सत्यमेव जयते

NATIONAL HEALTH MISSION
राष्ट्रीय स्वास्थ्य मिशन

CHILD HEALTH DIVISION

Ministry of Health and Family Welfare

Government of India

NEWBORN STABILIZATION UNIT TRAINING PARTICIPANTS' MODULE

2020

सबका साथ, सबका विकास, सबका विश्वास
Sabka Saath, Sabka Vikas, Sabka Vishwas

सत्यमेव जयते

डॉ हर्ष वर्धन
Dr Harsh Vardhan

स्वास्थ्य एवं परिवार कल्याण, विज्ञान और प्रौद्योगिकी व पृथ्वी विज्ञान मंत्री, भारत सरकार

Union Minister for Health & Family Welfare, Science & Technology and Earth Sciences Government of India

MESSAGE

It gives me immense pleasure to commemorate the National Newborn Week from 15th to 21st November, 2020 and launch the training module on "Newborn Stabilization Units (NBSUs)" for optimal management of newborn care at First Referral Units (FRU).

The health of children including newborns continues to be of highest priority to our Government. We are committed to reducing Neonatal Mortality Rate to single digit by the year 2030 - a target which has been much appreciated globally and is more ambitious than the targets set under Sustainable Development Goals.

I am also happy to note that to provide quality services to newborns at FRUs, my Ministry has developed a training module for NBSUs. I am sure this will help doctors and nurses to acquire essential knowledge and skills for optimal care of neonates thereby improving health status of newborns.

I wish all the best and hope this module will work as a good resource for capacity building of our healthcare personnel.

(**Dr. Harsh Vardhan**)

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सत्यमेव जयते

सर्वेसन्तु निरामया

स्वच्छ भारत
एक कदम स्वच्छता की ओर

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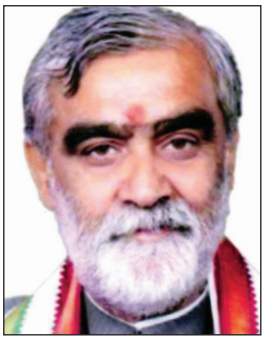

MESSAGE

The Ministry of Health and Family Welfare, Govt. of India has implemented a number of policies and programmes aimed at ensuring universal access to health coverage and reducing child and neonatal mortality.

Under the umbrella of RMNCAH+N strategy in National Health Mission, Child Health have always been of high priority. In 2014, the Government of India launched the India Newborn Action Plan (INAP) in order to intensify the efforts towards improving newborn health. INAP has successfully brought a sharper focus on implementation of the existing and new initiatives for the newborns both for their survival and subsequent growth and development.

To fulfill the role of providing quality service for newborn care in the health facilities, Ministry of Health and Family Welfare, Government of India has developed training packages for Newborn Stabilization Units. Capacity building of the service providers are of utmost importance as newborn care and survival necessitate knowledge and skills of high order in the providers.

I would like to express my heartfelt appreciation to all those who contributed to the preparation of these documents. I am sure that these packages will help in delivering newborn health services with quality care, all across the country.

(Ashwini Kumar Choubey)

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MESSAGE

Childhood and infant mortality in India has reduced substantially during the last decade, but the rate of neonatal mortality continues to remains high. Nearly two-thirds of infant deaths each year occur within the first four weeks of life and about two-thirds of these occur within the first week itself. Thus, the first few days and weeks of life are extremely critical for survival of a child. Therefore, newborns must be provided special attention during their birth for a healthy and safe start to life.

India Newborn Action Plan envisages that the country will make all possible endeavors and attain the target of single digit newborn mortality by 2030, a target which is more ambitious than even the corresponding global SDG target. Effective and quality Newborn care is a critical challenge faced by every health care setting dealing in child birth and child care. Building capacities of Doctors, Nurses and ANMs to improve quality of services in low resource settings remains a challenge but is urgently required for our country.

Newborn Stabilization Units (NBSUs) are an important part of the facility based newborn care at the first referral units to provide basic stabilization and feeding support to babies delivered at the facility and to sick and small babies referred to the facilities from outside. The NBSU training package has been developed with an aim to empower the health care providers with essential knowledge and skills for optimal management of any newborn presenting at NBSU. This aims to bring about the desired changes in quality of services at these units established at the sub district level.

I am sure that the NBSU training package will act as an enabling tool for health care providers. Functionalization of the NBSUs will result in effective utilization of resources and contribute in a significant way to reduce preventable mortality in the country.

(Rajesh Bhushan)

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PREFACE

A healthy start to life is vital for establishing the foundation of a healthy nation. During the last one and half decades, India has made concerted efforts towards improvement of maternal and child health and has achieved significant reduction in the maternal and child mortality. With significant gains in child mortality reduction, the contribution of newborn mortality to child mortality has increased despite a decline in absolute number of neonatal deaths. This points to an urgent need to accelerate efforts to improve newborn health.

