnutrition with poor appetite means that the child has a significant infection or a major metabolic abnormality. It is an indication for need of admission.

7.1.7. Take history and carry out medical assessment and check for presence of complications
<table>
<thead>
<tr>
<th>Taking a history concerning</th>
<th>On examination, look for</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Duration of sickness</td>
<td>➢ Look for emergency signs</td>
</tr>
<tr>
<td>☐ Recent intake of food and fluids</td>
<td>➢ Anthropometry - weight, height or length, mid arm circumference</td>
</tr>
<tr>
<td>☐ Usual diet (before the current illness)</td>
<td>➢ Baseline pulse, heart rate, respiratory rate</td>
</tr>
<tr>
<td>☐ Breastfeeding</td>
<td>➢ Sensorium</td>
</tr>
<tr>
<td>☐ Complementary feeds- introduction time, quality, quantity</td>
<td>➢ Oedema</td>
</tr>
<tr>
<td>☐ Duration and frequency of complaints if any: diarrhea (watery/bloody), vomiting (number), fever, cough, presence of disability and/ or developmental problems that affect feeding</td>
<td>➢ Lymphadenopathy</td>
</tr>
<tr>
<td>☐ Loss of appetite</td>
<td>➢ Signs of dehydration if history of diarrhea (general condition, sunken eyes, skin pinch and thirst)</td>
</tr>
<tr>
<td>☐ Contact with open case of tuberculosis</td>
<td>➢ Signs of shock (cold hands, slow capillary refill, weak and fast pulse)</td>
</tr>
<tr>
<td>☐ History of measles in last 3 months or repeated or chronic illness</td>
<td>➢ Palmar pallor</td>
</tr>
<tr>
<td>☐ Known or suspected HIV Infection</td>
<td>➢ Eye signs of vitamin A deficiency (Figure 9.7):</td>
</tr>
<tr>
<td>☐ Birth history- Preterm or LBW</td>
<td>➢ Dry conjunctiva or cornea,</td>
</tr>
<tr>
<td>☐ Immunization status</td>
<td>➢ Bitot's spots</td>
</tr>
<tr>
<td>☐ Health of parents</td>
<td>➢ Corneal ulceration</td>
</tr>
<tr>
<td>➢ Family circumstances (to understand the child's social background)</td>
<td>➢ Keratomalacia</td>
</tr>
<tr>
<td></td>
<td>➢ Localizing signs of infection, including ear and throat infections, skin infection or pneumonia</td>
</tr>
<tr>
<td></td>
<td>➢ Fever (temperature &gt;37.5°C or 99.5 °F)</td>
</tr>
<tr>
<td></td>
<td>➢ Hypothermia (axillary temperature &lt;35°C or 95 °F)</td>
</tr>
<tr>
<td></td>
<td>➢ Mouth ulcers/ Oral thrush</td>
</tr>
<tr>
<td></td>
<td>➢ Skin changes</td>
</tr>
<tr>
<td></td>
<td>➢ Hypo or hyperpigmentation</td>
</tr>
<tr>
<td></td>
<td>➢ Desquamation</td>
</tr>
<tr>
<td></td>
<td>➢ Ulceration (spreading over limbs, thighs, genitalia, groin, and behind the ears)</td>
</tr>
<tr>
<td></td>
<td>➢ Systemic examination- hepatosplenomegaly, any murmur or deformities, hypertension (cerebral palsy)</td>
</tr>
<tr>
<td></td>
<td>➢ Signs of meningeal irritation</td>
</tr>
</tbody>
</table>
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.

7.1.8. Check for complications
- Anorexia, no appetite
- Lower Respiratory Tract infection
- High fever
- Severe dehydration
- Severe anaemia
- Not alert (very weak, lethargic, unconscious, convulsions)
- Hypothermia
- Intractable vomiting
- Extensive skin infection or extensive mouth ulcers or ear pain with tender swelling behind the ear
- Jaundice
- Eye infection and other eye problems like corneal clouding or other signs of Vitamin A deficiency

7.1.9. Check vaccination status, last deworming and Vitamin A supplementation

7.1.10. Review and record any relevant information from referral document where there is one

7.1.11. Classify nutritional status of child
The classification of acute malnutrition into moderate and severe malnutrition is done by using weight for height, MUAC and edema as given in Table 7.3

<table>
<thead>
<tr>
<th>Table 7.3: Identification of acute malnutrition (wasting)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Moderate Acute Malnutrition</strong></td>
</tr>
<tr>
<td>- Weight-for-height between -2SD and -3SD and/or</td>
</tr>
<tr>
<td>- Mid arm circumference (MUAC) 11.5 to 12.5cm</td>
</tr>
<tr>
<td><em>AND</em></td>
</tr>
<tr>
<td>- No Oedema</td>
</tr>
<tr>
<td><strong>Severe Acute Malnutrition</strong></td>
</tr>
<tr>
<td><strong>For infants aged &lt;6 months</strong></td>
</tr>
<tr>
<td>- Weight for length is &lt;-3 z score of median of WHO child growth standards and/or</td>
</tr>
<tr>
<td>- Bilateral pitting pedal oedema **</td>
</tr>
<tr>
<td><strong>For children aged 6-59 months</strong></td>
</tr>
<tr>
<td>- Weight for length/height is &lt;-3 z score of median of WHO child growth standards and/or</td>
</tr>
<tr>
<td>- MUAC&lt;11.5 cm and/or</td>
</tr>
<tr>
<td>- Bilateral pitting pedal oedema</td>
</tr>
</tbody>
</table>

*Use visible severe wasting in emergency settings. If measurements not possible and for children who has length <45 cms
## 7.2 MANAGEMENT OF SAM

Site of management of SAM given in Table 7.4

### Table 7.4: Site of management of SAM

<table>
<thead>
<tr>
<th>Inpatient management of SAM in children 6-59 months</th>
<th>Outpatient management of SAM in children 6-59 months</th>
<th>Inpatient management of SAM in children &lt; 6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe acute malnutrition with complications Nutrition oedema +++ or Marasmic-Kwashior Kor (MUAC &lt;11.5cm with any grade of oedema) OR MUAC &lt;11.5cm or WHZ &lt; -3 Z score with any of the complications</td>
<td>Severe acute malnutrition without complications MUAC &lt;11.5 cm or WHZ &lt; -3 Z score or Nutritional oedema + and ++ AND Appetite Clinically well Alert</td>
<td>Visible wasting and/or WHZ &lt; -3 zscores and/or oedema AND One of the below complications:</td>
</tr>
</tbody>
</table>
| Referral from Outpatient Therapeutic Centre Due to deterioration or non-response | Referral from ITC After stabilisation | • Any of the medical complications  
• Infant is lethargic and unable to suckle Recent weight loss/inability to gain weight  
• Ineffective feeding (attachment, positioning and suckling) directly observed  
• Any medical or social issue needing more detailed assessment or intensive support (e.g. disability, depression of the mother/caretaker, or other adverse social circumstances) |

This chapter will address life threatening conditions during management of inpatient management of SAM in children 6-59 months. For other management refer to national guidelines.
7.3 INPATIENT THERAPEUTIC CARE OF CHILDREN 6-59 MONTHS

It is done during the stabilization phase of WHO inpatient protocols. The patients after stabilization has his treatment completed (where OTC is not available, infants < 6 months, cases with high risk home environment, patient choice) or is referred to OTC to complete treatment.

A good history and physical examination is required for treatment. Important history and examination points are summarized in Table 7.2

**Laboratory Tests**

- Blood glucose-
  - At admission
  - During stabilization if child is hypothermic or lethargic
- Haemoglobin or packed cell volume in all children
  - Peripheral smear if child has anemia/ palmar pallor
- Serum electrolytes e.g. (sodium, potassium, and calcium whenever possible)

**Screening for infections:** - Children with SAM often harbor occult infections. Screen for common infections by following investigations
  - Total and differential leukocyte count
  - Urine routine & microscopy
  - Chest x-ray
  - Mantoux test
  - Blood smear for Malaria; if febrile
  - Screening for HIV (when suspected based on history and clinical signs/ symptoms (recurrent infections, presence of oral thrush, lymphadenopathy, unexplained death of parents, persistent diarrhoea, parotid enlargement)

**Additional investigations depending on clinical situation and availability of Investigations**

There are 10 essential steps in two phases: an initial stabilization phase and a longer rehabilitation phase.

<table>
<thead>
<tr>
<th>S.NO</th>
<th>STEPS</th>
<th>STABILIZATION PHASE</th>
<th>REHABILITATION PHASE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Days 1-2</td>
<td>Days 3-7</td>
</tr>
<tr>
<td>1.</td>
<td>Treat/Prevent Hypoglycemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Treat/Prevent Hypothermia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. Treat/Prevent Dehydration
4. Correct Electrolyte Imbalance
5. Treat/Prevent Infection
6. Correct micro-nutrient deficiencies
   Iron supplementation
   No iron
   Iron
7. Start Cautious Feeding
8. Achieve Catch-up Growth
9. Provide Sensory Stimulation and Emotional Support
10. Prepare for Follow up

During management, remember following broad principles given in box 7.1.

**Box 7.1. Principles for management of malnutrition**

- Do not give I/V fluids routinely.
- Do not give diuretics or albumin to treat oedema.
- Do not give high protein formula.
- Do not give iron during the initial feeding phase.

This chapter will address management of few life threatening conditions in SAM children. For further management refer to national guidelines.

### 7.3.1 Hypoglycemia

All severely malnourished children are at risk of developing hypoglycemia (blood glucose <54 mg/dl) which is an important cause of death. Measure blood sugar on admission and subsequently in children who become lethargic. If the blood glucose cannot be measured, assume hypoglycemia.

#### 7.3.1a Treat & prevent hypoglycemia

- 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 not lethargic, unconscious, or convulsing, give the first feed of F-75/Starter diet. 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 and keep the baby warm and check temperature 8 hourly.
7.3.1b Monitoring
If the initial blood glucose was low, repeat the measurement after 30 minutes. If glucose is again <54 mg/dl, repeat the 10% glucose or sugar solution.

7.3.2 Hypothermia
If the axillary temperature is <35°C (<95°F) or does not register on a normal thermometer, assume hypothermia. Treat all hypothermic children for hypoglycemia and for infection as well.

7.3.2a Maintain warm room
- 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).

7.3.2b 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 put the child on the mother's bare chest or abdomen (skin-to-skin) and cover mother–baby pair with a blanket.
- Take the child's temperature 2-hourly until it rises to more than 36.5°C. Take it half-hourly if a heater is being used.
- Check for hypoglycemia and give antibiotics whenever hypothermia is found.
- Give 2 hourly feed through the night till the time temperature is stable.

7.3.3 Dehydration
7.3.3a Recognize dehydration
Correct estimation of dehydration is difficult in severely malnourished children. 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. Edema if present may mask diminished elasticity of the skin.
Ask the mother if the child had watery diarrhoea or vomiting. If the child has watery diarrhoea or vomiting, assume dehydration and give ORS.

*Remember a child with severe acute malnutrition may be dehydrated even in the presence of edema.*
7.3.3b Treatment

Since signs of dehydration are not very reliable, rehydration orally or through a nasogastric tube is recommended. It is also important to remember that these children are not able to handle high sodium load and are at risk of hypokalemia due to reduced muscle mass.

REMEMBER: Use IV rehydration only if the child has signs of shock and is lethargic or has lost consciousness

Calculate the amount of ORS to give is given in Table 7.5.

Table 7.5. Amount of ORS for rehydration in malnutrition

<table>
<thead>
<tr>
<th>How often to give ORS (ReSoMal)</th>
<th>Amount to give</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every 30 minutes for first 2 hours</td>
<td>5 ml/kg weight</td>
</tr>
<tr>
<td>Alternate hours for up to 10 hours</td>
<td>5-10 ml/kg**</td>
</tr>
</tbody>
</table>

*Starter (F-75) diet & ORS is given in alternate hours (e.g. Starter at 2, 4, 6 hours & ORS at 3, 5, 7) until the child is rehydrated

**The amount offered in this range should be based on child's willingness to drink and amount of ongoing losses in stool.

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.

Which ORS to be used?

- WHO recommended ORS for SAM children (ReSoMal) is not commercially available in Nepal. You can prepare modified ORS for SAM by dissolving one sachet (1 litre) of low-osmolarity oral rehydration salt in 2 litres of water (instead of 1 litre) and adding and dissolving 50 g of glucose/sugar and 30 ml of potassium chloride injection containing (40 mEq/L of potassium). In case preparation of modified ORS is not possible, start rehydration with low osmolarity. If the child has profuse watery diarrhoea or cholera is suspected, use low osmolarity ORS without any modification for rehydration.

Monitoring the child who is taking ORS: Check following signs at beginning and then every 30 minutes

- Respiratory rate
- Pulse rate
- Urine output
- Frequency of stools and vomiting
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.

**Prevent dehydration from on-going losses:**

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 50–100 ml after each watery stool between feeds to replace stool losses.

### 7.3.3d Shock in severely malnourished children

Management of shock depends upon cause of the shock. However, it is often difficult to differentiate shock due to dehydration & sepsis on clinical signs. Children with dehydration will respond to IV fluids while those with septic shock and no dehydration will not respond.

**Box 7.2. Indication of intravenous fluids in severely malnourished child**

<table>
<thead>
<tr>
<th>Give IV fluids to severely malnourished child if:</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Child is lethargic or unconscious and</td>
</tr>
<tr>
<td>□ Has cold hands plus</td>
</tr>
<tr>
<td>□ Slow capillary refill (longer than 3 seconds)</td>
</tr>
<tr>
<td>□ Weak and fast pulse</td>
</tr>
</tbody>
</table>

You have already learnt management of shock in severe acute malnutrition children in section 2.

### 7.3.4 Electrolyte imbalance

Give supplemental potassium at 3-4 mmol/kg/day for at least 2 weeks. Potassium can be given as syrup potassium chloride; the most common preparation available has 20 mmol/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 mmol/kg daily) orally. If oral commercial preparation is not available, you can give injection magnesium sulphate (50% which has 2 mmol/ml) *orally* mixed with feeds.
- Prepare food without adding salt to avoid sodium overload.
### 7.3.5 Infection

**Children with SAM often harbor infections without manifestations.** Hence assume all children with severe malnutrition admitted in a hospital have an infection and give broad spectrum antibiotics.

**Table 7.6: Recommended antibiotics for children with SAM**

<table>
<thead>
<tr>
<th>STATUS</th>
<th>ANTIBIOTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>All admitted case without medical complication</td>
<td>• Give Oral Amoxicillin 40 mg/kg /dose twice times per day for 5 days</td>
</tr>
<tr>
<td>All admitted cases with any complications other than shock, meningitis and dysentery</td>
<td>• Inj. Ampicillin 50 mg/kg/dose 6 hourly and Inj. Gentamycin 7.5 mg/kg once a day for 7 days</td>
</tr>
<tr>
<td></td>
<td>• Add Inj. Cloxacillin 100 mg/kg day 6 hourly if Staphylococcal infection is suspected.</td>
</tr>
<tr>
<td></td>
<td>• Revise therapy based on sensitivity report</td>
</tr>
<tr>
<td>For septic shock or worsening/no improvement in initial hours</td>
<td>• Give third generation cephalosporins like Inj. Cefatoxime 50 mg/kg/dose in 3 times daily or Ceftriaxone 50 mg/kg/day in 2 divided doses along with Inj. Gentamycin 7.5 mg in single dose.</td>
</tr>
<tr>
<td></td>
<td>• Do not give second dose of Gentamycin until child is passing urine</td>
</tr>
<tr>
<td>Meningitis</td>
<td>• IV Cefatoxime 50mg/kg/dose 6 hourly or Inj. Ceftriaxone 50 mg/kg 12 hourly plus Inj. Amikacin 15mg kg/day single dose.</td>
</tr>
<tr>
<td>Dysentery</td>
<td>• Give cefixime 5 mg/kg in twice a day for 5 days. If the child is sick, give Inj. Ceftriaxone 50 mg/kg/dose twice daily for 5 days</td>
</tr>
<tr>
<td>On Discharge</td>
<td>• 200 mg albendazole for children aged 12-23 months, 400 mg albendazole for children aged 24 months or more.</td>
</tr>
</tbody>
</table>

**7.3.5a 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

**7.3.5b Treat associated conditions**

- Give antimalarials, if blood smear or RDT is positive for malaria parasites.
- Start ATT if tuberculosis is diagnosed as per NTP recommended criteria.
- Suspect and investigate for HIV if he has also other problems like persistent diarrhoea, oral thrush, pneumonia, parotid swelling or generalized lymphadenopathy. For investigations and treatment 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.

If keratomalacia /corneal ulcer present, give Vitamin A dose, instil 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 antibacterial cream& any barrier cream (zinc cream) to the raw areas.

7.3.5c 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
- Appearance of danger signs

7.3.6 Micronutrients

☐ Vitamin A: Give one dose oral vitamin A to all children with SAM unless there is evidence that child has received vitamin A dose in last 1 month or has oedema on admission.

Table 7.7: Recommended oral dose of Vitamin A according to child’s age

<table>
<thead>
<tr>
<th>Age</th>
<th>Vitamin A Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6 months</td>
<td>50 000 IU</td>
</tr>
<tr>
<td>6-12 months or if weight &lt;8kg</td>
<td>100 000 IU</td>
</tr>
<tr>
<td>&gt;12 months or if weight &gt; 8 kg</td>
<td>200 000 IU</td>
</tr>
</tbody>
</table>

*3 doses in case of signs of Vitamin A deficiency on Day-1, Day-2 and Day-15 to all children with SAM

Other micronutrients should also be given daily for at least 2 weeks:

- Multivitamin supplement (should also contain vitamin A, C, D, E and B12 and not just vitamin B-complex): Twice Recommended Daily Allowance
- Folic acid: 5 mg on day 1, then 1 mg/day
- Elemental Zinc: 2 mg/kg/day (if the child has diarrhoea, give 10 mg to children aged less than 6 months and 20 mg to children aged 6-59 months for 14 days)
- **Copper**: 0.3 mg/kg/day (if separate preparation not available use commercial preparation containing copper)

- **Iron**: Start daily iron supplementation after two days of the child being on Catch up formula (F 100) or after 7 days or control of infection. Give elemental iron in the dose of 3 mg/kg/day in two divided doses, preferably between meals. (Do not give iron in stabilization and transition phase).