As a part of the Reproductive, Maternal, Newborn, Child, Adolescent Health and Nutrition (RMNCAH+N) strategy of the National Health Mission, newborn health has always been at priority. A well-defined multi level care system for newborn care at public health facilities has been scaled up massively and is supported by community level interventions. Health systems strengthening over the last 15 years has brought about considerable improvement in the infrastructure, availability of human resources, availability of drugs & equipment along with ancillary services.

Under facility based newborn care, "Newborn Stabilization Units" at the first referral units have been part of the care system since 2011. However, these units continue to remain underutilized, one of the main reasons being the lack of confidence and poor skills of healthcare providers working in these units. As a part of the strategy to revitalize these units, a new "NBSU Training Package" for both doctors and nurses has been developed by the Child Health Division, GoI with technical support from the Norway India Partnership Initiative (NIPI), technical experts and other development partners. I do hope that this new package will be rolled out across the States and UTs to reinvigorate the facility based newborn care system and pave way towards strengthening of timely and quality care for the newborns, closer to their homes.

(Vandana Gurnani)

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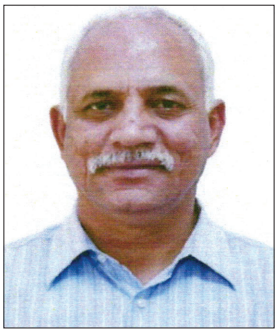

FOREWORD

With the National Health Policy-2017 and the India Newborn Action Plan, India is committed to accelerate reduction in the newborn deaths by more than half, by the year 2030. Newborn health occupies the centre-stage in the Reproductive, Maternal, Newborn, Child Health, Adolescent Health and Nutrition (RMNCAH+N) strategy and inter linkages between various components have a significant impact on the mortality and morbidity rates of a newborn.

Under the National Health Mission, newer interventions and improved service delivery platforms have been included in the newborn health programme over a period of time. This mandates a review of existing training packages and strategies in order to incorporate these new topics and skills sets emerging out of new evidences and technological advances which will work towards improving the quality of care at the health facilities.

With this background, the Child Health Division along with the support of technical experts and development partners including NIPI, has developed a "NBSU Training Package" for training of doctors and nurses working in the Newborn Stabilization Units (NBSU). Until now, the Facility Based IMNCI package was being used for this purpose. This new package equips both doctors and nurses to deliver interventions for management and stabilization of small and sick newborns. It is further envisioned that these units will play a key role in scaling up Kangaroo Mother Care Services, one of the most effective interventions , to save lives of preterm and low birth weight babies.

I do hope that by adopting this training package, a large number of babies will receive quality care at the sub district level thus preventing referral and overburdening of district level facilities, resulting in improvement of neonatal survival to a great extent.

18/11/2020

(Dr. Manohar Agnani)

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ACKNOWLEDGEMENT

India witnessed a consistent and sharp decline in maternal and child mortality in comparison to global averages since the inception of National Health Mission (NHM). India's newborn mortality has reduced by more than one-third in the last decade. With the National Health Policy 2017 in place and with sight on the Sustainable Development Goal agenda, the opportunity now is to build upon the gains made in the last decade, accelerate and sustain the pace of improvement.

In order to scale up the implementation of the facility based newborn care programme, at New Born Stabilization Units (NBSUs) at sub district level, it was a felt need that a training package should be designed exclusively for training of the health care providers to deliver full set of services at the NBSUs. Accordingly, the Child Health Division along with the technical support from the Norway India Partnership team has developed the "NBSU Training Package" for doctors and nurses to equip them with the necessary technical knowledge and skills for provision of quality care to small and sick newborns in these units.

I sincerely thank my colleagues Dr. Ajay Khera, Ex-Commissioner MCH & Dr. P. K. Prabhakar, Ex- JC, Child Health, for starting the process. I specially acknowledge the efforts of Dr. Harish Kumar, Dr. Harish Chellani, Dr. Renu Srivastava, Dr. Deepti Agrawal and NIPI team for their assistance in the development of this package.This was an intensive process that required a lot of brainstorming and deliberations. I would therefore take this opportunity to thank all the academicians, technical experts from NCC, State Programme officers, Child Health Division officers and consultants who participated in the discussions and shared their valuable experiences and suggestions.

As a next step, I will urge the State / UTs, to roll out this package at the earliest. Concerted, consistent efforts of all concerned stakeholders are solicited for achieving significant decrease in neonatal mortality.

(Dr. Sumita Ghosh)

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CHAPTER 1
Assessment & Management of Newborns with Emergency Signs

INTRODUCTION

Newborn Stabilization Units (NBSU) are an important part of the facility based newborn care. They have been established at the sub district level (First Referral Unit/Community Health Centre) in order to provide facility based newborn care to babies delivered at the same health facility and to sick and small babies delivered at other health facilities closer to FRU/CHC. The advantage of a functional NBSU is that it adds to the total bed capacity available in the district for newborn care, while making provision for newborn care closer to home for many sick and small babies. Current data shows that the mortality is higher in babies referred from home/other health facilities (out born), as compared to the facility born babies (inborn). This could be due to the fact that currently newborns are referred to Special Newborn Care Unit (SNCU), without adequate pre referral management. This gap can be addressed at an optimally functioning NBSU. NBSUs have an important role of stabilizing these sick & small newborns before they reach SNCU and managing not so seriously sick newborns so that the limited SNCU beds are utilized for those who need advanced care.

To fulfil your role as quality service provider for newborn care in the FRU/CHC, this course will help you in acquiring essential knowledge and skills for optimal management of newborns presenting at NBSU.

This module will equip you in acquiring the following skills:

1. Identifying emergency signs and their treatment in newborns.
2. Referral of newborns after initial management
3. Management of newborns admitted to NBSU.

Activity 1: Group discussion

What are the common conditions for which newborns need hospitalization?

Which skills would help you provide quality newborn services at your health facility?

1.1. Arrival & Rapid Assessment

Neonatal deaths can occur in seriously ill newborns, even after reaching the hospital. It is therefore important to make immediate clinical assessment and initiate emergency treatment in these babies. Assess every newborn for emergency signs, soon upon arrival, regardless of the place from where the newborn is brought (another ward, another health care facility, or home).

- The first step is rapid screening to identify life threatening conditions. This is known as triage or 'sorting'. A few of them may have emergency signs indicating that the problem is so serious that the newborn may die within minutes, if not immediately treated.

- Instruct staff to call a health care provider as soon as a newborn is brought to the facility. Do not keep the newborn waiting to receive care.
- Ensure that the admission and reception area is organized, so that every newborn can be seen quickly after arrival.
- Assess all sick or small babies before doing any of the usual administrative procedures to admit the newborn.

Sick newborns are triaged into following categories:

E Emergency
P Priority
N Non-urgent

Categories after Triage	Action required
Emergency cases	Need emergency treatment
Priority cases	Need assessment and rapid action
Non-urgent cases	Need assessment and counseling

Signs of triage

Emergency Signs	Priority Signs	Non-urgent Signs
• Hypothermia (Temp <35.5°C) • Apnoea or gasping respiration(rate >70, severe retractions, grunt) • Central cyanosis • Shock (cold periphery, CFT >3secs, weak and fast pulse) • Coma, convulsions or encephalopathy	• Tiny neonate (<1800 gms) • Temp 36.4°C-35.5°C • Respiratory distress (rate >60 but no or minimal retractions) • Irritable/restless/jittery • Refusal to feed • Abdominal distension • Severe jaundice (appears in <24 hours/ stains palms and soles/lasts >2 weeks) • Severe pallor • Bleeding from any site • Major congenital malformations (Tracheo esophageal fistula, Menigomyelocele, Anorectal malformation) • Large baby >3.8 kg or according to the percentile charts	• Jaundice • Transitions stools • Developmental peculiarities • Minor birth trauma • Possetting • Superficial infections • Minor malformations • All cases not categorized as Emergency/Priority
Action		
Neonates with emergency signs are at high risk and require urgent intervention and emergency measures. These neonates with emergency signs after stabilization are to be admitted or referred to the SNCU (Special Newborn Care Unit).	Neonates with priority signs are sick and would need immediate assessment. They should be attended to on be a priority basis. These will also need to referred to SNCU or admitted in NBSU.	In neonates with no emergency or priority signs, proceed with assessment and further treatment according to neonate's requirement

- First assess every neonate for emergency signs. Those with emergency signs require urgent intervention and immediate emergency treatment.
- If emergency signs are not present, look for priority signs. Those with priority signs should alert the health provider to a neonate who is seriously ill and needs immediate assessment and treatment.
- Neonates with no emergency or priority signs are treated as **non-urgent cases.**

Newborns in danger are those with the following clinical signs:

Emergency signs

- Low body temperature (Temp.<35.5°C)
- Not breathing at all "OR" gasping respiration
- Severe respiratory distress
- Central cyanosis
- Shock
- Convulsions/Unconsciousness

1.2. Clinical Assessment and Emergency Management

Perform following 3 steps (RED) as soon as a baby arrives:

✓ Place the newborn on a warm surface under a **Radiant warmer and under good light and record temperature.**
✓ Check for the **Emergency signs and institute appropriate treatment while planning for referral to SNCU/higher facility.**
✓ If there is an emergency sign perform bedside **diagnostics** (check blood glucose & oxygen saturation).

Give priority to stabilizing the sick or small baby before assessing and treating the underlying cause of the problem.

✓ **Place the newborn on a warm surface under a radiant warmer and under good light**
Placing the baby on a warm surface under a radiant warmer and under good light is the first essential step that you should perform in every baby irrespective of the underlying condition. This is important as many sick babies are hypothermic and their survival chances increase, if hypothermia is taken care, of even before instituting any resuscitation measure.

Record temperature

Take axillary temperature using a digital thermometer. The digital thermometer needs to be switched on for recording the temperature. Temperature is recorded by placing the tip of digital thermometer in roof of dry axilla parallel to the trunk. Newborn's arm is held close to the body to keep the thermometer in place. The temperature is read when the thermometer beeps. Normal axillary temperature is 36.5°C to 37.5°C. The recording should be noted after the beep. There should be no addition or subtraction to the displayed temperature.