### ANTHROPOMETRIC MEASUREMENTS

**Measuring Weight**

<table>
<thead>
<tr>
<th>Key points to remember</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Remove the child’s clothes, shoes, socks &amp; hair braids, &amp; ornaments to minimum as per weather conditions.</td>
</tr>
<tr>
<td>- Cover in a blanket or woollen shawl while carrying to the scale.</td>
</tr>
<tr>
<td>- Put a paper / cloth on the pan</td>
</tr>
<tr>
<td>- Set the weighing scale to zero before putting the child on the pan</td>
</tr>
<tr>
<td>- Place the child into the pan, wait for child to settle and weight to stabilize</td>
</tr>
<tr>
<td>- Allow mother to stand near weighing scale &amp; make baby calm.</td>
</tr>
<tr>
<td>- Measure weight in gm &amp; enter in the recording Performa <strong>immediately</strong>.</td>
</tr>
<tr>
<td>- Repeat the measurement &amp; record.</td>
</tr>
<tr>
<td>- In case the difference of two measurements is more than 5 g, take third measurement and take the average of two nearest measurements.</td>
</tr>
</tbody>
</table>
Measuring Length

Key Points to Remember

- Length is measured using a special device known as an infantometer which has a headboard and sliding foot piece. Lay the measuring board flat, on a stable, level table.
- One person should stand or kneel behind the headboard and position the child lying on his back on the measuring board, supporting the head and placing it against the headboard.
- The other person should stand alongside the measuring board and support the child's trunk as the child is positioned on the board.
- Position the crown of the head against the headboard, compressing the hair (Remove hair braids).
- Hold the head with two hands and tilt upwards until the eyes look straight up, and the line of sight is perpendicular to the measuring board.
- Check that the child lies straight along the centre line of the measuring board and does not change position.
- Measure length to the last completed 0.1 cm and record immediately on the case recording.
Measuring Height

- One person should kneel or crouch near the child's feet and 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.
- Prevent children from standing on their toes.
- Young children may have difficulty standing to full height. If necessary, gently push the child’s tummy to help him stand straight to full height.
- The other person should bend to level of the child's faces and Position the head so that the child is looking straight ahead (line of sight is parallel to the base of the board).
- Place thumb and forefinger over the child's chin to help keep the head in an upright position.
- With the other hand, pull down the head board to rest firmly on top of the head and compress hair.
- Measure height to the last
Measuring Mid Upper Arm Circumference

If using a 3 colour MUAC tape

<table>
<thead>
<tr>
<th>Color zone</th>
<th>MUAC Measurement</th>
<th>Nutritional status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>$\geq 12.5 \text{ cm}$</td>
<td>Well nourished</td>
</tr>
<tr>
<td>Yellow</td>
<td>11.5 cm-12.4 cm</td>
<td>Moderate acute malnutrition</td>
</tr>
<tr>
<td>Red</td>
<td>$&lt; 11.5 \text{ cm}$</td>
<td>Severe acute malnutrition</td>
</tr>
</tbody>
</table>

2. While locating the midpoint of upper arm, flex the elbow in 90 degree and mark the point between tip of shoulder and tip of elbow.

3. Extend the elbow while measuring the mid upper arm circumference

*See annex 35 exercise d for exercise on approach to child with malnutrition*
7.4: MANAGEMENT OF ANEMIA

Evaluation of anemia

Whom to refer

How to treat iron deficiency anemia

Blood transfusion

Evaluation of anemia

Common findings in history and physical examination, one should look for are listed in Table 7.8.

<table>
<thead>
<tr>
<th>Take a history concerning</th>
<th>On examination, look for</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Duration of symptoms</td>
<td>• Severe palmar pallor</td>
</tr>
<tr>
<td>• Usual diet (before the current illness)</td>
<td>• Skin bleeds (petechial and/or purpuric spots)</td>
</tr>
<tr>
<td>• Family circumstances (to understand the child’s social background)</td>
<td>• Lymphadenopathy</td>
</tr>
<tr>
<td>• Prolonged fever</td>
<td>• Hepato-Splenomegaly</td>
</tr>
<tr>
<td>• Worm infestation</td>
<td>• Signs of heart failure (gallop rhythm, raised JVP, respiratory distress, basal crepitations)</td>
</tr>
<tr>
<td>• Bleeding from any site</td>
<td></td>
</tr>
<tr>
<td>• Lymphnode enlargement</td>
<td></td>
</tr>
<tr>
<td>• Previous blood transfusions</td>
<td></td>
</tr>
<tr>
<td>• Similar illness in the family (siblings)</td>
<td></td>
</tr>
</tbody>
</table>

Laboratory diagnosis

- Hemoglobin<11 gm/dl in children aged 6 months - 5 years indicates anaemia.
- Complete blood counts and examination of red cell indices and peripheral blood smear should be done in all anemic children whenever possible.(See appendix for normal values)
- Blood films should be examined for malaria parasites particularly in high malaria risk areas.
- Stool examination for ova, cyst and occult blood may be done.
- Blood counts should be performed using electronic cell counter if available. Children with IDA will have low MCH, MCV, MCHC in red cell indices and peripheral blood smear shows microcytic-hypochromic anaemia. Usually leucocyte counts and platelet counts are normal.
Whom to refer?

**Red flag signs for non-nutritional anaemia (Consider referral)**
- Cases of anaemia and hepato-splenomegaly/splenomegaly, if malaria has been excluded or not strongly suspected (haemolytic anaemia, leukemia).
- Children with similar history in the family (haemolytic anaemia e.g. thalassemia, sickle cell anaemia).
- 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 (bone marrow failure).
- Also consider transfer of nutritional anemia other than iron deficiency anemia

- **Investigations in such cases should be done before blood transfusion.**
- **Iron therapy should be avoided in confirmed cases of hemolytic anaemia.**

**Treatment**
All children with suspected IDA should be treated using oral iron 2-3 mg/kg/dose twice daily (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). Repeat complete blood count with red cell indices or peripheral smear 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 chronic infections or may be referred to rule out other causes of anemia.

- **Deworming**
Give deworming agents to all children more than 1 year with anaemia at the time of discharge.
Albendazole (tab 400 mg, syrup 400 mg/10 ml)
- 1 tab (or 10 ml) once, then every 6 months – if the child >2 yrs

- ½ tab (or 5 ml), once every 6 months if the child ≤ 2 years OR
Give Mebendazole (100 mg) – 1 tab x BD x 3 days
7.5. BLOOD TRANSFUSION

7.5.1 Indications for blood transfusion

There are five general indications for blood transfusion:

- Acute blood loss, when 20–30% of the total blood volume has been lost, and bleeding is continuing
- Severe anaemia (see below)
- Septic shock (if IV fluids are insufficient to maintain adequate circulation; transfusion to be given in addition to antibiotic therapy). Refer to section
- Whole fresh blood is required to provide plasma and platelets for clotting factors, if specific blood components are not available

7.5.2 Storage of blood

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 h.

Large-volume, rapid transfusion at a rate > 15 ml/kg per h of blood stored at 4 °C may cause hypothermia, especially in small infants.

7.5.3 Problems in blood transfusion

Blood can be the vehicle for transmitting infections (e.g. malaria, syphilis, hepatitis B and C, HIV). Therefore, screen donors for as many of these infections as possible. To minimize the risk, give blood transfusions only when essential.

7.5.4 Severe anaemia

- Give a blood transfusion as soon as possible to:
  - all children with Hematocrit of ≤ 12% or Hb of ≤ 4 g/dl
  - less severely anaemic children (Hematocrit, 13–18%; Hb, 4–6 g/dl) with any of the following clinical features:
    - clinically detectable dehydration
    - shock
    - impaired consciousness
    - heart failure
    - deep, laboured breathing
• If packed cells are available, give 10 ml/kg over 3–4 h in preference to whole blood. If not available, give fresh whole blood (20 ml/kg) over 3–4 h.
• Check the respiratory rate and pulse rate every 15 min. If either rises or there is other evidence of heart failure, such as basal lung crepitations, enlarged liver or raised jugular venous pressure, transfuse more slowly. If there is any evidence of fluid overload due to the blood transfusion, give IV furosemide at 1–2 mg/kg, up to a maximum total of 20 mg.
• After the transfusion, if the Hb remains below 7 gm/dl, transfusion may be repeated.
• In children with severe acute malnutrition, fluid overload is a common and serious complication. Give packed cells when available or whole blood at 10 ml/kg (rather than 20 ml/kg).

7.5.5 Giving a blood transfusion

Before transfusion, check that:
• The blood is of the correct group, and the patient's name and number are on both the label and the form (in an emergency, reduce the risk for 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 plasma is not pink or has large clots, and the red cells do not look purple or black
• Make baseline recordings of the child's temperature, respiratory rate and pulse rate.
• The blood is thawed to room temperature.

During transfusion:
• If available, use an infusion device to control the rate of transfusion.
• Check that the blood is flowing at the correct speed @ 3 drops/kg/minute with micro drip set.
• Look for signs of a transfusion reaction (see below), particularly carefully in the first 15 min of transfusion.
• Record the child's general appearance, temperature, pulse and respiratory rate every 30 min.
• Record the times the transfusion was started and ended, the volume of blood transfused and any reactions.

After transfusion:
• Reassess the child. If more blood is needed, a similar quantity should be transfused and the dose of furosemide (if given) repeated.
SECTION 8: OTHER PROBLEMS
8.1. APPROACH TO A CHILD WITH SUSPECTED POISONING

8.1.1 Introduction:
Suspect poisoning in any unexplained illness in a previously healthy child. Consult standard textbook of paediatric for management of exposure to specific poisons and/or consult National Poisons Centre for guidance.
Only the principles for managing ingestion of few common poisons are given here.

8.1.2: Diagnosis of poisoning in children
A diagnosis is based on a history from the child or carer, a clinical examination and the results of investigations, where appropriate.

☐ Obtain full details of the poisoning agent, the amount ingested and the time of ingestion. Attempt to identify the exact agent involved by examining container, when relevant. Check that no other children were involved.
☐ The symptoms and signs depend on the agent ingested and therefore vary widely
☐ Check for signs of burns in or around the mouth or of stridor (upper airway or laryngeal damage), which suggest ingestion of corrosives.

8.1.3 Principles for management of ingested poison

☐ All children who present as poisoning cases should quickly be assessed for emergency signs (airway, breathing, circulation and level of consciousness), as some poisons depress breathing, cause shock or induce coma.
☐ Admit all children who have deliberately accidently ingested iron, pesticides, paracetamol or some other drugs.
☐ Children who have ingested corrosives or petroleum products should not be sent home without observation for at least 6 h. Corrosives can cause oesophageal burns, which may not be immediately apparent, and petroleum products, if aspirated, can cause pulmonary edema, which may take some hours to develop. X ray Chest is mandatory before discharge.
☐ Check for hypoglycemia; if blood glucose estimation facility is not available and the child has a reduced level of consciousness, treat as if hypoglycemia.
☐ Identify the specific agent and remove or adsorb it as soon as possible. Treatment is most effective if given as quickly as possible after the poisoning event, ideally within 1 h.
If the child swallowed kerosene, petrol or petrol-based products (note that most pesticides are in petrol-based solvents) or if the child’s mouth and throat have been burnt (for example with bleach, toilet cleaner or battery acid), do not make the child vomit but give water or, if available, milk, orally.

8.1.4 Principle for management of poisons in contact with skin or eyes

- **Skin contamination:** Remove all clothing and personal effects, and thoroughly clean all exposed areas with copious amounts of tepid water. Use soap and water for oily substances. Attending staff should take care to protect themselves from secondary contamination by wearing gloves and aprons. Remove clothing.

- **Eye contamination:** Rinse the eye for 10–15 min with clean running water or normal saline, taking care that the run-off does not enter the other eye if the child is lying on the side, when it can run into the inner canthus and out the outer canthus. Evert the eyelids and ensure that all surfaces are rinsed. Take ophthalmologist opinion.

8.1.5 Principle for management of inhaled poisons

- 8.1.5.1 Remove the child from the source of exposure.
- 8.1.5.2 Urgently call for help.
- 8.1.5.3 Administer supplementary oxygen if the child has respiratory distress, is cyanosed or has oxygen saturation ≤ 90%.
- 8.1.5.4 Inhalation of irritant gases may cause swelling and upper airway obstruction, bronchospasm and delayed pneumonitis. Intubation, bronchodilators and ventilatory support may be required.

8.1.6 Prevention of poisoning

- 8.1.6.1 Teach parents to keep drugs and poisons in proper containers and out of reach of children.
- 8.1.6.2 Advise parents on first aid if poisoning occurs again.

8.1.7 Treatment of Organophosphorus Poisoning

OP compounds and carbamates are two main classes of insecticides.

Commonly used organophosphates: methyl parathion (metacid) and dichlorovos (nuvan)

They inhibit cholinesterase (AchE) by irreversibly binding to it; accumulation of acetylcholine at the neural synapses; initial over stimulation eventual exhaustion and disruption of neural transmission.

If left untreated OP forms a permanent bond with this enzyme inactivating it. This process,
called 'aging' occurs 2-3 days after exposure; weeks to months be required for the body to regenerate inactivated enzymes. In contrast carbamates form a temporary bond to the enzyme allowing regeneration over several hours. Symptoms caused by carbamate toxicity are usually less severe than those seen with OP.

(1) ACUTE TOXICITY

The muscarinic (cholinergic) signs (caused by Organophosphates and Carbamates) can be remembered by use of one of two mnemonics

SLUDGE/BBB
Salivation, Lacrimation, Urination, Defecation, Garlic odor, Emesis (with Pin-point pupils), Bronchorrhea, Bronchospasm, Bradycardia

DUMBELS
Defecation, Urination, Miosis, Bronchorrhea/Bronchospasm/Bradycardia, Emesis, Lacrimation, Salivation

The nicotinic effects: fasciculations

CNS effects (probably through muscarinic and nicotinic receptors in the brain):
Respiratory depression, lethargy, excitability, seizures, coma

(2) INTERMEDIATE SYNDROME (IMS)

IMS occurs 24-96 hours after exposure. It arises between the early cholinergic syndrome and late onset peripheral neuropathy. Bulbar, respiratory and proximal muscle weakness is prominent. This resolves in 1-3 weeks.

(3) DELAYED PERIPHERAL NEUROPATHY

Occurs several weeks after exposure. Primarily motor involvement. May resolve spontaneously or result in permanent neurological dysfunction

TREATMENT OF ACUTE TOXICITY

Therapy depends on severity; mildest cases need only observation, aggressive cardiorespiratory support for seriously intoxicated. Identify the type of ingestion, time interval, current symptoms, amount ingested. Average swallow 5-10 ml (young child) 10-15 (older child). Protect yourselves with gloves

ABC
Give 100% oxygen, early intubation may be required
**Skin decontamination:** wash with soap and water twice, remove contaminated clothes.

**Gastric lavage:** If ingestion within one hour of presentation

- Single dose of activated charcoal 1g/kg (maximum dose 50 gm) is given for gastric lavage. If the patient is vomiting persistently, lavage is not necessary. Ensure that airway is protected.
- Forced emesis is contraindicated because of the risk of aspiration and seizures

**Atropine:** Specific antidote for muscarinic effects >12 yrs initial dose 1-2 mg; <12 yrs 0.05 mg/kg IV

Repeat the dose every 3-5 minutes until atropinization occurs which is indicated by clearing of bronchial secretions and cessation of wheezing. Do not rely on pupillary changes;

- Maintain atropinization by giving every hour 20-30% of the total amount that was required to atropinize. Maintain full atropinization for 2-3 days. Then atropine dose is daily reduced by 1/3 to ¼ of the dose given on the previous day.
- Continuous intravenous infusion of atropine may be necessary when atropine requirements are massive and the dose is 0.02 to 0.08 mg/kg/hr, depending on the degree and stage of intoxication. Hundreds of milligrams may be needed over several days in severe poisonings
- Signs of improvement after 12-24hrs are indications to begin gradual tapering of atropine doses.
- **TACHYCARDIA AND MYDRIASIS ARE NOT CONTRAINDICATIONS TO ATROPINE USE**
- Inhaled ipratropium 0.5 mg with parenteral atropine may be helpful for bronchospasm; may repeat 47
- Atropine blocks the acetyleholine receptor and so is effective in both OP and carbamate poisoning.

**Pralidoxime:** Bound AchE is reactivated by this drug; relieves nicotinic as well as muscarinic effects; should be administered as early as possible in severe poisoning

- >12 yrs 1 - 2 g IV infusion over 30 min; <12 yrs 25 mg/kg over 30 min
- May repeat after 30 minutes or give continuous infusion if severe
- Continuous infusion at 10 mg/kg/hour in children
- If no IV access, give pralidoxime 15 mg/kg IM in children <40 kg (>40 kg-600mg)rapidly
- Repeat as needed to total of 1800 mg or 45 mg/kg in children.

**Pralidoxime** **should NOT** be administered without concurrent atropine in order to prevent worsening symptoms due to transient oxime-induced acetylcholinesterase inhibition

It chemically breaks the bond between the OP and the enzyme liberating the enzyme and degrading the OP. Only effective before the bond 'ages' and becomes permanent.
Not necessary for carbamate because bond between insecticide and enzyme degrades spontaneously.

**Benzodiazepine:**
- Diazepam 0.1 to 0.2 mg/kg, repeat as necessary if seizures occur. Do not give phenytoin. Patient should be observed for 24 hrs after the last dose of atropine.

### 8.1.8 SNAKE BITE

Snake bite should be considered in any severe pain or swelling of a limb or in any unexplained illness presenting with bleeding or abnormal neurological signs. Some cobras spit venom into the eyes of victims causing pain and inflammation.

**Diagnosis of envenoming**

- General signs include shock, vomiting and headache. Examine bite for signs such as local necrosis, bleeding or tender local lymph node enlargement.
- Specific signs depend on the venom and its effects. These include:
  - Shock
  - Local swelling that may gradually extend up the bitten limb
  - Bleeding: external from gums, wounds or sores; internal especially intracranial
  - Signs of neurotoxicity: respiratory difficulty or paralysis, ptosis, bulbar palsies
  - (difficulty swallowing and talking), limb weakness
  - Signs of muscle breakdown: muscle pains and black urine
  - Check haemoglobin (where possible, blood clotting should be assessed).

**Treatment**

**First aid**

- Splint the limb to reduce movement and absorption of venom. If the bite was likely to have come from a snake with a neurotoxic venom, apply a firm bandage to affected limb from fingers or toes to proximal of site of bite.
- Clean the wound.
- If any of the above signs, transport to hospital which has antivenom as soon as possible. If snake has already been killed, take this with child to hospital.
- Avoid cutting the wound or applying tourniquet.
Hospital care

Treatment of shock/respiratory arrest

- Treat shock, if present (see pages 3, 17 and 18).

- Paralysis of respiratory muscles can last for days and requires intubation and mechanical ventilation or manual ventilation (with a mask or endotracheal tube and bag) by relays of staff and/or relatives until respiratory function returns. Attention to careful securing of endotracheal tube is important. An alternative is to perform an elective tracheostomy.

Antivenom

- If there are systemic signs or severe local signs (swelling of more than half of the limb or severe necrosis), give antivenom, if available.

- Prepare IM epinephrine and IV chlorpheniramine and be ready if allergic reaction occurs (see below).

- Give monovalent antivenom if the species of snake is known. Give polyvalent antivenom if the species is not known. Follow the directions given on the antivenom preparation. The dose for children is the same as for adults.

- Dilute the antivenom in 2–3 volumes of 0.9% saline and give intravenously over 1 hour. Give more slowly initially and monitor closely for anaphylaxis or other serious adverse reactions.

- If itching/urticarial rash, restlessness, fever, cough or difficult breathing develop, then stop antivenom and give epinephrine 0.01 ml/kg of 1/1000 or 0.1 ml/kg of 1/10,000 solution subcutaneously and IM or IV/SC chlorpheniramine 250 micrograms/kg. When the child is stable, re-start antivenom infusion slowly.

- More antivenom should be given after 6 hours if there is recurrence of blood incoagulability, or after 1–2 hr if the patient is continuing to bleed briskly or has deteriorating neurotoxic or cardiovascular signs. Blood transfusion should not be required if antivenom is given. Clotting function returns to normal only after clotting factors are produced by the liver. Response of abnormal neurological signs to antivenom is more variable and depends on type of venom.

- If there is no response to antivenom infusion this should be repeated.

- Anticholinesterases can reverse neurological signs in some species of snake (see standard textbooks of paediatrics for further details).
Other treatment

Surgical opinion

Seek surgical opinion if there is severe swelling in a limb, it is pulseless or painful or there is local necrosis.