Hypothermia is graded as:

- Cold stress : 36.4 – 36.0°C (97.5 – 96.8°F)
- Moderate hypothermia : 35.9 – 32.0°C (96.2 – 89.6°F)
- Severe hypothermia : < 32°C (89.6°F)

In hypothermia, the temperature is below 36.5°C. The common signs and symptoms in a hypothermic newborn are lethargy, irritability, poor feeding and breathing difficulty (tachypnoea/apnoea).

Temperature below 35.5°C is an emergency sign.

Tactile assessment of temperature: Temperature of a baby can be assessed with reasonable precision by human touch, the reliability of which can be enhanced by practice. Abdominal temperature is representative of the core temperature and it is reliable in the diagnosis of hypothermia. The warm and pink feet of the newborn indicate that the newborn is in thermal comfort, but when feet are cold and abdomen is warm, it indicates that the newborn is in cold stress. In hypothermia, both feet and abdomen are cold to touch.

In a newborn being nursed under a radiant warmer, temperature is usually recorded by a thermistor probe. The thermistor probe is attached to the skin over upper right side of the abdomen. The thermistor senses the skin temperature and displays it on the panel.

Ensure:

Assessment for other emergency signs is started while recording temperature.

Treatment is initiated immediately when an emergency sign is detected, while simultaneously completing the assessment for other emergency signs.

Table 1.1: Assessing newborn for emergency signs

Assessment	Emergency signs
• **Place under radiant warmer and attach thermistor probe. Record temperature using digital thermometer**	• **Low Body temperature (temperature<35.5°C)**
• **Look at breathing & count respiratory rate:** Not breathing at all, even when stimulated; or gasping; or ◆ Slow breathing - Respiratory Rate <20/min ◆ Apnoea – Breathing with prolonged, intermittent pauses lasting >20 seconds or less if associated with bradycardia/cyanosis	• **Not breathing at all or gasping respiration**
• **Check for severe respiratory distress** ◆ Respiratory Rate >70/min ◆ Severe chest indrawing ◆ Grunting	• **Severe respiratory distress**
• **Check for central cyanosis** Blue skin/tongue and lips	• **Central cyanosis**
• **Assess circulation** Shock - If newborn has cold hands/peripheries with capillary refill time (CRT) longer than 3 seconds and weak and fast pulse (>160/minute).	• **Shock**
• **Check for abnormal movements** Convulsions - Repetitive jerking movements of limbs or face, continuous extension or flexion of arms and legs; may be generalized, focal or multifocal. Many a times, convulsions in newborns are subtle (e.g. staring, repetitive blinking of eyes, or repetitive movement of mouth or tongue etc.)	• **Convulsions/Unconsciousness**
• **Check for consciousness level** Assess whether the baby is sleeping, lethargic or unconscious	
• **Perform bedside diagnostics** Check blood glucose levels & SpO_2	

ACTIVITY 1.1:

DRILL TO REVISE: WHAT STEPS TO TAKE ON RECEIVING A SICK OR SMALL NEWBORN?

1.

2.

3.

ACTIVITY 1.2:

DRILL TO IDENTIFY: WHICH CONDITIONS REQUIRE EMERGENCY MANAGEMENT?

Sign/Condition	Emergency Treatment Needed: Yes or No
Jitteriness	
Convulsions	
Fast breathing (66/min)	
Birth weight 1800 grams	
Cyanosis of lips	
Any abdominal distension	
Severe respiratory distress	
Bleeding From umbilicus	
Shock	
Temperature 35°C	
Diarrhoea	
Skin rashes	
Gasping for breath	
Temperature 36°C	
Refusal to feed	

1.2.1. How to assess for emergency signs:

Look at breathing & count respiratory rate:

Observe breathing effort and count the respiratory rate, for at least one minute, if the baby is not breathing; or is gasping; or respiratory rate is less than 20 breaths per minute, initiate immediate management.

Check for severe respiratory distress

Observe for severe lower chest wall indrawing or use of the accessory muscles for breathing, which may cause the head to nod or bob with every inspiration. Severe respiratory distress is present, if the newborn has any of the following:

a. Respiratory Rate >70/min
b. Severe chest indrawing
c. Grunting
d. $SpO_2 \leq 90\%$

LOOK: Count the breaths in one minute. Repeat the count if elevated.

Count the breaths in one minute to decide if the newborn has fast breathing. Tell the mother you are going to count her newborn's breathing. The newborn must be calm and quiet when you count the respiratory rate. If the newborn is crying or agitated, you will not be able to obtain an accurate count of the newborn 's breaths. If the newborn is sleeping, do not wake him. To count the number of breaths in one minute, use a watch with a second's hand or a digital watch. Look for breathing movement, anywhere on the newborn's chest or abdomen. Usually you can see breathing movements even in a newborn who is clothed. If you cannot see the movement easily, ask the mother to lift the newborn 's shirt. If the newborn starts to cry, ask the mother to calm the newborn before you start counting. If you are not sure about the number of breaths you counted (for example, if the newborn was actively moving and it was difficult to watch the chest, or if the newborn was upset or crying), repeat the count.