Surgical care will include:

- Excision of dead tissue from wound
- Incision of fascial membranes to relieve pressure in limb compartments, if necessary
- Skin grafting, if extensive necrosis
- Tracheostomy (or endotracheal intubation) if paralysis of muscles involved in swallowing occurs

Supportive care

- Give fluids orally or by NG tube according to daily requirements (see page 218).
- Keep a close record of fluid intake and output.
- Provide adequate pain relief
- Elevate limb if swollen
- Give antitetanus prophylaxis
- Antibiotic treatment is not required unless there is tissue necrosis at wound site
- Avoid intramuscular injections
- Monitor very closely immediately after admission, then hourly for at least 24 hours as envenoming can develop rapidly.

8.1.9 Drowning

Initial assessment should include ensuring adequate airway patency, breathing, circulation and consciousness (ABCs). Check if there are any injuries, especially after diving or an accidental fall. Facial, head and cervical spine injuries are common.

Management

8.1.9.1 Give oxygen and ensure adequate oxygenation.

8.1.9.2 Remove all wet clothes.

8.1.9.3 Use a nasogastric tube to remove swallowed water and debris from the stomach, and when necessary bronchoscopy to remove foreign material, such as aspirated debris or vomitus plugs, from the airway.

8.1.9.4 Warm the child externally if the core temperature is > 32 °C by using radiant heaters or warmed dry blankets; if the core temperature is < 32 °C, use warmed IV fluid (39 °C) or conduct gastric lavage with warmed 0.9% saline.
8.1.9.5 Check for hypoglycaemia and electrolyte abnormalities, especially hyponatraemia, which increase the risk of cerebral oedema.
8.1.9.6 Give antibiotics for possible infection if there are pulmonary signs.

8.1.10 Electrocution

- Provide emergency care by ensuring airway patency, breathing and circulatory support.
- Provide oxygen, especially for children with severe hypoxia, facial or oral burns, loss of consciousness or inability to protect the airway, or respiratory distress.
- Assess for traumatic injuries such as pneumothorax, peritonitis or pelvic fractures.
- Begin normal saline or Ringer’s lactate fluid resuscitation, and titrate to urine output of at least 2 ml/kg per h in any patient with significant burns or myoglobinuria.
- Consider furosemide or mannitol for further diuresis of myoglobin.
- Give tetanus vaccine as indicated, and provide wound care. Treatment may include early fasciotomy when necessary

POISONING CENTRE NUMBER: 9851038490
8.2. DEVELOPMENTAL DELAY IN CHILDREN

Health care providers may note red flags in developmental milestones that are cause for concern, further monitoring, or referral. In children, certain absent milestones may indicate a developmental delay that is more likely to be long-lasting or to require earlier intervention. Areas that benefit from intervention are particularly important to identify and treat to allow the child the greatest likelihood of healthy development. Studies show that beginning intervention earlier in a child’s developmental course leads to improved outcomes and can improve engagement of a family in the child’s developmental progress.

Parents may also exhibit patterns that are red flags for a child’s development. If a parent is frequently insensitive to an infant’s communication, is unable to recognize the infant’s cues, is easily angered by the infant, or ignores the infant, this may be a sign of difficulty with attachment and family support may be warranted.

The doctor is often the primary support for families in identifying red flags and guiding interventions. Children with unexplained early motor delays or hypotonia may benefit from further evaluation for conditions such as cerebral palsy, muscular dystrophy, or other neuromuscular disorders. Children who exhibit red flags in the areas of social communication can be referred for evaluation for autism spectrum disorders or language concerns. Children with receptive or expressive language delays benefit from a thorough evaluation and treatment by a speech/language pathologist. Children with developmental delay not explained by the medical history may benefit from evaluation by pediatrician.

<table>
<thead>
<tr>
<th>Table 8.1. Upper limit of age of attainment of milestone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Milestone</strong></td>
</tr>
<tr>
<td>Visual fixation or following</td>
</tr>
<tr>
<td>Vocalization</td>
</tr>
<tr>
<td>Sitting without support</td>
</tr>
<tr>
<td>Standing with assistance</td>
</tr>
<tr>
<td>Hands and knees crawling</td>
</tr>
<tr>
<td>Standing alone</td>
</tr>
<tr>
<td>Walking alone</td>
</tr>
<tr>
<td>Single words</td>
</tr>
<tr>
<td>Imaginative play</td>
</tr>
<tr>
<td>Loss of comprehension, single words or phrase at any age</td>
</tr>
</tbody>
</table>

Adapted from WHO; MGRS group, WHO motor development study. Acta pediatrics 2006;450:86-95
### Table 8.2 Red flag signs for developmental delay

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Language/Cognitive</th>
<th>Motor</th>
<th>Social-Emotional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonatal period</td>
<td>Infant does not respond to loud sounds.</td>
<td>Muscle tone too low to feed.</td>
<td>Infant shows indifference or disinterest in caregiver</td>
</tr>
<tr>
<td>2 months</td>
<td>Does not alert to voice.</td>
<td>Cannot raise head when prone.</td>
<td>Lack of looking at faces/lack of fixation.</td>
</tr>
<tr>
<td>4 months</td>
<td>No cooing or gurgling sounds.</td>
<td>Unable to bring hands to midline.</td>
<td>Lack of smiling.</td>
</tr>
<tr>
<td>6 months</td>
<td>Lack of turning toward voices.</td>
<td>Does not pass object from one hand to another.</td>
<td>No smiling, laughing, or expression.</td>
</tr>
<tr>
<td>12 months</td>
<td>Child does not respond to name. Does not understand “no”.</td>
<td>Does not stand or bear weight on legs when supported.</td>
<td>Indifferent or resistant attachment to caregiver. Does not look where caregiver points.</td>
</tr>
<tr>
<td>15 months</td>
<td>Does not use words such as mama and papa/dada.</td>
<td>No pincer grasp.</td>
<td>Absence of proto-imperative pointing (point to desired object).</td>
</tr>
<tr>
<td>18 months</td>
<td>Not using at least 6 words.</td>
<td>Inability to walk independently.</td>
<td>Absence of proto-declarative pointing (point to show interest) or showing gestures.</td>
</tr>
<tr>
<td>24 months</td>
<td>Lack of words and two-word meaningful sentences. Inability to follow simple commands.</td>
<td>Inability to walk well.</td>
<td>Does not imitate actions or words of caregivers. Poor eye contact.</td>
</tr>
<tr>
<td>36 months</td>
<td>Inability to use three-word sentences.</td>
<td>Frequent falling or difficulty with stairs.</td>
<td>Lack of pretend play.</td>
</tr>
<tr>
<td>4 years</td>
<td>Unclear speech. Does not answer simple questions. Inability to use pronouns.</td>
<td>Does not jump in place.</td>
<td>Ignores other children.</td>
</tr>
<tr>
<td>Time Period</td>
<td>Language/Cognitive</td>
<td>Motor</td>
<td>Social-Emotional</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------</td>
<td>-------</td>
<td>-----------------</td>
</tr>
<tr>
<td>5 years</td>
<td>Inability to rhyme. Inability to recognize shapes, letters, colors. Resists dressing, sleeping, using the toilet.</td>
<td>Does not draw pictures, a square, or a cross. Poor balance.</td>
<td>Unusually fearful, sad, shy, angry. Does not distinguish between real and make-believe.</td>
</tr>
<tr>
<td>Any age</td>
<td>Loss of previously acquired skill.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8.3 COMMON SURGICAL PROBLEMS

8.3.1 BURNS
Burns and scalds are associated with a high risk of mortality in children. Those who survive may suffer from disfigurement and psychological trauma as a result of a painful and prolonged stay in the hospital.

Assessment
Burns may be partial or full thickness. A full thickness burn means the entire thickness of the skin is destroyed, and the skin will not regenerate.

Ask two questions:
1. How deep is the burn?
   - Full thickness burns are black or white, usually dry, have no feeling and do not blanch on pressure
   - Partial thickness burns are pink or red, blistering or weeping, and painful.
2. How much of the body is burnt?
   - Use a body surface area chart according to age.
   - Alternatively, use the child’s palm to estimate the burn area. A child’s palm is approximately 1% of the total body surface area.

Treatment
- Admit all children with burns >10% of their body surface; those involving the face, hands, feet, perineum, across joints; burns that are circumferential and those that cannot be managed as outpatients.
- Consider whether the child has a respiratory injury due to smoke inhalation.
  - If there is evidence of respiratory distress, then provide supplemental oxygen.
  - Severe facial burns and inhalational injuries may require early intubation or tracheostomy to prevent or treat airway obstruction.

  Fluid resuscitation (required for >10% total body surface burn).
  - Use Ringer's lactate with 5% glucose, normal saline with 5% glucose or half-normal saline with 5% glucose.
  - 1st 24 hours: Calculate fluid requirements by adding maintenance fluid requirements and additional resuscitation fluid requirements (volume equal to 4 ml/kg for every 1% of surface burned)
    Administer 1/2 of total fluid in first 8 hours, and remaining in next 16 hours.
    Note: The first 8 hours refers to the period from the time of the burn, not the time the patient reached the hospital. And the maximum body surface area of burn taken for fluid calculation is 50%.

Example: 20 kg child with a 25% burn.
1. Resuscitation fluid= 4 mlx20kgx25% burn
   =2000 ml
2. Maintenance fluid= 100mlx10kg+50mlx10kg
Total fluid requirement = 2000+1500 ml
= 3500 ml
Out of this fluid, \( \frac{1}{2} \) of the fluid i.e. 1750 ml is given over first 8 hrs. Remaining \( \frac{1}{2} \) is given over next 16 hours.
- 2nd 24 hours: give 1/2 to 3/4 of fluid required during the first day.
- Monitor the child closely during resuscitation (pulse, respiratory rate, blood pressure and urine output).
- Blood may be given to correct anemia or for deep burns to replace blood loss.

☐ Prevent infection
- If skin is intact, clean with antiseptic solution gently without breaking the skin.
- If skin is not intact, carefully debride the burn. Blisters should be pricked and dead skin removed.
- Give topical antibiotics/antiseptics (there are several options depending on resources available and these include: silver sulfadiazine, gentian violet, NS and even mashed papaya). Clean and dress the wound daily.
- Small burns or those in areas that are difficult to cover can be managed by leaving them open to the air and keeping them clean and dry
Pain control
- Make sure that pain control is adequate including before procedures such as changing dressings.
- Give paracetamol (10–15 mg/kg every 6 hours) by mouth or give intravenous narcotic analgesics (IM injections are painful), such as morphine sulphate (0.05–0.1 mg/kg IV every 2–4 hours) if pain is severe.

Tetanus Prophylaxis
- Check tetanus vaccination status.
  - If not immunized give tetanus immune globulin.
  - If immunized, give tetanus toxoid booster if this is due.

Nutrition
- Begin feeding as soon as practical in the first 24 hours.
- Children should receive a high calorie diet containing adequate protein, and vitamin and iron supplements.
- Children with extensive burns require about 1.5 times the normal calorie and 2–3 times the normal protein requirements.

Burn contractures
- Burn scars across flexor surfaces contract.
– This happens even with the best treatment (nearly always happens with poor treatment).
– Prevent contractures by passive mobilization of the involved areas and by splinting flexor surfaces. Splints can be made of plaster of Paris. Splints should be worn at night.

• **Physiotherapy and rehabilitation**
  – Should begin early and continue throughout the course of the burn care.
  – If the child is admitted for a prolonged period, ensure the child has access to toys and is encouraged to play.

### 8.3.2 Principles of wound care

The goal of caring for any wound is to stop bleeding, prevent infection, assess damage to underlying structures and promote wound healing.

#### Stop bleeding

- Direct pressure will control any bleeding
- Bleeding from extremities can be controlled for short periods of time (<10 minutes) using a sphygmomanometer cuff inflated above the arterial pressure.
- Prolonged use of tourniquets can damage the extremity. Never use a tourniquet in a child with sickle-cell anaemia.

![Figure 8.1: Controlling external bleeding- Elevate the limb, apply direct pressure, then put a pressure bandage](image)

#### Prevent infection

- Cleaning the wound is the most important factor in preventing a wound infection. Most wounds are contaminated when first seen. They may contain blood clots, dirt, dead or dying tissue and perhaps foreign bodies.
- Clean the skin around the wound thoroughly with soap and water or antiseptic. Water and antiseptic should be poured into the wound.
- After giving a local anaesthetic such as bupivacaine 0.25% (not to exceed 1ml/kg), search carefully for foreign bodies and carefully excise any dead tissue. Determine what damage may have been done. Major wounds require a general anaesthetic.
• Antibiotics are usually not necessary when wounds are carefully cleaned. However, there are some wounds that should be treated with antibiotics

3. Wounds older than 12 hours (these are likely to be already infected).
4. Wounds penetrating deep into tissue (e.g. a dirty stick or knife wound).

Tetanus prophylaxis
• If not vaccinated, give anti-tetanus serum, if available, and start a course of tetanus toxoid vaccine.
• If the child has had active immunization, give a booster if vaccination status is not current.

Wound closure
• If the wound is less than a day old and has been cleaned satisfactorily, the wound can be closed (called primary closure).
• The wound should not be closed if it is more than 24 hours old, there has been a lot of dirt and foreign material in the wound, or if the wound has been caused by an animal bite.
• Wounds not treated with primary closure should be packed lightly with damp gauze.
• If the wound is clean 48 hours later, the wound can then be closed (delayed primary closure). If the wound is infected, pack the wound lightly and let it heal on its own.

Wound infections
• Clinical signs of wound infections are pain, swelling, redness, warmth and pus drainage from the wound.

• Treatment of infected wound:
  ➢ Open wound if pus suspected
  ➢ Clean the wound with disinfectant.
  ➢ Pack the wound lightly with damp gauze. Change the dressing everyday, more frequently if needed.
  ➢ Antibiotics until surrounding cellulitis has resolved (usually 5 days).
    – Give cloxacillin (25–50 mg/kg orally four times a day) for most wounds to deal with Staphylococcus.
    – Give ampicillin (25–50 mg/kg orally four times a day), gentamicin (7.5 mg/kg IM or IV once a day) and metronidazole (7.5 mg/kg three times a day) if bowel flora is suspected

8.3.3 DRAINING ABSCESS
Infection can cause a collection of pus in almost any area of the body.
Diagnosis

- Fever, swelling, tenderness, and fluctuant mass.
- Question what might be the cause of the abscess (e.g., injection, foreign body or underlying bone infection). Injection abscesses usually develop 2–3 weeks after injection.

Treatment

- Incision and drainage
- Large abscesses may require general anesthesia.

Antibiotics: cloxacillin (25–50 mg/kg four times a day) for 5 days or until surrounding cellulitis resolved. If bowel flora is suspected (e.g., perirectal abscess): give ampicillin (25–50 mg/kg IM or IV four times a day), gentamicin (7.5 mg/kg IM or IV once a day) and metronidazole (7.5 mg/kg three times a day).

8.3.4 ABDOMINAL PAIN

Children commonly complain of abdominal pain. Not all abdominal pain is caused by gastrointestinal infections. Abdominal pain lasting longer than four hours should be regarded as a potential abdominal emergency.

Assessment

Ask three questions:

- Are there associated symptoms? The presence of nausea, vomiting, diarrhoea, constipation, fever, cough, headache, sore throat or dysuria (pain on passing urine) helps determine the severity of the problem and can help narrow the diagnosis.
- Where does it hurt? Ask the child to point to where it hurts most. This can also help narrow the diagnosis. Periumbilical pain is a nonspecific finding.
- Does the child have peritonitis—inflammation of the lining of the peritoneal cavity? This is a critical question, as most causes of peritonitis in children require operation. Signs of peritonitis include tenderness during palpation, pain in the abdomen when the child jumps or has his pelvis shaken and involuntary guarding (spasm of the abdominal musculature following palpation). A rigid abdomen that does not move with respiration is another sign of peritonitis.

Treatment

- Give the child nothing orally.
- If vomiting or abdominal distension, place a nasogastric tube.
- Give intravenous fluids (most children presenting with abdominal pain are dehydrated) to correct fluid deficits (normal saline 10–20 ml/kg repeated as needed) followed by 150% maintenance fluid requirements
- Give analgesics if the pain is severe (this will not mask a serious intra-
abdominal problem, and may even facilitate a better examination).

- Repeat the examinations if the diagnosis is in question.
- Give antibiotics if there are signs of peritonitis. To deal with enteric flora
- (Gram-negative rods, Enterococcus, and anaerobes): give ampicillin (25–50 mg/kg IM or IV four times a day), gentamicin (7.5 mg/kg IM or IV once a day) and metronidazole (7.5 mg/kg three times a day).

URGENT REVIEW by a surgeon experienced in paediatric surgery.

### 8.3.5 PAIN CONTROL

The underlying principles of pain control are:

- give analgesia by mouth, where possible (IM treatment may be painful)
- give it regularly, so that the child does not have to experience the recurrence of severe pain in order to get the next dose of analgesia
- give it in increasing doses, or start with mild analgesics and progress to strong analgesics as the requirement for pain relief rises or tolerance develops
- set the dose for each child, because children will have different dose requirements for the same effect.

Use the following drugs for effective pain control:

1. **Local anaesthetics**: for painful lesions in the skin or mucosa or during painful procedures.
   - Lidocaine: apply on a gauze to painful mouth ulcers before feeds (apply with gloves, unless the family member or health worker is HIV-positive and does not need protection from infection); it acts in 2–5 minutes.

2. **Analgesics**: for mild and moderate pain (such as headaches, post-traumatic pain, and pain from spasticity).
   - paracetamol
   - nonsteroidal anti-inflammatory drugs, such as ibuprofen.

3. **Potent analgesics such as opiates**: for moderate and severe pain not responding to treatment with analgesics.
   - morphine, an inexpensive and potent analgesic: give orally or IV every 4–6 hours, or by continuous IV infusion.
     - pethidine: give orally or IM every 4–6 hours
     - codeine: give orally every 6–12 hours, combined with non-opioids to achieve additive analgesia.

*Note*: Monitor carefully for respiratory depression. If tolerance develops, the dose will need to be increased to maintain the same degree of pain relief.