LOOK for severe chest indrawing

If you did not lift the shirt when you counted the breaths, ask the mother to lift it now. Look for chest indrawing when the infant breathes in. Look at the lower chest wall (lower ribs). The newborn has chest indrawing if the lower chest wall goes IN when the infant breathes IN. Chest indrawing occurs when the effort needed to breathe in, is greater than normal. In normal breathing, the whole chest wall (upper and lower) and the abdomen move OUT when the young infant breathes IN. When chest indrawing is present, the lower chest wall goes IN as the young infant breathes IN. If you are not sure about the presence of chest indrawing, look again. If the body is bent at the waist, it is hard to see the lower chest wall move. Ask the mother to change the position, so that the baby is lying flat in her lap. If you still do not see the lower chest wall go IN, when the baby breathes IN, the newborn does not have chest indrawing. For chest indrawing to be present, it must be clearly visible and present all the time. If you only see chest indrawing when the

baby is crying or feeding, the newborn does not have chest indrawing. If only the soft tissue between the ribs goes in when the infant breathes IN (also called intercostal indrawing or intercostal retractions), the infant does not have chest indrawing.

Mild chest indrawing is normal in a young infant (till two months' age) because the chest wall is soft. Severe chest indrawing is very deep and easy to see. Severe chest indrawing is a sign of pneumonia and is serious in a young infant.

LOOK and LISTEN for grunting

Grunting is the soft, short sound a young infant makes when breathing OUT. Grunting occurs when newborn is having trouble breathing.

Check for Central Cyanosis

Central cyanosis occurs when there is an abnormally low level of oxygen in the blood. 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.

Identification of central cyanosis can be difficult. Examine the tongue or gums (not the lips) in natural light or the light from an incandescent light bulb (even healthy people may look slightly blue under fluorescent light). If unsure, compare the colour of the baby's tongue with that of the mother's. Bluish discoloration of the nail-beds indicates peripheral cyanosis, which can occur with vasoconstriction as a result of hypothermia. This is not central cyanosis and does not denote low oxygen level.

Assess circulation

Assess if a newborn has a poor circulation:

- Does the newborn have cold hands?
- Is the capillary refill time (CRT) longer than 3 seconds?
- Is the pulse weak and fast?

Feel the temperature of extremities. If the newborn's hands feel cold, you need to assess the capillary refill.

Is the CRT ≥ 3 seconds?

Capillary refill is a simple test that assesses how quickly blood returns to the skin after pressure is applied and indicates adequacy of tissue perfusion.

- CRT is checked on the central part of the body such as the chest. Gentle pressure is applied by the tip of finger for 3-5 seconds e.g. by slowly counting from 1 to 5, this results in blanching of the underlying surface. Observe how fast the blanched area refills and becomes pink after the tip of the finger is lifted from the skin surface. Normal capillary refill time is < 3 seconds.

Is the pulse weak and fast?

The central pulse (a pulse nearer to the heart e.g. brachial pulse) should be felt. If this is strong and not obviously fast, then the pulse is adequate and no further assessment is needed. Fast pulse is labelled when the rate is more than 160 per minute.

Check for abnormal movements

The most common causes of abnormal movements in a newborn are convulsions and jitteriness. Convulsions can be due to asphyxia, birth injury, or hypoglycaemia and could also be a sign of meningitis or neurologic problems. Between the convulsions, the newborn may appear normal or may be unconscious, lethargic, or irritable.

How to differentiate convulsions and jitteriness?

- Like convulsions, jitteriness is characterized by repetitive movements; however, in a jittery newborn, these movements are at a faster pace than convulsions.
- Like spasms, jitteriness can be precipitated by sudden handling of the newborn or by loud noises, but it is usually stopped by cuddling, change in position or restraining the newborn's limb.

Jitteriness

Jitteriness must be differentiated from seizures in neonates.

1. Jitteriness is not associated with ocular deviation.
2. It is stimulus sensitive (e.g., triggered by stimulation or easily stopped with change in position or restraining of the limb).
3. The movement resembles a tremor and no autonomic changes, such as tachycardia, are associated with it.

Seizures, often, are associated with ocular deviation and are not stimulus sensitive. Autonomic changes frequently accompany them.

The assessment of a seizure is based on observation; convulsion must be witnessed by a health care worker in the health facility. A convulsion can be recognised as sudden loss of consciousness, associated with uncontrolled jerky movements of the limbs and/or the face. The same may be associated with stiffening of the arms and legs or uncontrolled movements of the limbs.

Sometimes, in newborns, jerky movements may be absent, but there may be twitching (abnormal facial movements)/abnormal movements of the eyes, hands or feet and the neonate may appear awake but unresponsive. These are classified as subtle seizures.

Subtle seizures can be recognized by following features:

Subtle convulsion

- Repetitive blinking, eye deviation, or staring
- Repetitive movements of mouth or tongue
- Purposeless movement of the limbs, as if bicycling or swimming
- Apnoea (spontaneous cessation of breathing for more than 20 seconds or less, if associated with cyanosis and bradycardia)

Check for consciousness level

A newborn who is awake is, obviously, conscious. If the newborn appears asleep, ask the mother whether the baby is sleeping. If there is any doubt, assess the level of consciousness by assessing response to sound and if there is no response, then the infant can be gently shaken to elicit a response. A little shake to the arm or leg should be enough to wake a sleeping newborn.

A newborn who does not respond to any of the above stimuli, may be lethargic or unconscious.

Lethargy is decreased level of consciousness from which the newborn can be aroused, but with difficulty. Unconscious babies have profound sleep; are unresponsive to stimuli and may not respond to a painful stimulus.

✓ **If newborn has an emergency sign, perform bedside diagnostics**

A. Check blood glucose levels
B. Check oxygen saturation

Check blood glucose levels

- Perform blood glucose estimation using glucometer. The procedure is described in detail in skill station.
- Hypoglycaemia is described as blood glucose levels below 45mg/dl.
- Small (LBW and or premature) and sick babies are more prone to hypoglycaemia.
- Hypoglycemia may be symptomatic or asymptomatic. It is important to realize that even asymptomatic hypoglycemia can cause brain damage and should be treated without delay.

Check for oxygen saturation

Use pulse oximeter to check oxygen levels (see annexure for details). If a newborn has severe respiratory distress or gasping respiration or apnoea or central cyanosis, the oxygen levels should be monitored. Oxygen saturation (SpO_2) should be maintained between 91-95%.

- While looking for emergency signs, introduce yourself to the mother/attendant and ask:
  - What is the problem with the newborn?
  - When did the problem(s) first start?
  - How old is the newborn?
- Details of any treatment received so far?
- Keep the newborn with the mother, if possible, and allow her to be present during the assessment and for any procedures.
- Provide immediate management (as described in the section below) for any life- threatening emergency signs, before continuing with the further assessment.
- While initiating the emergency management, prepare for referral.

1.2.2. Management of newborn with emergency signs

Once emergency signs are identified, give prompt emergency treatment to stabilize the condition of the newborn. The general management of each of the emergency signs is given below:

Table 1.2: Management of emergency conditions

Emergency Signs	Actions
• **Low Body Temperature (temperature <35.5°C)**	• Maintain temperature under radiant warmer in servo control mode.(If warmer not available, put in skin to skin contact). Monitor axillary temperature every ½ hour till it reaches 36.5°C
• **Not breathing at all "OR" gasping respiration** • **Severe respiratory distress** • **Central cyanosis**	• If not breathing at all/gasping, maintain the airway by positioning the head correctly by placing a shoulder roll, suctioning the mouth and nose if required; stimulate to breathe, administer positive pressure ventilation with bag & mask. ✓ ***Attach pulse oximeter and monitor oxygen saturation – Provide oxygen if saturation is 90% or below.*** ✓ ***Prevent and treat hypoglycemia. If not possible to check blood glucose levels, Give 10% Dextrose bolus @2ml/kg slowly over one minute*** and start Glucose Infusion Rate (GIR) @6 mg/kg/min
• **Shock**	✓ If in shock, give IV fluid bolus 10 mL/kg normal saline over 20-30 minutes. Repeat bolus, if circulation does not improve.
• **Convulsions/Unconsciousness**	✓ If convulsing, give IV 10% Calcium gluconate at 2ml/kg in equal dilution with distilled water, slowly under cardiac monitoring. If seizure persists, give Injection Phenobarbitone at a dose of 20mg/kg (diluted with normal saline) slowly over 15-20 minutes ✓ ***Dress the newborn in warm clothes and a cap, and cover with a warm blanket.*** ✓ ***Refer after administering pre-referral dose of antibiotics and provide i/v fluids or oxygen support as required.*** ✓ ***Give Inj. Vit K1 if not given earlier, around birth.***

A sick newborn can present with one or more emergency signs. They all require maintenance of **Temperature, Airway, Breathing and Circulation (TABC),** in addition to specific management of the condition/emergency sign.

Common actions for any newborn with an emergency sign:

1. **Maintain temperature.** Keep the newborn under a radiant warmer. Remove cold or wet clothing.
2. **Position and clear airway, if required.**
3. **Oxygen:** Check oxygen saturation using pulse oximeter. Maintain SpO_2 between 91-95%. Give oxygen to newborns with saturation value of 90 or less.
4. **Prevent and Treat hypoglycemia:** Check blood glucose. If hypoglycemic (blood glucose <45 mg/dl), give 2 ml/kg body weight of 10% Dextrose, through IV route and start GIR @6mg/kg/min. If blood glucose cannot be checked quickly, assume the baby to be hypoglycaemic and administer IV glucose. If an IV line cannot be established quickly, provide 2 ml/kg body weight of 10% glucose or expressed breast milk through a nasogastric tube.
5. **Refer all newborns with emergency signs after stabilization.**
6. **Give fluids if newborn is not able to feed.**
7. **Give pre-referral dose of antibiotics** before referral. The antibiotics of choice to be given before transport are - ampicillin and gentamicin.