4. **Other Drugs**: For specific pain problems. These include diazepam of muscle spasm, carbamazepine for neuralgic pain, and corticosteroids (such as dexamethasone) for pain due to an inflammatory swelling pressing on a nerve.
8.3.6 SEDATION FOR PROCEDURES

- For some procedures (e.g. chest tube insertion or femoral cannulation) sedation with diazepam or light anaesthesia with ketamine should be considered.
- For diazepam sedation give 0.1–0.2 mg/kg IV. For ketamine light anaesthesia give 2–4 mg/kg IM. This takes 5–10 minutes to act and lasts for about 20 minutes.
- When giving any sedation, manage the child’s airway, beware of respiratory depression and monitor oxygen saturation with a pulse oximeter, where possible. Ensure you have a resuscitation bag available (and if possible oxygen).
ANNEXES
## ANNEX 1: NORMAL LABORATORY VALUES

<table>
<thead>
<tr>
<th>Normal values</th>
<th>Age</th>
<th>Normal value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin(gm/dl)</td>
<td>1 month</td>
<td>10.7-13.9</td>
</tr>
<tr>
<td></td>
<td>2 months</td>
<td>9.4-11.2</td>
</tr>
<tr>
<td></td>
<td>3-6 months</td>
<td>11.1-12.6</td>
</tr>
<tr>
<td></td>
<td>6 months to 2 years</td>
<td>10.5-12</td>
</tr>
<tr>
<td></td>
<td>2-6 years</td>
<td>11.5-12.5</td>
</tr>
<tr>
<td></td>
<td>6-12 years</td>
<td>11.5-13.5</td>
</tr>
<tr>
<td>Leukocyte count</td>
<td>1-3 day</td>
<td>9.4-34</td>
</tr>
<tr>
<td></td>
<td>2 week</td>
<td>5-20</td>
</tr>
<tr>
<td></td>
<td>1 mo</td>
<td>4-19.5</td>
</tr>
<tr>
<td></td>
<td>6 mo</td>
<td>6-17.5</td>
</tr>
<tr>
<td></td>
<td>6mo-2yr</td>
<td>6-17</td>
</tr>
<tr>
<td></td>
<td>2-6yr</td>
<td>5-15.5</td>
</tr>
<tr>
<td></td>
<td>6 yr-18yr</td>
<td>4.5-13.5</td>
</tr>
<tr>
<td>Differential</td>
<td>Neutrophils</td>
<td>54-62%</td>
</tr>
<tr>
<td></td>
<td>Lymphocytes</td>
<td>25-33%</td>
</tr>
<tr>
<td></td>
<td>Monocytes</td>
<td>3-7%</td>
</tr>
<tr>
<td></td>
<td>Eosinophils</td>
<td>1-3%</td>
</tr>
<tr>
<td></td>
<td>Basophils</td>
<td>0-0.75%</td>
</tr>
<tr>
<td>Calcium( total)</td>
<td>Preterm</td>
<td>6.2-11 mg/dl</td>
</tr>
<tr>
<td></td>
<td>Full term &lt; 10 days</td>
<td>7.6-10.4 mg/dl</td>
</tr>
<tr>
<td></td>
<td>10days-2mo</td>
<td>9-11 mg/dl</td>
</tr>
<tr>
<td></td>
<td>2-12yrs</td>
<td>8.8-10.8 mg/dl</td>
</tr>
<tr>
<td></td>
<td>Adult</td>
<td>8.6-10 mg/dl</td>
</tr>
<tr>
<td>Creatinine</td>
<td>Newborn</td>
<td>0.3-1 mg/dl</td>
</tr>
<tr>
<td></td>
<td>&lt;1 year</td>
<td>0.2-0.4 mg/dl</td>
</tr>
<tr>
<td></td>
<td>Child</td>
<td>0.3-0.7 mg/dl</td>
</tr>
<tr>
<td></td>
<td>Adolescent</td>
<td>0.5-1 mg/dl</td>
</tr>
<tr>
<td>ESR</td>
<td>Neonate</td>
<td>0-4 mm in 1st hour</td>
</tr>
<tr>
<td></td>
<td>Child</td>
<td>4-20 mm in 1st hour</td>
</tr>
<tr>
<td>Glucose</td>
<td>Neonate</td>
<td>&gt;45 mg/dl</td>
</tr>
<tr>
<td></td>
<td>Children</td>
<td>&gt;54 mg/dl</td>
</tr>
<tr>
<td>Sodium</td>
<td></td>
<td>135-135 meq/dl</td>
</tr>
<tr>
<td>Potassium</td>
<td></td>
<td>3.5-5.5 meq/dl</td>
</tr>
<tr>
<td>Platelet count</td>
<td></td>
<td>150000-400000 cells/mm³</td>
</tr>
<tr>
<td>Urea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCH(pg/cell)</td>
<td>0-30days</td>
<td>33-39</td>
</tr>
<tr>
<td></td>
<td>1-23 months</td>
<td>24-30</td>
</tr>
<tr>
<td></td>
<td>2-5 yrs</td>
<td>25-31</td>
</tr>
<tr>
<td>MCHC(gm Hb/ dl RBC)</td>
<td>32-36</td>
<td></td>
</tr>
<tr>
<td>MCV(fL/ RBC)</td>
<td>0-30days</td>
<td>99-115</td>
</tr>
<tr>
<td></td>
<td>1-23 months</td>
<td>72-88</td>
</tr>
<tr>
<td></td>
<td>2-5 yrs</td>
<td>76-90</td>
</tr>
<tr>
<td>CRP(mg/L)</td>
<td>0-3 months</td>
<td>0.8-15.8</td>
</tr>
<tr>
<td></td>
<td>3 months-3 years</td>
<td>0.8-11.2</td>
</tr>
<tr>
<td></td>
<td>3-5 years</td>
<td>0.6-7.9</td>
</tr>
</tbody>
</table>
ANNEX 2: MODIFIED BALLARD CHART

### Neuromuscular Maturity

<table>
<thead>
<tr>
<th>Score</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posture</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
</tr>
<tr>
<td>Square window (wrist)</td>
<td>&gt;90°</td>
<td>90°</td>
<td>60°</td>
<td>45°</td>
<td>30°</td>
<td>0°</td>
<td>![image]</td>
</tr>
<tr>
<td>Arm recoil</td>
<td>![image]</td>
<td>180°</td>
<td>140°–180°</td>
<td>110°–140°</td>
<td>90°–110°</td>
<td>&lt;90°</td>
<td>![image]</td>
</tr>
<tr>
<td>Popliteal angle</td>
<td>180°</td>
<td>160°</td>
<td>140°</td>
<td>120°</td>
<td>100°</td>
<td>90°</td>
<td>&lt;90°</td>
</tr>
<tr>
<td>Scarf sign</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
</tr>
<tr>
<td>Heel to ear</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
<td>![image]</td>
</tr>
</tbody>
</table>

### Physical Maturity

<table>
<thead>
<tr>
<th>Skin</th>
<th>Sticky, friable, transparent</th>
<th>Gelatinous, red, translucent</th>
<th>Smooth, pink; visible veins</th>
<th>Superficial peeling and/or rash; few veins</th>
<th>Cracking, pale areas; rare veins</th>
<th>Parchment, deep cracking; no vessels</th>
<th>Leathery, cracked wrinkled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lanugo</td>
<td>None</td>
<td>Sparse</td>
<td>Abundant</td>
<td>Thinning</td>
<td>Bald areas</td>
<td>Mostly bald</td>
<td>Maturity Rating</td>
</tr>
<tr>
<td>Plantar surface</td>
<td>Heel-toe 40-50 mm; 1-40 mm: -2</td>
<td>&gt;50 mm, no crease</td>
<td>Faint red marks</td>
<td>Anterior transverse crease only</td>
<td>Creases anterior 3/4</td>
<td>Creases over entire sole</td>
<td>Score</td>
</tr>
<tr>
<td>Breast</td>
<td>Imperceptible</td>
<td>Barely perceptible</td>
<td>Flat areola, no bud</td>
<td>Stippled areola, 1–2 mm bud</td>
<td>Raised areola, 3–4 mm bud</td>
<td>Full areola, 5–10 mm bud</td>
<td>15</td>
</tr>
<tr>
<td>Eye/Ear</td>
<td>Lids fused loosely: -2</td>
<td>Lids open; pinna flat; stays folded</td>
<td>Slightly curved pinna; soft; slow recoil</td>
<td>Well curved pinna; soft but ready recoil</td>
<td>Formed and firm, instant recoil</td>
<td>Thick cartilage, ear stiff</td>
<td>25</td>
</tr>
<tr>
<td>Genitals (male)</td>
<td>Scrotum flat, smooth</td>
<td>Scrotum empty, faint rugae</td>
<td>Testes in upper canal, rare rugae</td>
<td>Testes descending, few rugae</td>
<td>Testes down, good rugae</td>
<td>Testes pendulous, deep rugae</td>
<td>35</td>
</tr>
<tr>
<td>Genitals (female)</td>
<td>Clitoris prominent, labia flat</td>
<td>Clitoris prominent, small labia minora</td>
<td>Clitoris prominent, enlarging minora</td>
<td>Majora and minora equally prominent</td>
<td>Majora large, minora small</td>
<td>Majora cover clitoris and minora</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>
# ANNEX 3: DEVELOPMENTAL MILESTONES

<table>
<thead>
<tr>
<th>Age</th>
<th>Gross motor</th>
<th>Fine motor</th>
<th>Language</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>3month</td>
<td>Supports on forearm in prone</td>
<td>Holds hands open at rest</td>
<td>Cooing</td>
<td>Reaches for familiar objects</td>
</tr>
<tr>
<td>6 months</td>
<td>Sits with support</td>
<td>Unilateral reach, transfers object</td>
<td>Babbles</td>
<td>Stranger anxiety</td>
</tr>
<tr>
<td>9 months</td>
<td>Crawls, pull to stand</td>
<td>Immature pincer grasp</td>
<td>Says mama, dada indiscriminately</td>
<td>Exploring environment</td>
</tr>
<tr>
<td>12 months</td>
<td>Walks alone</td>
<td>Mature pincer grasp</td>
<td>2-4 words with meaning</td>
<td>Comes when called</td>
</tr>
<tr>
<td>2 years</td>
<td>Walks up and down steps without help</td>
<td>Imitates stroke with pencil</td>
<td>Uses two word sentences</td>
<td>Parallel play</td>
</tr>
<tr>
<td>3 years</td>
<td>Alternate feet when going up, Pedals tricycle</td>
<td>Copies circle</td>
<td>2 word sentences</td>
<td>Knows full name, age, gender</td>
</tr>
<tr>
<td>4 years</td>
<td>Hops, alternate feet while going down</td>
<td>Copies a square, catches ball</td>
<td>Knows colors, says song</td>
<td>Plays cooperatively with group of children</td>
</tr>
<tr>
<td>5 years</td>
<td>Jumps over low obstacle</td>
<td>Copies triangle</td>
<td>Writes first name</td>
<td>Likes to help in household task</td>
</tr>
</tbody>
</table>
# ANNEX 4: VITAL PARAMETERS

## Heart Rate

<table>
<thead>
<tr>
<th>Age</th>
<th>Normal Heart Rate (awake)</th>
<th>Normal Heart Rate (sleeping)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn to 3 months</td>
<td>85-205</td>
<td>80-160</td>
</tr>
<tr>
<td>3 months to 2 yrs</td>
<td>100-190</td>
<td>75-160</td>
</tr>
<tr>
<td>2 yrs to 10 yrs</td>
<td>60-140</td>
<td>60-90</td>
</tr>
<tr>
<td>&gt;10 yrs</td>
<td>60-100</td>
<td>50-90</td>
</tr>
</tbody>
</table>

## Respiratory Rate:

<table>
<thead>
<tr>
<th>Age</th>
<th>Normal Respiratory Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants (&lt; 1 y)</td>
<td>30-53</td>
</tr>
<tr>
<td>Toddler (1-2 y)</td>
<td>22-37</td>
</tr>
<tr>
<td>Preschooler (3-5 y)</td>
<td>20-28</td>
</tr>
<tr>
<td>School-age (6-11 y)</td>
<td>18-25</td>
</tr>
<tr>
<td>Adolescent (12-15 y)</td>
<td>12-20</td>
</tr>
</tbody>
</table>

## Blood Pressure

<table>
<thead>
<tr>
<th>Age</th>
<th>Systolic Pressure</th>
<th>Diastolic Pressure</th>
<th>Systolic Hypotension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth (12 h, &lt;1000 g)</td>
<td>39-59</td>
<td>16-36</td>
<td>&lt; 40-50</td>
</tr>
<tr>
<td>Birth (12 h, 3 kg)</td>
<td>60-76</td>
<td>31-45</td>
<td>&lt; 50</td>
</tr>
<tr>
<td>Neonate (96 h)</td>
<td>67-84</td>
<td>35-53</td>
<td>&lt; 60</td>
</tr>
<tr>
<td>Infant (1-12 mo)</td>
<td>72-104</td>
<td>37-56</td>
<td>&lt; 70</td>
</tr>
<tr>
<td>Toddler (1-2 y)</td>
<td>86-106</td>
<td>42-63</td>
<td>&lt; 70 + (age in years x 2)</td>
</tr>
<tr>
<td>Preschooler (3-5 y)</td>
<td>89-112</td>
<td>46-72</td>
<td>&lt; 70 + (age in years x 2)</td>
</tr>
<tr>
<td>School age (6-9 y)</td>
<td>97-115</td>
<td>57-76</td>
<td>&lt; 70 + (age in years x 2)</td>
</tr>
<tr>
<td>Preadolescent (10-11 y)</td>
<td>102-120</td>
<td>61-80</td>
<td>&lt; 90</td>
</tr>
<tr>
<td>Adolescent (12-15 y)</td>
<td>110-131</td>
<td>64-83</td>
<td>&lt; 90</td>
</tr>
</tbody>
</table>
**Temperature**

**Normal Temperature Range by Method**


<table>
<thead>
<tr>
<th>Method</th>
<th>Normal Range (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectal</td>
<td>36.6-38</td>
</tr>
<tr>
<td>Ear</td>
<td>35.8-38</td>
</tr>
<tr>
<td>Oral</td>
<td>35.5-37.5</td>
</tr>
<tr>
<td>Axillary</td>
<td>36.5-37.5</td>
</tr>
</tbody>
</table>
ANNEX 5: APPROPRIATE SIZES OF PEDIATRIC EQUIPMENT ACCORDING TO AGE (WEIGHT) OF CHILD

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Preterm</th>
<th>0-5 mth (3-6 kg)</th>
<th>6-12 months (4-9 kg)</th>
<th>1-3 years (10-15 kg)</th>
<th>4-7 years (16-20 kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suction catheter(Fr)</td>
<td>5</td>
<td>6-10</td>
<td>8-10</td>
<td>8-10</td>
<td>10</td>
</tr>
<tr>
<td>IV cannula(gauze)</td>
<td>24</td>
<td>22-24</td>
<td>20-24</td>
<td>18-22</td>
<td>18-20</td>
</tr>
<tr>
<td>Nasogastric tube(Fr)</td>
<td>5</td>
<td>5-8</td>
<td>8-10</td>
<td>10</td>
<td>10-12</td>
</tr>
<tr>
<td>Urinary catheter</td>
<td>5 Feeding tube</td>
<td>5 feedingtube</td>
<td>5 feeding tube/F8</td>
<td>Foley 8</td>
<td>Foley 10</td>
</tr>
<tr>
<td>Chest tube(fr)</td>
<td>8-10</td>
<td>12-16</td>
<td>16</td>
<td>16</td>
<td>16-20</td>
</tr>
</tbody>
</table>

Sizes in French gauge or Charriere, which are equivalent and indicate the circumference of the tube in millimeters.
ANNEX 6 : GROWTH CHART
ANNEX 7: FEEDING RECOMMENDATION DURING SICKNESS AND HEALTH IN NEPAL

<table>
<thead>
<tr>
<th>Upto 6 months of age</th>
<th>6 months up to 12 months</th>
<th>12 months up to 2 years</th>
<th>2 years and older</th>
</tr>
</thead>
</table>

* A good quality diet should be adequate in quantity and include an energy-rich foods (for example thick cereal with added oil; meat, fish, eggs or pulses; and fruits and vegetables)

- Breastfeed as often as the child wants, day and night, at least 8 times in 24 hours
- Do not give other foods and fluids
- Breastfeed at least for 15 minutes everytime
- Breastfeed as often as the child wants, day and night, at least 8 times 24 hours
- Give adequate serving of Rice and Daal, Jaulo, Haluwa, Sugar and wheat bread with milk, Khichadi, Lito, fresh fruits like papaya, mango and banana
- Give 3 times per day if breastfed with snacks
- Give one more serving of snacks per day to 9-11 months old child
- Give five times per day if not breastfed
- Breastfeed as often as the child wants
- Give adequate serving of Rice and Daal, Jaulo, Haluwa, Sugar and wheat bread with milk, Khichadi, Lito, fresh fruits like papaya, mango and banana
- Give family food three times in a day, in addition to that give additional nutritious food between the meals such as, Cheura, Ghee or Oil with wheat bread, roasted Maize and soyabean (Bhuteko Makai- Bhatmas) and beans etc.
Key feeding problems and possible solution.

<table>
<thead>
<tr>
<th>Feeding Practices</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complementary Feed started too early (&lt;6 months of age)</td>
<td>• Build mother’s confidence that she can produce all the breast milk that the child needs</td>
</tr>
<tr>
<td></td>
<td>• Suggest giving more frequent, longer breastfeeds day or night, and gradually reducing other milk or foods</td>
</tr>
<tr>
<td>Complementary Feed is Delayed</td>
<td>• Offer small amounts of soft mashed cereals, pulses, vegetables and fruits</td>
</tr>
<tr>
<td></td>
<td>• Try one new food at a time for 2-3 days</td>
</tr>
<tr>
<td></td>
<td>• If a child refuses a particular food, try again after a week</td>
</tr>
<tr>
<td>Complementary feeds that are introduced are too thin or lack variety</td>
<td>• Offer mashed soft foods and gradually increase the consistency (thicker) as the child gets older</td>
</tr>
<tr>
<td></td>
<td>• Offer chopped fine family foods to 10-12 months old children</td>
</tr>
<tr>
<td></td>
<td>• Offer locally available variety of foods such as cereals, pulses, seasonal vegetables, green leafy vegetables and fruits</td>
</tr>
<tr>
<td></td>
<td>• Add 1 teaspoon of cooking oil to the food</td>
</tr>
</tbody>
</table>
# ANNEX 8: TB IN CHILDREN

## Categories and treatment of TB

<table>
<thead>
<tr>
<th>Patient</th>
<th>TB cases</th>
<th>Regimen</th>
</tr>
</thead>
</table>
| **New cases** | New pulmonary TB cases  
New extrapulmonary TB cases | **Intensive phase**  
2( HRZE)  
**Continuation phase**  
4(HR) |
| **Treatment of severe forms of complicated extrapulmonary TB cases:**  
CNS TB  
TB pericarditis  
Miliary TB  
Musculo-skeletal TB  
Other forms of extrapulmonary TB | 2( HRZE)  
10(HRE) |
| **Retreatment cases (for all who requires retreatment for TB and Drug sensitivity test need to be performed)** | Susceptible to first line drugs( HRE) | 3( HRZE)  
5( HRE) |

In case of resistance drug resistance diagnostic and treatment protocol

- Drug resistance cases
  - Follow drug resistance management

* Use of streptomycin:

Streptomycin can still be used when other drugs have to be replace because of toxicity of first line drugs

When treatment failure is in doubt, drug resistant TB should be considered and worked upon

For children with osteoarticular Tb, treatment may be extended up to 12 months based on clinical judgement

## Doses of drugs

<table>
<thead>
<tr>
<th>Drug</th>
<th>Daily dose( range) in mg/kg</th>
<th>Maximum dose in mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoniazid(H)</td>
<td>10(7-15)</td>
<td>300</td>
</tr>
<tr>
<td>Rigampcin(R)</td>
<td>15(10-20)</td>
<td>600</td>
</tr>
<tr>
<td>Pyrazinamide(Z)</td>
<td>35(30-40)</td>
<td>2000</td>
</tr>
<tr>
<td>Ethambutol(E)</td>
<td>20(15-25)</td>
<td>1200</td>
</tr>
</tbody>
</table>

## Indication of steroid

- **TB meningitis**
- TB pericarditis ( reduces the risk of restrictive pericarditis)

Dose: 2-4 mg/ kg/day for 4 weeks, then tapered over 1- 2 weeks
ANNEX 9: MANAGEMENT OF HIV EXPOSED BABIES

<table>
<thead>
<tr>
<th>Age</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>At birth</td>
<td>Sample collection for DNA PCR Testing</td>
</tr>
<tr>
<td></td>
<td>Start ARV Prophylaxis (categorize baby as high or low risk)</td>
</tr>
<tr>
<td></td>
<td>• Low Risk Babies*- Syr NVP or AZT for 6 weeks</td>
</tr>
<tr>
<td></td>
<td>• High Risk Babies** - Syr. NVP and AZT for 12 weeks</td>
</tr>
<tr>
<td></td>
<td>Counseling for Breastfeeding</td>
</tr>
<tr>
<td>At 6 weeks</td>
<td>Sample collection for DNA PCR Testing if negative at birth</td>
</tr>
<tr>
<td></td>
<td>ARV Prophylaxis</td>
</tr>
<tr>
<td></td>
<td>• STOP if child falls in low risk stop</td>
</tr>
<tr>
<td></td>
<td>• CONTINUE until 12 weeks if child is high risk</td>
</tr>
<tr>
<td></td>
<td>Start Cotrimoxazole Prophylaxis</td>
</tr>
<tr>
<td></td>
<td>Counseling for Breastfeeding</td>
</tr>
</tbody>
</table>

Note:

- Vaccination schedule to follow as for other children and in addition to all vaccines additional measles vaccine at age of 6 months is recommended
- Exclusive breast feeding for 6 months and add complimentary food after 6 months with breastfeeding
- All child should be recommended for confirmatory HIV testing after 3 months of stopping breastfeeding
- If DNA PCR test is positive, ARV prophylaxis to stop and ART to start at earliest

*Low risk Babies - babies whose mother was on ART and Viral load is suppressed (<1000 copies per ml) at 36 weeks of pregnancy
** High risk Babies – babies whose mother was on ART for less than 8 weeks, mother diagnosed during labour, delivery and even during breast feeding and VL is not suppressed (>1000 copies per ml)

ARV Prophylaxis for Low risk Babies from Birth to Six weeks (NVP or AZT)

<table>
<thead>
<tr>
<th>Infant weight</th>
<th>Daily Dose of ARV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight 2000 to 2499 g*</td>
<td>NVP 10 mg once daily Or AZT 10 mg twice daily</td>
</tr>
<tr>
<td>Birth weight &gt;2500g</td>
<td>NVP 15 mg once daily Or AZT 15 mg twice daily</td>
</tr>
</tbody>
</table>

ARV Prophylaxis for High risk Babies (NVP and AZT)

<table>
<thead>
<tr>
<th>Infant weight</th>
<th>Daily Dose of NVP</th>
<th>Daily Dose of AZT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth to Six weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth weight less than 2000g</td>
<td>2mg/kg once daily</td>
<td>4mg/kg twice daily</td>
</tr>
<tr>
<td>Birth weight 2000 to 2499 g*</td>
<td>10 mg once daily</td>
<td>10 mg twice daily</td>
</tr>
<tr>
<td>Birth weight &gt;2500g</td>
<td>15 mg once daily</td>
<td>15 mg twice daily</td>
</tr>
<tr>
<td>Six to 12 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 mg once daily</td>
<td>60 mg twice daily</td>
<td></td>
</tr>
</tbody>
</table>
ANNEX 10: MALARIA

Management of severe and complicated malaria cases

1. Maintain airway, breathing and circulation
2. Treat hypoglycaemia:
3. Treat convulsions
4. Treat for meningitis if suspicious
5. Manage fever
6. Provide intravenous fluid
7. Specific antimalarial treatment:
<table>
<thead>
<tr>
<th>Drug</th>
<th>Available as</th>
<th>Dose</th>
<th>Followed by (after gain of consciousness)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artesunate</td>
<td>Intravenous</td>
<td>Ampoules with 60 mg of anhydrous artesunaic acid with separate ampoule of 5% sodium bicarbonate solution</td>
<td>2.4 mg/kg stat then after 12 h and then once a daily until consciousness</td>
<td>Oral ACT (6 doses over 3 days in 12 hrs interval) with single dose of Primaquine 0.75 mg/kg</td>
</tr>
<tr>
<td>Artemether</td>
<td>Intramuscular</td>
<td></td>
<td>3.2 mg/kg stat then 1.6 mg/kg body weight per day</td>
<td>Oral ACT (6 doses over 3 days in 12 hrs interval) with single dose of Primaquine 0.75 mg/kg</td>
</tr>
<tr>
<td>Quinine</td>
<td>Intravenous</td>
<td>Inj- 2ml contains 600 mg of quinine hydrochloride Tab- 300mg of quinine sulphate</td>
<td>20 mg/kg stat followed by 10 mg/kg every 8 hourly with infusion rate 5 mg/kg/hr</td>
<td>Oral quinine for 7 days with single dose of primaquine 0.75 mg/kg</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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<tr>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Quinine Intramuscular</strong></td>
<td>Dilute in normal saline to 100 mg/ml and divide portion into two equal parts and administer in anterior thighs</td>
<td>If IV infusion no possible</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# ANNEX 11: MANAGEMENT OF DENGUE

## Group A
- Able to tolerate adequate volumes of oral fluids
- Passes urine at least once every 6 hours
- Do not have warning signs particularly when fever subsides

### Fluid intake
- Encourage oral intake of ORS, fruit juice and other fluids containing electrolytes and sugar to replace losses from fever and vomiting

### Manage fever
- Avoid aspirin and ibuprofen

### Monitoring
- Temperature pattern, volume of fluid intake and losses, urine output, warning signs, signs of plasma leakage and bleeding, hematocrit and white blood cell and platelet counts daily

### Follow up immediately if
- No clinical improvement
- Deterioration around the time of defervescence
- Severe abdominal pain
- Persistent vomiting
- Cold and clammy extremities
- Lethargy or irritability/ restlessness
- Bleeding like black tarry stools or coffee-ground vomiting
- Not passing urine for more than 4-6 hours

## Group B
- With warning signs
- With co-existing conditions that may make dengue or its management more complicated like pregnancy, infancy, old age, obesity, diabetes mellitus, renal failure, chronic

### Manage as per algorithm given below
- Encourage oral fluids.
- If not tolerated, start intravenous fluid therapy of 0.9% saline or Ringer’s lactate with or without dextrose at maintenance rate.
- For obese and overweight patients, use the ideal body weight for calculation of fluid infusion. Patients may be able to take oral fluids after a few hours of intravenous fluid therapy. Thus, it is necessary to revise the fluid infusion frequently. Give the minimum volume required to maintain
<table>
<thead>
<tr>
<th>Group C</th>
<th>Patients with severe dengue</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Patient need hospital with access with intensive care facilities and blood transfusion.</td>
</tr>
<tr>
<td></td>
<td>• Patient with compensated (normal systolic pressure but has signs of reduced perfusion) shock should be given NS or RL at 5-10 ml/kg over 1 hour and referred with fluid continued as for dengue with warning signs</td>
</tr>
<tr>
<td></td>
<td>• Patient with hypotensive shock should be given NS or RL 20 ml/kg over 15 mins and refer to higher centre with fluid management as for compensated shock.</td>
</tr>
</tbody>
</table>

haemolytic disease

- With certain social circumstances like living alone, living far from health facility without reliable means of transport

- Good perfusion and urine output. Intravenous fluids are usually needed only for 24–48 hours.
  - Monitor temperature pattern, volume of fluid intake and losses, urine output (volume and frequency), warning signs, haematocrit, and white blood cell and platelet counts daily. Other laboratory tests (such as liver and renal functions tests) can be done, depending on the clinical picture and the facilities of the hospital or health centre.

**Treatment of hemorrhagic complications in non severe dengue**

In stable patient, mucosal bleed is considered minor. Thrombocytopenia in stable patients ensure strict bed rest, protect from trauma and avoid IM injections. No role of platelet transfusion. So do not refer these patients.
MANAGEMENT OF DENGUE WITH WARNING SIGNS

Obtain reference Hct and blood group

NS or RL
5-7 ml/kg/hr for 1-2 hours

NS or RL 3-5 ml/kg/hr for 2-4 hours

NS or RL 2-3 ml/kg/hr

Reassess clinical status
Repeat Hct

Clinically stable
Hct same or rises minimally

Clinically worse
Hct rising rapidly

Increase rate to 5-10 ml/kg/hr for 1-2 hours

Reassess clinical status and hematocrit

Adjust fluid to maintain good perfusion and urine output of about 0.5 ml/kg/hr

Continue fluid @ 2-3 ml/kg/hr
ANNEX 12: KALAZAR

The national program recommends the use of the following drugs for Kala-azar treatment:

1. First line therapy-
   Liposomal amphotericin B infusion (5 mg/kg/dose once a day for 3 days or single dose of 10 mg/Kg). OR
   Combination therapy regimens (i) Miltefosine (D1-10) + Paromomycin (D1-10) and (ii) L-AmB (5mg/Kg on D1) + Paromomycin (D2-D11).
   In children (< 5 years), pregnant and breast feeding women and women of child bearing age group, the preferred regimens will be L-AmB or combination of L-AmB + Paromomycin.

2. Second line therapy
   Miltefosine
   >11 years and more than 25 Kg body weight- 50mg twice daily for 28 days for adults
   > 11 years and less than 25 Kg body weight- 50mg daily for 28 days for adults
   Children (2-11 years age) -2.5 mg/kg body weight 10 mg formulation in divided doses for 28 days.
   OR
   Amphotericin B at a dose of 0.75-1 mg/kg daily dose as a daily IV infusion in 5% dextrose over 4 hours for 14 days. If there is poor response to the treatment, the drug has to be continued for a period of 21-28 days. Total cumulative dose of 14-28 days
### ANNEX 13. ROLE PLAY FOR EFFECTIVE COMMUNICATION SKILLS

<table>
<thead>
<tr>
<th>No.</th>
<th>GOOD COMMUNICATION SKILLS</th>
<th>Date:</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shows respect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Does not become judgmental</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Speaking clearly using understandable words</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Listens actively</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Uses good body language</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Encourages mother to voice her concerns and asks questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Respects mother’s right to make decisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Listens to what the mother has to say</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ANNEX 14. CHECKLIST FOR COUNSELING

<table>
<thead>
<tr>
<th>No.</th>
<th>COUNSELLING</th>
<th>Date:</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduces self</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Tells the reason for admission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tells about the initial diagnosis at the time of admission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Outlines the management plans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Tells about the prognosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Tells about the daily progression if not admitted the same day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Tells about the changing clinical course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Tells about the adverse event</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Information and consent regarding any intervention procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Reason for referral and care during transport in case of referral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Follow up information in case of discharge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>COUNSELLING</td>
<td>Date:</td>
<td>Rating</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td>1.</td>
<td>Remove jewellery (rings, bracelets) and watches before washing hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ensure that the nails are clipped short</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Roll the sleeves up to the elbow.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Wet the hands and wrists, keeping hands and wrists lower than the elbows</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(permit the water to flow to the fingertips, avoiding arm contamination).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Apply soap and lather thoroughly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Palms and fingers and web spaces by putting right palm over the left and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>then left over the right</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Palm to palm and finger interlaced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Back of the finger to opposing finger over-locked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Rotational rubbing of right thumb clasped in left palm and vice versa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Wash wrist and forearm up to elbow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Do not lower hand i.e. keep hand folded at elbow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Close tap with elbow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Dry hand using sterile cloth / or dry hand in air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Hand rinsing with alcohol is not a substitute for proper hand washing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>If running water is not available, use a bucket and pitcher.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Do not dip your hands into a bowl to rinse, as this re-contaminates them.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# ANNEX 16: CHECKLIST FOR STEPS OF WEARING STERILE GLOVES

<table>
<thead>
<tr>
<th>No.</th>
<th>COUNSELLING</th>
<th>Date:</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Scrub hands thoroughly with soap and water. Dry them completely</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Open the glove packet carefully without touching the gloves or the inside surface of the packaging material (The cuffed gloves should be with the palms up)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Pick up the first glove by the cuff, touching only the inside portion of the cuff (the inside is the side that will be touching your skin when the glove is on).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>While holding the cuff, slip your other hand into the glove (Pointing the fingers of the glove toward the floor will keep the fingers open). Be careful not to touch anything, and hold the gloves above your waist level.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Pick up second glove by sliding fingers of the gloved hand under the cuff of the second glove. Be careful not to contaminate gloved hand with ungloved hand as the second glove is being put on</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Put second glove on ungloved hand by maintaining a steady pull through the cuff Roll back cuffs (unfold them). Adjust the glove fingers until the gloves fit comfortably</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Once sterile gloves are on, hold your hands up and away from your body and always above your waist.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>After a procedure, rinse gloves in chlorine solution while still on hands, including disposables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>After the procedure, always wash gloved hands to remove the blood stains and secretions and rinse gloves in chlorine solution while still on hands, including disposables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Turn gloves inside out as you take them off and put into 0.5% chlorine solution Wash hands again with soap and water</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### ANNEX 17: CHECKLIST FOR EFFECTIVE BAG AND MASK VENTILATION

<table>
<thead>
<tr>
<th>No.</th>
<th>VENTILATE WITH BAG AND MASK (MANNEQUIN)</th>
<th>Y</th>
<th>¥</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Looks, listens and feels if child is breathing adequately or not</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Checks the bag and valve by closing the patient connection with his/her thumb and attempts to expel air from the bag</td>
<td></td>
<td>¥</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attaches the reservoir and oxygen tubing to the bag</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Chooses the correct size of mask which covers the mouth and nose without covering the eyes or overlapping the chin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Holds the mask over the child’s face in E-C technique</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Presses the bag and watches for just visible chest rise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>If the baby’s chest is not rising-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reapplies the mask and repositions the head</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Suctions the throat and keeps mouth slightly open</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Increases the pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Verbalises the need of alternative airway like intubation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bags few breaths after each corrective step</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Gives 1 breath every 3 to 5 seconds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Looks for visible chest rise in each breath that is given</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Reassess for pulse and breathing every 2 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ANNEX 18: CHECKLIST FOR CHEST COMPRESSION

<table>
<thead>
<tr>
<th>No.</th>
<th>CHEST COMPRESSION(MANNEQUIN)</th>
<th>Y</th>
<th>¥</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Verbalises indication of chest compression</td>
<td></td>
<td>¥</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- No detectable pulse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Heart rate less than 60/min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Calls another person for help</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Child is kept supine on hard- flat surface</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stands at the infant’s feet or side</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Localises the site of chest compression</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Compresses at the depth of atleast 1/3 AP diameter of the chest, about 4 cm in infants and 5 cm in children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Allow complete chest recoil after each compression</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Minimizes interruptions in chest compressions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Ratio of chest compressions to ventilation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 15:2 if two rescuers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 30:2 if single rescuer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Rate at least 100/min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Reassess for pulse every 2 minutes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### ANNEX 19: CHECKLIST FOR INSERTION OF INTRAVENOUS CANNULA

<table>
<thead>
<tr>
<th>No.</th>
<th>INTRAVENOUS INDWELLING CANNULATION (MANNEQUIN)</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>1.</td>
<td>Keeps all equipments ready</td>
<td>¥</td>
</tr>
<tr>
<td></td>
<td>Antiseptic wipes- spirit, iodine, alcohol solution</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Intravenous cannula of appropriate size</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intravenous flush- Normal saline or distilled water</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tape and splint to fix the cannula</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Identifies accessible peripheral vein. In children fourth interdigital vein on the dorsum of hand, cephalic vein in antecubital fossa, saphenous vein just infront of medial malleolus</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Takes aseptic precautions- Hand washing, wear gloves, clean site with antiseptic wipes- alcohol, iodine, alcohol</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Asks an assistant to keep the position of limb steady and act as a tourniquet to dilate the veins.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Traction the skin distal to vein to stabilise the vein.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Inserts the cannula initially at 5-30 degree and watch for blood flow in the catheter chamber.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Advances the plastic part of cannula further</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If cannot advance, flushes the cannula with normal saline</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Remove the metal needle.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Flushes the cannula for confirmation</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Secures the cannula with tape.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Watches for complications like swelling, redness, blockade- cannula should be removed</td>
<td></td>
</tr>
</tbody>
</table>

### ANNEX 20: CHECKLIST FOR INTRAMUSCULAR INJECTION

<table>
<thead>
<tr>
<th>No.</th>
<th>INTRAMUSCULAR INJECTION (MANNEQUIN)</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>1.</td>
<td>Locate the injection site</td>
<td>¥</td>
</tr>
<tr>
<td></td>
<td>• Children &lt; 2 years/ severely malnourished children- Anterolateral upper thigh</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>• Children &gt;2 years outer aspect of upper arm</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Clean skin with alcohol</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Pinch muscle with free hand and insert 23 or 25 gauge, 1 inch needle until the hub is flush with the skin surface</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Insert the needle at 45 degrees in anterolateral thigh and 90 degrees in outer aspect of forearm.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Aspirate for blood if absent then inject medication and if present withdraw and aspirate for blood</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Remove the needle and press firmly over the site with a dry swab.</td>
<td></td>
</tr>
</tbody>
</table>
## ANNEX 21: CHECKLIST FOR ESTABLISHING AN INTRAOSSEOUS ACCESS

<table>
<thead>
<tr>
<th>No.</th>
<th>INTRAOSSEOUS ACCESS (MANNEQUIN)</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Keeps all equipments ready&lt;br&gt;Antiseptic wipes- spirit, iodine, alcohol solution&lt;br&gt;Intraosseous needle or bone marrow aspiration needle or wide bore (22 or 20 G) cannula&lt;br&gt;Normal saline or distilled water flush filled in 10 ml syringe&lt;br&gt;Tape and splint to fix the cannula</td>
<td>Y Y NA</td>
</tr>
<tr>
<td>2.</td>
<td>Identifies the insertion site&lt;br&gt;(proximal end of tibia 1 cm below and 1 cm medial to the tibial tuberosity or distal end of femur 2 cm above the lateral condyle).</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Takes aseptic precautions- Hand washing, wear gloves&lt;br&gt;Prepare the skin over the insertion site using a swab or cotton-wool ball soaked in antiseptic solution, and allow it to dry.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Position the baby’s leg with the knee bent about 30 degrees and resting on the table.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Support the upper tibia with one hand, placed so that the hand is not directly behind the site of insertion.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Hold the needle (with the attached syringe if using a hypodermic needle) in the other hand at a 900 angle to the selected insertion site, angled slightly towards the foot.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Once the needle is properly positioned, remove the stylet (if a bone marrow or intraosseous needle was used) and attach the syringe.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Aspirate using the syringe to confirm that the needle is correctly positioned. The aspirate should look like blood</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Slowly inject 3ml of I/V fluid to check for proper placement of needle. Look for swelling (indicating leaking of fluid under the skin) at the front of the leg or in the calf muscle at the back of the leg. If swelling is seen, remove the needle and try again.</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Inspect the infusion site every hour. Remove the intraosseous needle as soon as alternative I/V access is available, and within 8 hrs, if possible.</td>
<td></td>
</tr>
</tbody>
</table>
### ANNEX 22: CHECKLIST FOR URINARY BLADDER CATHETERISATION

<table>
<thead>
<tr>
<th>No.</th>
<th>URINARY BLADDER CATHETERIZATION</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Confirms child has not voided within one hour of procedure</td>
<td>Y</td>
</tr>
<tr>
<td>2</td>
<td>Keeps all the equipments ready</td>
<td>¥</td>
</tr>
<tr>
<td></td>
<td>Sterile gloves</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Nasogastric tube/ Foley’s catheter</td>
<td>¥</td>
</tr>
<tr>
<td></td>
<td>Antiseptic wipes- Savlon or betadine</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Lubricating jelly</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Container for collecting samples</td>
<td>NA</td>
</tr>
<tr>
<td>3</td>
<td>Wears sterile gloves</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>Prepares the urethral opening by cleaning with betadine or savlon solution</td>
<td>¥</td>
</tr>
<tr>
<td>5</td>
<td>In boys applies gentle traction to the penis to straighten the urethra. In girls identifies urethral opening just anterior to the vaginal orifice.</td>
<td>NA</td>
</tr>
</tbody>
</table>