Table 1.3: Dose of pre-referral antibiotics

Give First Dose of Antibiotics Give first dose of Ampicillin (or Oral Amoxicillin*) and Gentamicin intramuscularly.				
	AMPICILLIN	**AMOXICILLIN**	**GENTAMICIN**	
	Dose: 50 mg per kg	Dose: 30-50 mg per Kg	Dose: 5 mg per kg	
	Add 1.3 ml sterile water to a vial of 250 mg=250 mg/1.5ml	Oral syrup (contains 125 mg in 5 ml)	Undiluted 2 ml vial containing 20 mg=2 ml at 10 mg/ml	or Add 6 ml sterile water to 2 ml vial containing 80 mg in 2 ml=8 ml at 10 mg/ml
WEIGHT				
< 1.5 kg	0.4 ml	2.0 ml*	0.5 ml	
1.5 - 2.0 kg	0.5 ml	2.0 ml*	1.0 ml	
2.0 - 3.0 kg	0.5 ml	2.5 ml*	1.0 ml	
3.0 - 4.0 kg	1.0 ml	3.0 ml*	1.5 ml	
4.0 - 5.0 kg	1.25 ml	4.0 ml*	2.0 ml	
***Determine if the child is able to take orally**				

Low Body Temperature (Temp. <35.5°C)

a. Check axillary temperature.
b. Remove any wet clothing and rewarm the baby, under radiant warmer in servo control mode. Assess temperature every half hour (in axilla).
c. If radiant warmer not available, place in skin to skin contact.
d. Keep the room warm (at least 26°C) using an external heating device, if needed.
e. Monitor temperature & capillary refill time during rewarming. Watch for apnoea and hypoglycemia
f. Check temperature regularly and ensure that the infant's temperature is maintained in the range 36.5–37.5°C.

Not breathing at all "OR" gasping respiration

a. Position and Clear airway by suction,
b. Initiate bag & mask ventilation, if there is apnoea, gasping or respiratory rate too slow (<20/minute). (The steps are described below).
c. In addition, all the common actions described above need to be taken.

How to administer Positive Pressure Ventilation (PPV) using self-inflating bag

Place the newborn on a firm, flat surface with head in the neutral position and place the face mask covering the chin, mouth and nose, but not the eyes. Stand at the head end of the newborn and squeeze the bag 40-60 times per minute using the dominant hand. Look for chest rise and check for effective PPV.

Check for heart rate after 30 seconds of effective ventilation:

a. If the heart rate is above 60 beats per minute (bpm), continue PPV.
   - Ventilate for 30 seconds and check HR and breathing. If HR is more than 100 bpm, stop PPV and quickly determine if the newborn is breathing spontaneously:
     - If the respiratory efforts are good and rate is normal (40 to 60 breaths per minute), stop ventilating;
   - If the newborn is gasping or not breathing, or the respiratory rate is less than 20 breaths per minute, continue ventilating. Monitor heart rate and breathing every 30 seconds during bag and mask ventilation.
   - If the newborn is not breathing regularly after 2 minutes of ventilation:
     - Insert an oro-gastric tube to empty the stomach of air and secretions;
     - Continue ventilation with oxygen

b. If heart rate is less than 60 bpm, **initiate chest compressions** along with PPV. Rate is 90 chest compressions, coordinated with 30 breaths per min (ratio 3:1), three compressions and one breath to be delivered in 2 seconds. After one minute of coordinated chest compression with PPV, monitor HR.
   - If HR continues to be less than 60 bpm, administer inj. Adrenaline (Details of dose and route will be discussed at the skill station) and continue chest compression with ventilation.

- Establish an IV line, if one is not already in place, and give a bolus of IV Normal saline 10 ml/kg body weight over 5-10 minutes, continue ventilation and chest compression (until the HR is above 60/bpm);
- Communicate with the family and organize transfer to the SNCU.

- If there is no sign of life (no breathing and no cardiac activity) since the initiation of resuscitative efforts and none detectable even after 10 minutes of resuscitation, stop resuscitation. Inform the family and provide emotional support to the family. However, if there was detectable heart or gasping response, then continue resuscitative efforts for 30 minutes, before declaring the baby dead.

Oxygen therapy

For all sick neonates, assess oxygen saturation using a pulse oximeter. Heated and humidified oxygen should be given if the oxygen saturation is ≤ 90%, and the oxygen flow should be regulated to maintain saturation between 91-95%. Use a pulse oximeter to guide oxygen therapy. Oxygen can be discontinued once the infant can maintain saturation > 90% in room air.

Oxygen delivery devices available for babies include nasal cannula, nasal prongs and head box. Nasal cannula, nasal prongs should be snugly fitting inside the nostrils, without blanching the nares. Ends of prongs should be cleaned twice daily, with saline and checked to avoid plugging by mucous or secretions.

- A flow rate of 0.5-1 litres/min should be maintained for nasal prongs
- Nasal prongs carry the advantage of permitting breast feeding while newborn is on oxygen therapy.
- Head box should allow for newborn's head movement within the box.
- Oxygen flow rate of 5-7 Litres/min is required for the headbox.
- Meticulous monitoring of SpO_2 and general condition should be ensured while the baby is on oxygen therapy.