### ANNEX 23: CHECKLIST FOR MAKING AND ADMINISTERING DOPAMINE

<table>
<thead>
<tr>
<th>No.</th>
<th>MAKING AND ADMINISTERING DOPAMINE(SKILL STATION)</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Makes all equipments ready</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>- Centrally placed large bore cannulae</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>- Burette set</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>- Normal saline or 5% Dextrose</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>- Inj. Dopamine (200mg/5ml)</td>
<td>Y</td>
</tr>
<tr>
<td>2</td>
<td>Calculate the IV infusion dose by using the formula</td>
<td>¥</td>
</tr>
<tr>
<td></td>
<td>Amount of drug to be given in mg in 50 ml NS or 5% Dextrose</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>[ \text{ml/hr} = \frac{3 \times \text{wt} \times \text{ugm/kg/min}}{120} ]</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>For Eg- To give Dopamine at 10 ugm/kg/min in a 20 kg child at 12 ml/hr</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>[ 3 \times 20 \times 10 \div 12 = 50 \text{ mg (50/40)= 1.25 ml} \text{ Dopamine in 50 ml fluid @ 12ml/hr or 12 drops per minute} ]</td>
<td>NA</td>
</tr>
<tr>
<td>3</td>
<td>Gives Dopamine via Burette set by adjusting drops per minute equal to ml/hr</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>Avoids interruptions during infusion</td>
<td>¥</td>
</tr>
<tr>
<td>5</td>
<td>Labels the burette set providing the information about the</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>- amount of dopamine added</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>-the type and amount of diluents used</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>- the infusion rate</td>
<td>NA</td>
</tr>
<tr>
<td>6</td>
<td>Checks for extravasations</td>
<td>Y</td>
</tr>
<tr>
<td>7</td>
<td>Reassesses child’s Pulse rate, volume, CRT, blood pressure every 15 minutes till it normalises then every 2 hourly. Adjust dose according to vitals</td>
<td>¥</td>
</tr>
<tr>
<td>8</td>
<td>To increase the dose increase the rate of infusion</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>For example in above case to give 15 ugm/kg/min increase the rate by 1.5 and to give 20 ugm/kg/min increase the rate by two times</td>
<td>Y</td>
</tr>
</tbody>
</table>
### ANNEX 24: CHECKLIST FOR BLOOD TRANSFUSION

<table>
<thead>
<tr>
<th>No.</th>
<th>GIVING BLOOD TRANSFUSION</th>
<th>Y</th>
<th>¥</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Checks if the blood is of the correct group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Checks if the patient’s name and number are on both the label and the form</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Checks if the blood transfusion bag has no leaks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Checks if the plasma is not pink or has large clots and the red cells do not look purple or black</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Prior to transfusion, makes baseline recordings of the child’s temperature, respiratory rate and pulse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Thaws the blood to room temperature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Monitors the rate of blood flow during the transfusion by counting the drop rate/min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Looks for signs of transfusion reactions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Records the child’s temperature, pulse and respiratory rate every 30 min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Records the time the transfusion was started and ended, the volume of blood transfused and any reactions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Looks for signs of fluid overload like hepatomegaly and basal crepts in between and at the end of transfusion and if present, inj. Furosemide is given</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Reassess the baby after transfusion for the need of repeat transfusion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>NASOGASTRIC TUBE INSERTION (MANNEQUIN)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Makes all equipments ready</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Nasogastric tube of appropriate size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- &lt;2yrs- 8-10 Fr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 2-5 yrs- 10-12 Fr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Gloves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Lubricating agent/ Plain water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Syringe- 10 ml</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Tape for fixation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Stethoscope</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Places the patient on his or her back with the head slightly raised</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Prepares tape for fixation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Wears gloves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Measures the length of tube to be inserted - Measure from nostrils to tragus and from tragus to a point in between xiphsternum and umbilicus and add the length.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Moisten the tube with lubricant or plain water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Passes the tube through the nostrils. Gently advances till the tip is in the back of throat. The tube is advanced slowly as the patient swallows</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Pulls back the tube if the patient chokes, coughs repeatedly or has trouble breathing. Waits for a minute and tries to reinsert again</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Advances till the appropriate distance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Checks in the mouth of patient to see if the tube is not coiled in the back of throat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Confirms placement of tube by attaching a syringe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Withdrawing a little stomach fluid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Injecting air into tube and listening for air entering the stomach by placing stethoscope just above the navel.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Fixes the NG tube</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>At each feed confirms non-displacement of tube by the above method</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**ANNEX 25: CHECKLIST FOR PUTTING NG TUBE**
## ANNEX 26: CHECKLIST OF BASIC LIFE SUPPORT

<table>
<thead>
<tr>
<th>No.</th>
<th>BASIC LIFE SUPPORT (MANNEQUIN)</th>
<th>Date:</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>1</td>
<td>Ensures safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Check if baby is unresponsive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Shouts for help</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Asks for defibrillator if available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Opens airway using chin lift and head tilt, jaw thrust if risk of cervical spine injury</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Looks, listens and feels for breathing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Identifies not breathing or only gasping</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Checks pulse within 10 seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Identifies no definite pulse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>One rescuer - 30 chest compressions and 2 breaths</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Two rescuers- 15 chest compressions and 2 breaths</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Reasses for pulse and breathing every 2 mins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>If pulse &lt;60/min or no pulse- Continue CPR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If pulse &gt; 60/min- Checks for respiration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>If not breathing or gasping- Continue BMV with oxygen with 1 breath every 3 sec. Reassess every 2 mins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>If spontaneous breathing- Put in recovery position, give oxygen and continue further assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Follow these steps for keeping the child in recovery position</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Kneel beside the victim and make sure that both his legs are straight.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Place the arm nearest to you out at right angles to his body, elbow bent with the hand palm-up.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Bring the far arm across the chest, and hold the back of the hand against the victim’s cheek nearest to you.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. With your other hand, grasp the far leg just above the knee and pull it up, keeping the foot on the ground.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. Keeping his hand pressed against his cheek, pull on the far leg to roll the victim towards you on to his side.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>f. Adjust the upper leg so that both the hip and knee are bent at right angles.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>g. Tilt the head back to make sure that the airway remains open.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>h. If necessary, adjust the hand under the cheek to keep the head tilted and facing downwards to allow liquid material to drain from the mouth.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>i. Check breathing regularly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>j. If the victim has to be kept in the recovery position for more than 30 minutes turn him to the opposite side to relieve the pressure on the lower arm.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ANNEX 27: CHECKLIST OF ETAT CASE RECORDING FORM

<table>
<thead>
<tr>
<th>ASSESS (circle all signs present)</th>
<th>EMERGENCY TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check for head/neck trauma before treating child – do not move neck if cervical spine injury possible.</td>
<td></td>
</tr>
</tbody>
</table>

**EMERGENCY SIGNS:** (If any sign positive: give treatment(s), call for help, draw blood for emergency laboratory investigations (glucose, malaria smear, Hb)

<table>
<thead>
<tr>
<th>AIRWAY AND BREATHING</th>
<th>CIRCULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Not breathing or gasping or</td>
<td>• Capillary refill longer than 3 seconds, and</td>
</tr>
<tr>
<td>• Central cyanosis or</td>
<td>• Weak and fast pulse</td>
</tr>
<tr>
<td>• Severe respiratory distress (Respiratory rate ≥ 70/min, Severe lower chest in-drawing, Grunting, Head nodding, Apnoic spells, Unable to feed due to respiratory distress, Stridor in a clam child)</td>
<td></td>
</tr>
<tr>
<td>IF POSITIVE Check for severe acute malnutrition</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMA CONVULSING</th>
<th>SEVERE DEHYDRATION (ONLY IN CHILD WITH DIARRHOEA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Coma (AVPU) or</td>
<td>Diarrhoea plus any two of these:</td>
</tr>
<tr>
<td>• Convulsing (now)</td>
<td>• Lethargy</td>
</tr>
<tr>
<td></td>
<td>• Sunken eyes</td>
</tr>
<tr>
<td></td>
<td>• Very slow skin pinch</td>
</tr>
<tr>
<td>If two signs positive check for severe acute malnutrition</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRIORITY SIGNS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tiny baby (&lt;2 months)</td>
<td></td>
</tr>
<tr>
<td>• Respiratory distress (RR&gt;60/min)</td>
<td></td>
</tr>
<tr>
<td>• Temperature &lt;36.5°C or &gt; 38.5°C</td>
<td></td>
</tr>
<tr>
<td>• Bleeding</td>
<td></td>
</tr>
<tr>
<td>• Restless, Continuously irritable, or lethargy</td>
<td></td>
</tr>
<tr>
<td>• Trauma or other urgent surgical condition</td>
<td></td>
</tr>
<tr>
<td>• Referral (urgent)</td>
<td></td>
</tr>
<tr>
<td>• Pallor (severe)</td>
<td></td>
</tr>
<tr>
<td>• Malnutrition: Visible severe wasting</td>
<td></td>
</tr>
<tr>
<td>• Oedema of both feet</td>
<td></td>
</tr>
<tr>
<td>• Poisoning</td>
<td></td>
</tr>
<tr>
<td>• Burns (major)</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Initial newborn examination</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Prepare equipment: Thermometer, watch or clock with second hand, scale for weighing (if available), clean clothes, gloves</td>
</tr>
<tr>
<td>2</td>
<td>GET HISTORY OF PREGNANCY, BIRTH AND IMMEDIATE NEWBORN PERIOD</td>
</tr>
<tr>
<td>3</td>
<td>Ask the mother or look at her prenatal and intrapartum records to find out the following information:</td>
</tr>
<tr>
<td>a.</td>
<td>Fever during labour</td>
</tr>
<tr>
<td>b.</td>
<td>Duration of labour, mode of delivery, Bag of water broken more than 18 hours before delivery, APGAR score</td>
</tr>
<tr>
<td>c.</td>
<td>any other infections (hepatitis B, syphilis or other sexually transmitted infections, HIV/AIDS)</td>
</tr>
<tr>
<td>d.</td>
<td>Any other diseases (TB, Malaria, diabetes, chronic infections, pre-eclampsia) or medicines and immunization?</td>
</tr>
<tr>
<td>e.</td>
<td>Method, time and place of delivery</td>
</tr>
<tr>
<td>f.</td>
<td>Was the amniotic fluid clear?</td>
</tr>
<tr>
<td>g.</td>
<td>Was newborn resuscitation done?</td>
</tr>
<tr>
<td>h.</td>
<td>How many times baby had passed urine in last 24 hours?</td>
</tr>
<tr>
<td>i.</td>
<td>How many times has the baby breastfed?</td>
</tr>
<tr>
<td>j.</td>
<td>Any prelacteal feed being given?</td>
</tr>
<tr>
<td>k.</td>
<td>Does the baby feed on the breast well?</td>
</tr>
<tr>
<td>l.</td>
<td>Do you think the baby is well?</td>
</tr>
<tr>
<td>m.</td>
<td>Are you (mother or family) worried about anything?</td>
</tr>
<tr>
<td>4</td>
<td>Explain to the mother and family what you are going to do</td>
</tr>
<tr>
<td>5</td>
<td>Wash your hands thoroughly with soap and water</td>
</tr>
<tr>
<td>6</td>
<td>Dry with a clean dry cloth or air-dry</td>
</tr>
<tr>
<td>7</td>
<td>Place of Exam:</td>
</tr>
<tr>
<td></td>
<td>• Do exam with baby in mother's lap, if possible</td>
</tr>
<tr>
<td></td>
<td>• or do exam on a table or bed with a clean warm cloth covering surface close to mother</td>
</tr>
<tr>
<td>8</td>
<td>Throughout the exam:</td>
</tr>
<tr>
<td>9</td>
<td>Explain to the mother and family what you are doing and answer any questions they ask</td>
</tr>
<tr>
<td>10</td>
<td>Praise the baby as you do the exam</td>
</tr>
<tr>
<td>11</td>
<td>Handle the baby gently</td>
</tr>
<tr>
<td>12</td>
<td>DO PHYSICAL EXAMINATION</td>
</tr>
<tr>
<td></td>
<td>Without touching the baby, observe and teach the mother to observe the baby's:</td>
</tr>
<tr>
<td></td>
<td>Breathing (count for 1 full minute):</td>
</tr>
<tr>
<td></td>
<td>• 30-60 quite breaths in 1 minute</td>
</tr>
<tr>
<td></td>
<td>• No indrawing of the chest or nostril flaring</td>
</tr>
<tr>
<td></td>
<td>• No apnoea (periods of not breathing for more than 20 seconds)</td>
</tr>
<tr>
<td></td>
<td>• Chest and abdomen move with each breath</td>
</tr>
<tr>
<td>No.</td>
<td>Initial newborn examination</td>
</tr>
<tr>
<td>----</td>
<td>----------------------------</td>
</tr>
<tr>
<td>13</td>
<td>Look at colour:</td>
</tr>
<tr>
<td></td>
<td>• Face, chest, tongue and lips are pink</td>
</tr>
<tr>
<td></td>
<td>• Hands and feet may be bluish during first 48 hours</td>
</tr>
<tr>
<td>14</td>
<td>Look at posture: Arms and legs are flexed.</td>
</tr>
<tr>
<td>15</td>
<td>Look at activity:</td>
</tr>
<tr>
<td></td>
<td>• Moves legs and arms equally</td>
</tr>
<tr>
<td></td>
<td>• Opens mouth and turns head to search for nipple when cheek is stroked gently</td>
</tr>
<tr>
<td></td>
<td>• Touch the baby gently and check the following:</td>
</tr>
<tr>
<td>16</td>
<td>Heart rate (count for 1 full minute):</td>
</tr>
<tr>
<td></td>
<td>HR • 100-160 beats in 1 minute</td>
</tr>
<tr>
<td>17</td>
<td>Temperature:</td>
</tr>
<tr>
<td></td>
<td>• Normal: Axillary temperature between 36.5°C - 37.5°C</td>
</tr>
<tr>
<td></td>
<td>• If no thermometer available. Use back of hand to feel abdominal wall and both lower limbs. Severe hypothermia present if both the abdomen and feet feel cold.</td>
</tr>
<tr>
<td></td>
<td>• If baby is cold, either delay examination until baby is warm or do exam near a heat source.</td>
</tr>
<tr>
<td>18</td>
<td>Look at skin:</td>
</tr>
<tr>
<td></td>
<td>• Normal: (Milia [white bumps on face] bluish area over lower back, peeling of skin, pustules, blisters, red or purple spots)</td>
</tr>
<tr>
<td>19</td>
<td>Look at and feel the head:</td>
</tr>
<tr>
<td></td>
<td>• Moulding, caput</td>
</tr>
<tr>
<td></td>
<td>• Anterior fontanelle flat or bulging</td>
</tr>
<tr>
<td>20</td>
<td>Look at eyes: No discharge, not sticky</td>
</tr>
<tr>
<td>21</td>
<td>Look at and feel the mouth: Lips, gums, and palate intact</td>
</tr>
<tr>
<td>22</td>
<td>Look at the chest:</td>
</tr>
<tr>
<td></td>
<td>• Both side of chest move equally</td>
</tr>
<tr>
<td></td>
<td>• Breast nodules maybe enlarged in both girls and boys at birth</td>
</tr>
<tr>
<td>23</td>
<td>Look at and feel the abdomen:</td>
</tr>
<tr>
<td></td>
<td>• Rounded and soft</td>
</tr>
<tr>
<td></td>
<td>• Umbilical cord tied tightly, dry, not bleeding</td>
</tr>
<tr>
<td>24</td>
<td>Look at back and spine: Any swelling over spine</td>
</tr>
<tr>
<td>25</td>
<td>Look at anus: Do not insert finger or instrument to inspect the anus</td>
</tr>
<tr>
<td>26</td>
<td>Look at girl’s external genital organs:</td>
</tr>
<tr>
<td></td>
<td>• Vaginal opening present (Discharge: normal to have white vaginal discharge and bloody vaginal discharge that starts on day 2 or 3 and continues up to day 7)</td>
</tr>
<tr>
<td>27</td>
<td>Look at boy’s external genital organs:</td>
</tr>
<tr>
<td></td>
<td>• Urethra opens at end of penis</td>
</tr>
<tr>
<td></td>
<td>• One or two testes felt in the scrotum</td>
</tr>
<tr>
<td>28</td>
<td>Weight: Normal range is 2.5 - 4 kg</td>
</tr>
<tr>
<td></td>
<td>Watch the baby breastfeed</td>
</tr>
<tr>
<td>29</td>
<td>Position</td>
</tr>
<tr>
<td>30</td>
<td>Sucking</td>
</tr>
<tr>
<td>31</td>
<td>Attachment</td>
</tr>
</tbody>
</table>
No. | Initial newborn examination | Y | N
--- | --- | --- | ---
32 | Watch Mother-Baby interaction | Y | N
33 | Dress the baby or place the baby close to mother and cover both | Y | N
34 | DECIDE NEEDS / PROBLEMS | Y | N
35 | If all is normal, tell mother her baby is healthy and normal. | Y | N
36 | Compare your findings with the normal findings | Y | N
37 | If any of the findings not under "Normal Findings": | Y | N
38 | Gently explain to mother what abnormal findings may mean and what action is needed | Y | N
39 | Explain Dos and Don’ts while caring for normal newborn | Y | N
40 | • Exclusive breast feeding | Y | N
41 | • Immunize as appropriate | Y | N
42 | • Learn about danger signs | Y | N
43 | • Mother should be getting iron and folic acid and adequacy about mother’s diet | Y | N
44 | • Do not put oil in eyes, ear, nose and umbilicus | Y | N
45 | • Do not squeeze newborn’s breast | Y | N
46 | • Do not apply kajal or gajal | Y | N
47 | • Do not try to warm baby by using coal and fire | Y | N
48 | • Do not give vigorous massage to the newborn | Y | N
49 | • Do not give water or any other medicine without consulting doctor | Y | N

ANNEX 29: CHECKLIST FOR MAKING CPAP

<table>
<thead>
<tr>
<th>No.</th>
<th>CHECKLIST FOR MAKING CPAP</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Keeps all the equipments ready-</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>• Nasal prongs that snugly fits into the nostrils</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>• A tube to connect to the nasal prongs to dip in the water</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>• A clean bottle filled with distilled water upto the level of the pressure to be given- 5-6 cm</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>• Adhesive Tape</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>• Oxygen cylinder/ concentrator</td>
<td>Y</td>
</tr>
<tr>
<td>2.</td>
<td>Takes the nasal prongs and cut one end of the tubings</td>
<td>Y</td>
</tr>
<tr>
<td>3.</td>
<td>Attaches the connceter tubing to the cut end of the nasal prongs that is exiting out of the baby and tie the other end that goes to the oxygen and secure with tape</td>
<td>Y</td>
</tr>
<tr>
<td>4.</td>
<td>Dips the end of the connecter tubing into the distilled water which is measured up to the level of the pressure (5-6 cm of water) to be given</td>
<td>Y</td>
</tr>
<tr>
<td>5.</td>
<td>Attaches the inlet of nasal prongs to the oxygen delivery device</td>
<td>Y</td>
</tr>
<tr>
<td>6.</td>
<td>Applies the nasal prongs to the baby’s nostrils and secure with tape</td>
<td>Y</td>
</tr>
<tr>
<td>7.</td>
<td>Watches for presence of bubbling in the distilled water</td>
<td>Y</td>
</tr>
</tbody>
</table>
### ANNEX 30: CHECKLIST FOR NEONATAL RESUSCITATION

<table>
<thead>
<tr>
<th>SN</th>
<th>Procedure</th>
<th>Yes</th>
<th>No</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equipment check (See checklist 3.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Dries the baby thoroughly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Evaluates breathing or crying</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Initial steps of resuscitation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Dry and maintains normal temperature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Positions airway</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Clears secretion if needed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Dries and stimulates (back rubbing or flickers soles)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Checks breathing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>If apnea or gasping</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Starts PPV for 60 seconds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Monitors saturation if available and checks targeted pre-ductal saturation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Check heart rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>If heart rate less than 100, checks chest movement.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>If absent, performs ventilation corrective steps (MRSOPA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mask reposition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reposition of head</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Suction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Open mouth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Pressure increase</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Alternative airway</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>PPV for 60 seconds with effective chest rise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Assess HR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>If heart rate less than 60,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Starts CPR at the ratio of 3:1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Attach ECG monitor if available</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Reassess HR after 1 minute</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>If heart rate less than 60,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Inj. Adrenaline via UVC followed by a flush</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Check for pneumothorax and hypotension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Post resuscitation care</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ANNEX 31: CHECKLIST FOR EQUIPMENTS NEEDED FOR NEONATAL RESUSCITATION

<table>
<thead>
<tr>
<th>Warm</th>
<th>Clear airway</th>
<th>Auscultate</th>
<th>Ventilate</th>
<th>Oxygenate</th>
<th>Intubate</th>
<th>Medicate</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Preheated warmer</td>
<td>• Bulb syringe/ Penguin suction</td>
<td>• Stethoscope</td>
<td>• Flowmeter set to 10L/min</td>
<td>• Oxygen tubing</td>
<td>• Laryngoscope with size 0 and size 1 straight blades (size 00, optional)</td>
<td>Access to</td>
</tr>
<tr>
<td>• Warm towels or blankets</td>
<td>• 10F or 12F suction catheter attached to wall suction, set at 80-100 mm Hg</td>
<td>• Position</td>
<td>• Positive pressure ventilation device</td>
<td>• Pulse oximeter with sensor and cover</td>
<td>• Stylet (optional)</td>
<td>• 1:10,000 (0.1mg/ml) epinephrine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Suction</td>
<td>• Term and preterm sized masks</td>
<td>• Target oxygen saturation table</td>
<td>• Endotracheal tubes (sizes 2.5, 3.0, 3.5)</td>
<td>• Normal saline</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 8F feeding tube and large syringe</td>
<td>• Measuring tape and/or endotracheal tube insertion depth table</td>
<td>• Waterproof tape or tube securing device</td>
<td>• 5 or 6 Fr feeding tube</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Scissors</td>
<td></td>
<td>• ECG monitor leads and ECG monitor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ANNEX 32: CHECKLIST FOR ASSESSMENT AND MANAGEMENT OF A NEWBORN REQUIRING SPECIAL CARE.

1. **Temperature** – assess
   - Hypothermia  - Provide heat by radiant warmer, warm clothing
   - Cold stress  - Skin to skin contact, warm clothing
   - Hyperthermia - Uncover

2. **Airway**
   - Compromised  - Open and maintain airway
     • Position
     • Suction
   - Maintained    - No intervention

3. **Breathing**
   - None or gasping - Positive-pressure ventilation with 100% oxygen
   - Respiratory distress - Provide oxygen
   - Normal        - No intervention
4. Circulation – CRT

- >3 seconds: Normal saline bolus
- Check temperature
- Check heart rate
- Normal: No intervention

5. Fluids

- If CRT >3 sec: IV NS 10 ml/kg
- If stressed baby: IV 10% Dextrose 2ml/kg
- If circulation not compromised: Normal requirement (refer to Chart 8)

6. Medications

- Pneumonia: IV antibiotics - Ampicillin, Gentamycin
- Apnea: IV Aminophyllin
- Meningitis: IV antibiotics (Ampicillin, Gentamycin, Cefotaxim)
- Bleeding: Inj Vitamin K - 1 mg IM
- Convulsions: Inj Phenobarbitone, Inj Phenytoin

7. Feeds

- Weight < 1200 g: Gavage feeds
- Weight 1200-1800 g: Katori / cup feeding
- Weight > 1800 g (>34 wk): Breastfeeding

8. Monitoring

- Temperature: Touch method
- Temperature recorded 2 hourly
- Respiration: Apneic
- Gasping
- Tachypneic – RR
- Retractions +/-
- Grunts +/-
- Color: Pink
- Pink with peripheral cyanosis
- Pale
- Cyanosis
- Heart Rate: Normal
- Tachycardia
- Bradycardia
- CRT: Normal
- > 3 seconds
- SpO2: 90-93
- <90
- >93
## ANNEX 33: CHECK LIST FOR MDI THERAPY

<table>
<thead>
<tr>
<th>No.</th>
<th>MDI THERAPY</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>1.</td>
<td>Keeps all the equipments ready- Mask, Spacer, Inhaler drug</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Attaches the mask to the spacer</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Shakes the inhaler drug and attach to the other end of the spacer Solution</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Applies the mask over the child covering the mouth and the nose</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Presses the inhaler drug</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Allows the child to take few breaths( around 10)</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>To give another puff, again re- shake the inhaler drug and repeat the procedure</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Clean the spacer by washing in free flow water and allow it to air dry</td>
<td></td>
</tr>
</tbody>
</table>

## ANNEX 34: CHECKLIST OF LUMBAR PUNCTURE

<table>
<thead>
<tr>
<th>No.</th>
<th>LUMBAR PUNCTURE</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>1.</td>
<td>Keeps all equipments ready</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lumbar puncture needle of appropriate size</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Eye towel and sterile towels</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Antiseptic wipes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vials to collect the sample</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Aseptic precaution- Wears sterile gloves</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Positions the child in lateral recumbent position with hips, knees and neck flexed.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Prepares the skin in sterile fashion using betadine, betadine and spirit.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Drapes the area with eye towel and sterile towel</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Locates the desired intervertebral space by drawing an imaginary line between the top of the iliac crests</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Puncturea the skin in the midline in the intervertebral space with needle angling slightly cephalad towards the umbilicus.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Advances several millimetres at a time withdrawing the stylet each time to check for CSF flow.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>If resistance is felt initially( hit bone), withdraws needle to skin surface and redirect angle slightly.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Collects the samples for investigations.</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Removes the needle and give pressure over the prick site for few minutes.</td>
<td></td>
</tr>
</tbody>
</table>
### Exercise a: Case discussion of approach to cough (chapter 4)

1. Ramesh, 13 months old child was brought to hospital with the complaints of 4 days of Cough and fever. His respiration is very fast and there is severe chest in drawing. You have started emergency treatment in form of positioning and oxygen as you found his oxygen saturation 88%. When you examined him further, RR is 76/minutes. He looks lethargic, there is no history of convulsion, extremities are warm, and Mother tells you that Ramesh is feeding poorly. On chest auscultation you found equal air entry both side with occasional crepitations. Other systemic examinations are normal.

### a. How will you classify Ramesh's illness?

### b. What investigations will you order for Ramesh?

### c. Write specific treatment which you will start?

### d. Write supportive treatment if any required for Ramesh

### e. How will you monitor him during first 48 hours?

### f. Enumerate conditions in which you will start anti-staphylococcal treatment

---

**Q.2.** A four-year-old Sonika has been brought to your hospital with cough, fever for a day along with difficulty in breathing. She has RR of 72 /minute with subcostal retraction. She has similar episodes in past and has father is on Inhalation therapy. Her oxygen saturation is 80% on admission, has bilateral rhonchi. Other systemic examination is normal.

### a. What is most likely diagnosis?

### b. How will you grade her disease?

### c. What immediate treatment should be started?

### d. Will you start antibiotics?

### e. After 2 hour, on re-examination, she is better with RR of 48/minute. Write further management plan for her.

---

**Q.3.** A 2.5-year-old boy is brought with complaints of: mild coryza for one day; difficulty in breathing for 6 hours; barking cough and; hoarseness of voice. On examination, the child is agitated, febrile, pale and also has stridor at rest. There are marked chest retraction and absent breath sound on auscultation. She had been hospitalized once with similar complaints at two years of age and has been well since then.

### a. What is the diagnosis?

### b. What is the severity?

### c. What would be the appropriate management?
Exercise b: Exercises on management of child presenting with diarrhoea (Chapter 5)

1. Sana 13 months old female baby is brought to emergency with history of loose motion for 2 days. Her admission weight is 9 Kg. On examination Sana is lethargic, her eyes are sunken and her skin pinch is very slow. When she is offered fluid, she is not able to drink.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Classify the hydration status of Sana?</td>
<td></td>
</tr>
<tr>
<td>b. Which plan of treatment you will start?</td>
<td></td>
</tr>
<tr>
<td>c. Write the type of fluid, amount and duration over which you will rehydrate?</td>
<td></td>
</tr>
<tr>
<td>d. What will you monitor during rehydration?</td>
<td></td>
</tr>
<tr>
<td>e. What will you look after completion of rehydration?</td>
<td></td>
</tr>
</tbody>
</table>

After 3 hours, you re-examined Sana. She now looks alert, eyes are sunken, skin pinch goes back slowly and she is eagerly.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. What is hydration status now? What treatment plan will you follow?</td>
<td></td>
</tr>
<tr>
<td>b. What type of fluid, how much and over how much time will you give?</td>
<td></td>
</tr>
</tbody>
</table>

After 4 hours, Sarita is active, alert, skin pinch goes back immediately, eyes are not sunken and is drinking normally.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>c. What is hydration status of Sarita at present</td>
<td></td>
</tr>
<tr>
<td>d. Will you discharge her or keep her in the hospital?</td>
<td></td>
</tr>
<tr>
<td>e. What advice will you give to the mother at discharge?</td>
<td></td>
</tr>
</tbody>
</table>
Exercise c1: Approach to childhood fever (chapter 6)

1. Abiral, 3 years old child is brought to hospital with loose stool, pain abdomen and fever for two days. Akbar also has visible blood in stool. Akbar does not show any emergency signs and has no dehydration. There is no past history of measles. His weight is 11 kg.
   a. Write treatment for Abiral.

   b. After what interval you will call Abiral for follow-up?

   c. Now there is no blood in stool, no abdominal pain, and he is passing semi formed stool with occasional mucus. What advise you will give?

2. 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, moderate underweight and anaemia. His diet includes animal milk, cooked cereal, and some mashed vegetables.
   a. Should Sonu be admitted to the health facility?

   b. Name some non-intestinal infections which may be causative?

   c. Write treatment plan for Sonu.

   d. What diet will you give to Sonu?

   e. Enumerate criteria for changing the diet?
Exercise c2: Approach to childhood fever (chapter 6)

1. A 3 years old Jagat has been brought with fever for 3 days and impaired consciousness for 6 hours and one episode of seizure on the way while coming to the hospital. He is breathing normally, is unconscious but responding to painful stimuli, extremities are warm. On arrival you have started emergency treatment – positioning, oxygen. History & examination – Weight -14 kg, Temp- 39 degree centigrade, Pallor ++, RR-28/min, No signs of meningeal irritation, Spleen 3 cm. His peripheral smear is positive for P. falciparum, Blood Sugar-60mg/dl, Hb - 4 gm/dl, Blood urea/Serum Creatinine-Normal. After initial treatment the child regained consciousness and had no further seizures, and no signs of meningeal irritation.

   a) What is likely diagnosis?
   
   b) What complications does John have?
   
   c) Write specific treatment which you will start?
   
   d) What supportive treatment will John need?

Exercise c3: Approach to childhood fever (chapter 6)

1. A 13 months old Sagun has been brought with history of fever for 2 days and impaired consciousness and one episode of seizure on the way to the hospital. He is breathing normally, is unconscious but responding to painful stimuli, extremities are warm. On arrival you have started emergency treatment – positioning, Oxygen. History & examination – Weight -8 Kg, Temp- 39 degree centigrade, No Pallor, RR-38/min, Signs of meningeal irritation +, no splenomegaly. His peripheral smear is negative for malarial parasite, Blood Sugar- 40 mg/dl, Hb -11.5gm/dl, Blood urea/Serum Creatinine- N, CSF- 250 cells, 90% polymorphs, Protein 68mg/dl, Sugar 30mg/dl,

   a) What is the likely diagnosis?
   
   b) What complications does Sharad have?
   
   c) Write specific treatment which you will start?
   
   d) What supportive treatment will Sharad need?
1. A five-year-old child, weighing 20 kg is brought to hospital with history of fever, generalized rash, bodyache and headache for 5 days and extreme lethargy and abdominal pain for one day. On examination, he is conscious, his temperature is 38°C, PR – 110/min, BP – 98/60 mmHg, CFT/CRT <3seconds, RR – 26/min. He has erythematous, maculo-papular rash all over body. His tourniquet test is positive.

a. What is the most likely diagnosis?

b. What are the important investigations to confirm the diagnosis?

c. Outline the management plan.

d. What is the indication of referral of this child to higher center?
Exercise d1: Exercise on approach to child with malnutrition (chapter 7)

Determine weight-for-height (or weight-for-length) SD scores for the following cases. (The participants should refer to Annexure 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 length Z-score?
   Ans :

2. Ram is a 4-year-old boy. His weight is 13 Kg and height is 95 cm. What is his weight for length Z-score?
   Ans :

Exercise d2: Determine the nutritional status of children using measurements given below

<table>
<thead>
<tr>
<th>Name</th>
<th>Age (months)</th>
<th>Sex</th>
<th>Weight (kg)</th>
<th>Length / Height (cm)</th>
<th>SD Scores</th>
<th>MUAC</th>
<th>Oedema</th>
<th>Nutrition Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prakash</td>
<td>12</td>
<td>M</td>
<td>9.8</td>
<td>73</td>
<td>+1</td>
<td>12.8</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Rita</td>
<td>15</td>
<td>F</td>
<td>7.2</td>
<td>75</td>
<td>-2 - -3</td>
<td>11.8</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Ritika</td>
<td>26</td>
<td>F</td>
<td>10</td>
<td>89</td>
<td></td>
<td>12.3</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Dinesh</td>
<td>32</td>
<td>M</td>
<td>10.5</td>
<td>95</td>
<td>&lt;-3</td>
<td>12.1</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

Exercise d3

1. Fourteen months old Ramesh has been brought to hospital with poor feeding. He weighs 5.6 kg and his length is 72.5 cms. Examination history shows that his airway and breathing is normal and he has become unconscious while coming to hospital. His mid upper arm circumference is 11.6 cm and there is no pedal oedema. His blood sugar is 40 mg/dl and temperature is 36°C.

   a. Do you think Ramesh has SAM?
      Ans :

   b. Is Ramesh hypoglycemic?
      Ans :

   c. Does he have hypothermia?
      Ans :

   d. What immediate treatment you will give to Ramesh?
      Ans :
Exercise d4

1. Radha, a 7 months old child has been brought to hospital with history of diarrhoea & vomiting for 5 days with no blood in stools. Her weight was 5 kg, MUAC 9.2 cm and she has sunken eyes and very slow skin pinch and did not accept the offered fluids.

<table>
<thead>
<tr>
<th>a. Does Radha have signs of dehydration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ans :</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b. How will you treat Radha ?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c. After 30 minutes, Radha is better and accepting oral fluids. What antibiotics should you give to Radha?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ans :</td>
</tr>
</tbody>
</table>

Exercise d5

1. Anu weighs 6 kg and length is 82 cm. She does not have any airway problem, doesn't have convulsion. Capillary refill time is less than 3 seconds. She is lethargic and has blood sugar of 40mg/dl, axillary temperature is 34.8 degree centigrade and has mild dermatosis.

<table>
<thead>
<tr>
<th>a. What two antibiotics should Anu be given now ? Determine the dose of each antibiotic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ans :</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b. Write the electrolyte and micronutrient supplementation you will give to Anu ?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ans :</td>
</tr>
</tbody>
</table>
## ANNEX 36: DRUG DOSES

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Route(Concentration)</th>
<th>Doses</th>
<th>Remarks</th>
<th>3-&lt;6kg</th>
<th>6-&lt;10kg</th>
<th>10-&lt;15kg</th>
<th>15-&lt;20 kg</th>
<th>20-&lt;29kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% dextrose for hypoglycaemia</td>
<td>IV/ Oral</td>
<td>5 ml/kg</td>
<td>Start feed. Repeat glucose test after 30 mins</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dopamine</td>
<td>IV infusion(200mg/5ml)</td>
<td>5-20 mcg/kg/min</td>
<td>See chapter for shock</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium gluconate (10%)</td>
<td>IV</td>
<td>1 ml/kg</td>
<td>Can be diluted with normal saline. Give slowly over 15 mins</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midazolam</td>
<td>IV(5mg/5ml)</td>
<td>0.1-0.2mg/kg</td>
<td>Repeat after 5 mins Watch for respiratory depression</td>
<td>0.5</td>
<td>1</td>
<td>1.5</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Intrasanal(5mg/ml)</td>
<td>0.3mg/kg</td>
<td></td>
<td>1.5</td>
<td>3</td>
<td>4.5</td>
<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td>Diazepam</td>
<td>IV(10mg/2ml)</td>
<td>0.25mg/kg(0.05ml/kg)</td>
<td>Give slowly over 1 minute Repeat after 10 mins Watch for respiratory depression</td>
<td>0.2</td>
<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>PR(10mg/2ml)</td>
<td>0.5mg/kg(0.1ml/kg)</td>
<td>Repeat after 10 mins Watch for respiratory depression</td>
<td>0.4</td>
<td>0.8</td>
<td>1.2</td>
<td>1.6</td>
<td>2</td>
</tr>
<tr>
<td>Drugs</td>
<td>Route(Concentration)</td>
<td>Doses</td>
<td>Remarks</td>
<td>3-&lt;6kg</td>
<td>6-&lt;10kg</td>
<td>10-&lt;15kg</td>
<td>15-&lt;20 kg</td>
<td>20-&lt;29kg</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------</td>
<td>----------------------</td>
<td>--------------------------------------</td>
<td>--------</td>
<td>---------</td>
<td>----------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td>Salbutamol</td>
<td>MDI(100mcg/puff)</td>
<td>2 puff</td>
<td>2 puff</td>
<td>2 puff</td>
<td>2 puff</td>
<td>2 puff</td>
<td>2</td>
<td>2 puff</td>
</tr>
<tr>
<td></td>
<td>Nebulisation(500mcg/ml)</td>
<td>&lt;14kg- 0.5 ml ≥14 kg- 1 ml</td>
<td>Dilute in NS to make 3 ml solution</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Syrup(2mg/5ml)</td>
<td>0.15mg/kg thrice a day</td>
<td></td>
<td>1.5ml</td>
<td>2.5ml</td>
<td>5</td>
<td>7.5ml</td>
<td>10ml</td>
</tr>
<tr>
<td></td>
<td>Tablets 2mg</td>
<td></td>
<td>½</td>
<td>½</td>
<td>1</td>
<td>1 1/2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tablets 4 mg</td>
<td></td>
<td>1/8</td>
<td>½</td>
<td>¾</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ampicillin</td>
<td>IV</td>
<td>50 mg/kg four times a day</td>
<td>Vial of 500 mg mixed with 2.1ml sterile water to give 50 mg/2.5 ml</td>
<td>1ml</td>
<td>2 ml</td>
<td>3 ml</td>
<td>5 ml</td>
<td>6 ml</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>IV/IM</td>
<td>7.5mg/kg once a day</td>
<td>Vial containing 80 mg(2ml at 40mg/ml)</td>
<td>0.5-0.9ml</td>
<td>1.1-1.7ml</td>
<td>1.9-2.6ml</td>
<td>2.8-3.5ml</td>
<td>3.75-5.4ml</td>
</tr>
</tbody>
</table>

xlivii
<table>
<thead>
<tr>
<th>Drugs</th>
<th>Route (Concentration)</th>
<th>Doses</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amikacin</td>
<td>IV/IM</td>
<td>15 mg/kg once a day</td>
<td></td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>IV/IM</td>
<td>40-50 mg/kg two time a day (maximum dose 4 gm) Can be given once a day</td>
<td>Higher doses in meningitis Vial of 1g mixed with 9.6 ml sterile water to give 1g/10ml Vial of 2g mixed with 19 ml of sterile water to give 2g/20ml</td>
</tr>
<tr>
<td>Cefotaxime</td>
<td>IV/IM</td>
<td>25-50 mg/kg four times a day</td>
<td>Higher doses for meningitis Vial of 500mg mixed with 2ml sterile water or Vial of 1g mixed with 4 ml of sterile water or Vial of 2g mixed with 8 ml of sterile water to give 250mg/ml</td>
</tr>
<tr>
<td>Cloxacillin</td>
<td>IV</td>
<td>25-50 mg/kg four times a day (50mg/kg in brackets) Maximum dose 4 g</td>
<td>Vial of 500 mg mixed with 8 ml sterile water to give 500mg/10ml Vial of 250mg mixed with 1,3 ml sterile water to give 250mg/0.5ml</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Route (Concentration)</th>
<th>Doses</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>3-&lt;6kg</td>
<td>6-&lt;10kg</td>
</tr>
<tr>
<td>Drugs</td>
<td>Route(Concentration)</td>
<td>Doses</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Paracetamol</td>
<td>Oral(120mg/5ml)</td>
<td>10-15 mg/kg four to six times daily</td>
</tr>
<tr>
<td>Tab 250 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amoxycillin</td>
<td>Syrup- 125/5ml</td>
<td>40 mg/kg per dose twice a day</td>
</tr>
<tr>
<td>Dispersible tablets- 250 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dispersible tablets 125 mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prednisolone</td>
<td>Oral</td>
<td>1mg/kg twice daily</td>
</tr>
<tr>
<td><strong>Hydrocortisone</strong></td>
<td>IV- 100mg/ml. Dilute in 4 ml WFI 20mg/ml</td>
<td>Asthma- 10 mg/kg stat then 5 mg/kg four times a day Anaphylaxis- 2.5 mg/kg four times a day</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Adrenaline</strong></td>
<td>Nebulisation(1:1 000)</td>
<td>2 ml in 2 ml NS</td>
</tr>
<tr>
<td></td>
<td>SC/IM- Give exact dosing</td>
<td>0.01ml/kg/dose (max- 0.3ml)</td>
</tr>
<tr>
<td><strong>Ipratropium bromide</strong></td>
<td>Nebulisation(500 mcg/2.5ml)</td>
<td>250mcg/dose 6 hourly</td>
</tr>
<tr>
<td>Drugs</td>
<td>Route(Concentration)</td>
<td>Doses</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Cetirizine</td>
<td>Syrup- 1mg/ml</td>
<td>6 mo- 1 yrs- 2.5ml OD 1-5yrs- 2.5ml OD to BD</td>
</tr>
<tr>
<td></td>
<td>10 mg</td>
<td></td>
</tr>
<tr>
<td>Fexofenadine</td>
<td>Syrup- 30 mg/5ml</td>
<td>6 mo-&lt;2yr- 2.5ml BD 2-5 yrs- 5 ml BD</td>
</tr>
<tr>
<td>Chlorpheniramine</td>
<td>4mg</td>
<td>2-5 yrs- 1mg/dose 4-6 hourly</td>
</tr>
<tr>
<td>Mannitol(20%)</td>
<td>IV- 200 mg/ml</td>
<td>5 ml/kg stat followed by 2 ml/kg 6 hourly</td>
</tr>
<tr>
<td>Drugs</td>
<td>Route(Concentration)</td>
<td>Doses</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>Furosemide</td>
<td>IV- 10mg/ml</td>
<td>1-2 mg/kg 6-12 hourly</td>
</tr>
<tr>
<td></td>
<td>Tablet 40 mg</td>
<td></td>
</tr>
<tr>
<td>Phenytoin</td>
<td>IV- 50mg/ml</td>
<td>IV-15-20 mg/kg loading dose followed by 3-4mg/kg/dose maintainence IV/PO twice daily</td>
</tr>
<tr>
<td></td>
<td>Tab 50 mg</td>
<td></td>
</tr>
<tr>
<td>Phenobarbitalone</td>
<td>IV or IM(200mg/ml)</td>
<td>15-20 mg/kg loading dose. Additional 5 mg/kg/dose upto 30 mg/kg followed by 3-4mg/kg/day twice daily IV or PO</td>
</tr>
<tr>
<td></td>
<td>Tab 30 mg</td>
<td></td>
</tr>
<tr>
<td>Drugs</td>
<td>Route(Concentration)</td>
<td>Doses</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>Atropine</td>
<td>IV(0.6mg/ml)</td>
<td>OP poisoning- 0.05 mg/kg every 3-5 mins till clearing of secretions and cessation of wheezing Maintaince- 20-30% of total atropinizing dose/hour for 2-3 days. Then reduce by 1/3 to ¼ dose given on previous days if asymptomatic 1 drop three times a day</td>
</tr>
<tr>
<td></td>
<td>Eye drops</td>
<td></td>
</tr>
<tr>
<td>Pralidoxime</td>
<td>IV</td>
<td>25 mg/kg twice daily for 2 days</td>
</tr>
</tbody>
</table>

Iiv
<table>
<thead>
<tr>
<th>Drugs</th>
<th>Route(Concentration)</th>
<th>Doses</th>
<th>Remarks</th>
<th>3-&lt;6kg</th>
<th>6-&lt;10kg</th>
<th>10-&lt;15kg</th>
<th>15-&lt;20 kg</th>
<th>20-&lt;29kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doxycycline</td>
<td>Tab 100 mg</td>
<td>Cholera 2-4 years 50 mg stat 4-5 years 100 mg stat Typhus 2.2 mg/kg twice daily</td>
<td>Higher doses in enteric fever</td>
<td>1/8</td>
<td>1/21/4</td>
<td>1/21/2</td>
<td>13/4</td>
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<tr>
<td></td>
<td></td>
<td>6-&lt;10kg</td>
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<td></td>
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<td>10-&lt;15kg</td>
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<td>15-&lt;20 kg</td>
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<td>20-&lt;29kg</td>
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</tr>
<tr>
<td>Ciprofloxac</td>
<td>IV 2 mg/ mL</td>
<td>10mg-15/kg/dose twice daily</td>
<td>Higher doses in enteric fever</td>
<td>30ml-40ml</td>
<td>40ml-70ml</td>
<td>70ml-100ml</td>
<td>100-140</td>
<td>140-200</td>
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<tr>
<td>Tablet 250 mg</td>
<td></td>
<td></td>
<td></td>
<td>¼</td>
<td>½</td>
<td>¾</td>
<td>1</td>
<td>1 ½</td>
</tr>
<tr>
<td>Tablet 100 mg</td>
<td></td>
<td></td>
<td></td>
<td>½</td>
<td>1</td>
<td>1 ½</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Eye drop</td>
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<td></td>
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<td>Keratomalacia</td>
<td></td>
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<tr>
<td>Ear drop</td>
<td></td>
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</tr>
<tr>
<td>Ofloxacin</td>
<td>IV(2mg/ml)</td>
<td>IV - 5-7.5mg/kg/dose twice daily PO-7.5-10 mg/kg/dose twice daily</td>
<td>Higher doses in enteric fever</td>
<td>12-20ml</td>
<td>22-35ml</td>
<td>35-50ml</td>
<td>5-750ml</td>
<td>15-20</td>
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<tr>
<td>Syrup 10mg/ml</td>
<td></td>
<td></td>
<td></td>
<td>3.5-5ml</td>
<td>7.5-9ml</td>
<td>10-14ml</td>
<td>15-20ml</td>
<td>20-28ml</td>
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<tr>
<td>Tablet 200 mg DT</td>
<td></td>
<td></td>
<td></td>
<td>1/8-1/4</td>
<td>¼-1/2</td>
<td>½-3/4</td>
<td>¼-1</td>
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<td>Drugs</td>
<td>Route(Concentration)</td>
<td>Doses</td>
<td>Remarks</td>
<td>3-&lt;6kg</td>
<td>6-&lt;10kg</td>
<td>10-&lt;15kg</td>
<td>15-&lt;20 kg</td>
<td>20-&lt;29 kg</td>
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<tr>
<td>Azithromycin</td>
<td>Syrup 200mg/5ml</td>
<td>Enteric fever-10mg/kg/dose twice daily Pertussis-10mg/kg stat then 5 mg/kg for 4 days</td>
<td>1ml then 0.5ml 1ml then 1 ml 2 ml then 1 ml then 1.5 ml 3.5 ml then 1.5 ml 4.5 ml then 2.5 ml 6 ml then 3 ml</td>
<td>6</td>
<td>6</td>
<td>4.5</td>
<td>6.5</td>
<td>6.5</td>
</tr>
<tr>
<td></td>
<td>500 mg</td>
<td></td>
<td></td>
<td>1/8</td>
<td>½ then 1/8</td>
<td>¾ then 1/8</td>
<td>½ then ¾</td>
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<tr>
<td>Erythromycin</td>
<td>Tablet- 250mg</td>
<td>Diptheria, Pertussis-12.5mg/kg/dose four times daily</td>
<td>¼ ½ ¼ 1</td>
<td>1 ½</td>
<td></td>
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<tr>
<td>Cefixime</td>
<td>Tablet- 100 mg</td>
<td>Dysentery, UTI-5mg/kg/dose twice daily Enteric fever-10mg/kg/dose twice daily</td>
<td>¼ ½ ¼ 1 1½ 2 2½</td>
<td>1 ¼</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Syrup- 100 mg/5ml</td>
<td></td>
<td></td>
<td>3</td>
<td>2.5</td>
<td>4</td>
<td>5</td>
<td>7.5</td>
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<td>Route(Concentration)</td>
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<td>Remarks</td>
<td>3-&lt;6kg</td>
<td>6-&lt;10kg</td>
<td>10-&lt;15kg</td>
<td>15-&lt;20kg</td>
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<tr>
<td>Metronidazole</td>
<td>IV- 500mg/100ml</td>
<td>Amoebiasis, Giardiasis 15 mg/kg/dose three times daily</td>
<td>Oral ulcers- 7.5 mg/kg/dose three times daily(half of above dose)</td>
<td>10 ml</td>
<td>20ml</td>
<td>40ml</td>
<td>40ml</td>
<td>50ml</td>
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<td>Syrup- 200 mg/5ml</td>
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<td>Tablet- 400 mg</td>
<td></td>
<td></td>
<td>¼</td>
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<tr>
<td>Vitamin A</td>
<td>Capsule</td>
<td>&lt; 6 months = 50,000 IU</td>
<td>Stat for prophylaxis If feature of Vitamin A deficiency present repeat doses on next day and 2-4weeks later</td>
<td>¼-1/2</td>
<td>½-1</td>
<td>1</td>
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<td></td>
<td></td>
<td>6 - 12 months = 1,00,000 IU</td>
<td></td>
<td>1/2</td>
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<td>&gt;12 months &amp;&lt;8 kg = 1,00,000 IU</td>
<td></td>
<td>1</td>
<td>2-4</td>
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<tr>
<td></td>
<td></td>
<td>&gt;12 months &amp;&gt; 8 kg = 2,00,000 IU</td>
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<td>Drugs</td>
<td>Route(Concentration)</td>
<td>Doses</td>
<td>Remarks</td>
<td>3-&lt;6kg</td>
<td>6-&lt;10kg</td>
<td>10-&lt;15kg</td>
<td>15-&lt;20 kg</td>
<td>20-&lt;29kg</td>
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<tr>
<td>Folic acid</td>
<td>Oral</td>
<td>5 mg stat then 1 mg(1/4th tab of 5mg) once a day</td>
<td></td>
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<tr>
<td>Multivitamin</td>
<td>Oral</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Iron</td>
<td>Oral 920 mg/ml of elemental iron</td>
<td>Iron deficiency anemia 3 mg/kg/dose twice daily Prophylaxis 1.5 mg/kg/dose twice daily</td>
<td>Continue 3 months following normalization of haemoglobin In iron deficiency anemia</td>
<td>1ml</td>
<td>1.25ml</td>
<td>2ml</td>
<td>2.5ml</td>
<td>4ml</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>IV/IM</td>
<td>25 mg/kg/dose three to four times daily Maximum 1 gm/dose</td>
<td>Use four times per day IV doses for meningitis and cholera Vial of 1 g mixed with 9.2ml sterile water to give 1g/10ml</td>
<td>0.75-1.25ml</td>
<td>1.5-2.25ml</td>
<td>2.5-3.5ml</td>
<td>3.75-4.75ml</td>
<td>5-7.25ml</td>
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<tr>
<td>Syrup 125mg/5ml</td>
<td></td>
<td></td>
<td></td>
<td>3-5 ml</td>
<td>6-9 ml</td>
<td>10-14 ml</td>
<td>15-19 ml</td>
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<tr>
<td>Tablet 250 mg</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1 ½</td>
<td>2</td>
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<tr>
<td>Drugs</td>
<td>Route(Concentration)</td>
<td>Doses</td>
<td>Remarks</td>
<td>3-&lt;6kg</td>
<td>6-&lt;10kg</td>
<td>10-&lt;15kg</td>
<td>15-&lt;20 kg</td>
<td>20-&lt;29kg</td>
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<tr>
<td><strong>Cotrimoxazole</strong></td>
<td>Tablet- 480mg</td>
<td>4 mg/kg of trimethoprim equivalent twice daily Double dose in Interstitial pneumonia in HIV- 8mg/kg TMP three times a day</td>
<td>Avoid in jaundiced and premature neonates</td>
<td>¼(1/2)</td>
<td>½(1)</td>
<td>1(2)</td>
<td>1(2)</td>
<td>1(2)</td>
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<tr>
<td></td>
<td>Tablet 120 mg</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Syrup 240 mg/5ml</td>
<td></td>
<td></td>
<td>2 ml</td>
<td>3.5 ml</td>
<td>6 ml</td>
<td>8.5 ml</td>
<td>10 ml</td>
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<tr>
<td><strong>Tetracycline</strong></td>
<td>Eye ointment</td>
<td></td>
<td>Thrice a day</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Gentian violet(0.5%)</strong></td>
<td>Mouth paint</td>
<td></td>
<td>Four times a day</td>
<td></td>
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<tr>
<td>Drugs</td>
<td>Route(Concentration)</td>
<td>Doses</td>
<td>Remarks</td>
<td>3-&lt;6kg</td>
<td>6-&lt;10kg</td>
<td>10-&lt;15kg</td>
<td>15-&lt;20 kg</td>
<td>20-&lt;29kg</td>
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<tr>
<td>Amoxycillin Clavulinic acid</td>
<td>Oral liquid: 125 mg amoxicillin + 31.25 mg clavulanic acid/5 mL AND 250 mg amoxicillin + 62.5 mg clavulanic acid/5 mL</td>
<td>ASOM: 30 mg/kg/dose three times a day</td>
<td></td>
<td>4ml</td>
<td>6ml</td>
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<td>15ml</td>
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<tr>
<td>Ceftazidime</td>
<td>IV</td>
<td>CSOM due to pseudomonas-50mg/kg/dose three times daily</td>
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<tr>
<td>Artesunate</td>
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<tr>
<td>Quinine</td>
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<tr>
<td>Artemether</td>
<td></td>
<td>See Chapter of malaria</td>
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<tr>
<td>Drugs</td>
<td>Route(Concentration)</td>
<td>Doses</td>
<td>Remarks</td>
<td>3-&lt;6kg</td>
<td>6-&lt;10kg</td>
<td>10-&lt;15kg</td>
<td>15-&lt;20kg</td>
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<td>Artemether/ Lumenatrine(ACT)</td>
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<td>Chloroquine</td>
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<td>Primaquine</td>
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<tr>
<td>Albendazole</td>
<td>Oral</td>
<td>1-2 years- 200 mg &gt;2 years- 400 mg</td>
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<tr>
<td>Magnesium sulphate(50%)</td>
<td>IM 0.5g/mL in 2 mL ampoule</td>
<td>Malnutrition 0.3 ml/kg upto 2 ml</td>
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<tr>
<td>Potassium chloride</td>
<td>Oral(20 meq/15 ml)</td>
<td>Malnutrition-0.75-1meq(0.5-0.75ml)/kg/day in four divided doses</td>
<td></td>
<td>3.5ml</td>
<td>6.5ml</td>
<td>10</td>
<td>14</td>
<td>20</td>
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<tr>
<td>Drugs</td>
<td>Route(Concentration)</td>
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<td>Remarks</td>
<td>3&lt;-6kg</td>
<td>6&lt;-10kg</td>
<td>10&lt;-15kg</td>
<td>15&lt;-20 kg</td>
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<tr>
<td>Zinc</td>
<td>Oral</td>
<td>Malnutrition- 2 mg/kg/day Diarrhoea- &lt;6 months- 10 mg 6 months-5 years- 20 mg</td>
<td></td>
<td>10 mg</td>
<td>15 mg</td>
<td>25 mg</td>
<td>35 mg</td>
<td>50 mg</td>
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<tr>
<td>Ketamine for anaesthesia in major procedure</td>
<td>IM</td>
<td>Loading dose- 5-8 mg/kg Further dose 1-2mg/kg( if required)</td>
<td>Calculate exact dose acc to body weight</td>
<td>20-35 mg</td>
<td>40-60 mg</td>
<td>60-100 mg</td>
<td>80-140 mg</td>
<td>125-200 mg</td>
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<td></td>
<td>IV</td>
<td>Loading dose 1-2 mg/kg Further dose 0.5-1 mg/kg(if required)</td>
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<td>5-10 mg</td>
<td>8-15 mg</td>
<td>12-25 mg</td>
<td>15-35 mg</td>
<td>25-50mg</td>
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<td>Ketamine for light anaesthesia in minor procedures</td>
<td>IM</td>
<td>2-4 mg/kg</td>
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<td></td>
<td>12-25 mg</td>
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<td></td>
<td>IV</td>
<td>0.5-1mg/kg</td>
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REFERENCES

12. Government of Nepal, Ministry of Health, Department of Health Services, Child Health Division, IMNCI Section. Comprehensive Newborn Care Training Package for Level II Hospital Care. 2073
<table>
<thead>
<tr>
<th>S. N.</th>
<th>Name of Participant</th>
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<th>Organization</th>
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<tbody>
<tr>
<td>1</td>
<td>Dr. R.P. Bichha</td>
<td>Director</td>
<td>FWD</td>
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<tr>
<td>2</td>
<td>Dr. Rajendra P Pant</td>
<td>Director</td>
<td>CHD</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Bikash Lamichhane</td>
<td>Director</td>
<td>CHD</td>
</tr>
<tr>
<td>4</td>
<td>Dr. Jhalak Sharma Gautam</td>
<td>Section Chief, Child Health and Immunization Section</td>
<td>FWD</td>
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<td>5</td>
<td>Parashuram Shrestha</td>
<td>Chief IMNCI Section</td>
<td>CHD</td>
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<tr>
<td>6</td>
<td>Deepak Jha</td>
<td>Sr. PHO</td>
<td>FWD</td>
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<td>7</td>
<td>Dr. Rahul Jha</td>
<td>MO</td>
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<tr>
<td>8</td>
<td>Dr. Kalpana Upadhayay Subedi</td>
<td>Chief Consultant Pediatrician</td>
<td>PMWH, Thapathali</td>
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<tr>
<td>9</td>
<td>Dr. Prerana Kansakar</td>
<td>Pediatrician</td>
<td>Patan Academy of HS</td>
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<tr>
<td>10</td>
<td>Dr. Dinesh Dharel</td>
<td>Consultant</td>
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<td>11</td>
<td>Dr. Amrit Pokhrel</td>
<td>Pediatrician</td>
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<td>Dr. Prajwal Paudel</td>
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<td>Dr. Niraj Nakarmi</td>
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<td>14</td>
<td>Deepak Chaulagain</td>
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