Figure 1.1: Oxygen delivery devices- Nasal prongs and head box

Video 1
Oxygen delivery in neonates

Shock

In addition to maintaining temperature, airway, oxygen saturation, and glucose levels:

a. Give IV fluid bolus 10 mL/kg normal saline over 20-30 minutes. Repeat bolus, if circulation does not improve. This is described below in further detail.

Administer IV fluids

To administer IV fluids, superficial distal veins over dorsum of hands or feet are preferred.

- Fluid may be administered using a micro drip set or an infusion pump. Each mL of micro drip set equals 60 micro drops; thus, the amount of fluid required in mL/hour equals number of drops per minute.
- Always check the fluid bottle for type of fluid, bottle's seal, date of expiry and whether it contains clear fluid or not.
- Check the Intravenous site for leakage or displacement of cannula.

Monitoring: The clinical signs that should be monitored during treatment of shock to evaluate for response to therapy include:

- Heart rate [decrease in heart rate by at least 10 beats per minute]
- Respiratory Rate (normalization of RR)
- Capillary refill time (Improvement of CRT)
- Oxygen saturation (Imrpovement in SpO_2)

Look for signs of over-hydration

- Puffiness of eyes
- Weight gain
- Increasing liver size on per abdomen examination

In case of excess fluid administration, further fluid bolus should be stopped and only maintenance fluid therapy should be continued.

Video 2
IV access in newborns

Convulsions/Unconsciousness

a. Maintain temperature under radiant warmer
b. Position the newborn to maintain airway
c. Clear the airway, if required
d. Maintain SpO_2 between 91-95%
e. Check glucose levels; if blood glucose <45mg/dl, then treat with 10% dextrose as described below.
f. Give IV 10% Calcium gluconate at 2ml/kg (in equal dilution with distilled water), slowly over 5-10 minutes under cardiac monitoring.

g. If seizure persists, start Injection Phenobarbitone 20mg/kg loading dose (diluted with normal saline) over 20 minutes prior to referral.
h. For newborns with any signs of serious bacterial infection or sepsis, give first dose of antibiotic before referral.

Note that generalized and subtle convulsions are both managed in the same way.

Treatment of hypoglycaemia:

- **If blood Sugar >45mg:** Give breastfeed/20-30ml EBM/top feed, continue feeding and ensure 6 hourly blood sugar estimation.
- **If blood glucose <45mg/dl** by glucometer (if possible get confirmation done by plasma blood sugar levels), give treatment.
  - **Asymptomatic newborn: Provide one oral feed (direct breastfeed or EBM 20ml by spoon).** Assess blood sugar after an hour, if blood sugar remains below 45mg/dl, treat with IV dextrose as for symptomatic newborn (given below).
  - **Symptomatic newborn** (lethargy, limpness, sweating, respiratory distress, apnoea etc.): Give a bolus of 10% Dextrose @2ml/kg slowly over a minute (If IV access is difficult, give the same amount through OG tube) and follow by Dextrose infusion @6mg/kg/min. Start infusion of dextrose containing fluid at the daily maintenance volume according to the baby's age so as to provide a glucose infusion rate (GIR) of 6 mg/kg/min.(Refer to the table below)
  - Repeat blood glucose after half an hour. Refer to SNCU for further management.

How to prepare glucose infusion rates@6mg/kg/min for neonates with Birth weight ≥ 1500 gms using a mixture of D10 and D25 Volume (ml/kg/d)

Day of Life	IVF (ml/Kg/day)	D10 (ml/Kg/day)	D25 (ml/Kg/day)
D1	60	42	18
D2	75	68	7

Appropriate mixture of these two fluids will achieve the GIR @ 6mg/Kg/min.
It is mandated that an early referral for such a baby is planned by the team at NBSU

Treatment of hypocalcaemia

Collect the sample for estimation of Calcium levels if facility is available. Give 10% Calcium gluconate 2ml/Kg IV over 5-10 minutes. 10% Calcium gluconate is diluted with equal volume of distilled water and administered slowly under cardiac monitoring, preferably by an infusion pump (withhold infusion if HR< 100/min).

Do not add calcium to maintenance IV Fluid.

Administration of anticonvulsant:

Anticonvulsant drugs should be given if seizures persist, even after correction of hypoglycemia and hypocalcemia. First line drug for newborns is Phenobarbitone which is given in the loading dose of 20 mg/kg IV over 20 minutes (at the rate of 1mg/kg/min.).
If seizures persist after initial Phenobarbitone infusion, administer further boluses of 5mg/Kg, up to a total of 40 mg/Kg.

Table 1.4: i Dose of Phenobarbitone for newborns

Inj. Phenobarbitone	Intravenous (200 mg/ml) 0.1 ml diluted with 0.9 ml saline (20 mg/ml)	
Weight of Infant	Initial	Repeat dose
2 kg or less	2 mL	0.5 mL
2 to 3 kg	3 mL	0.75 mL
3 to 4 kg	4 mL	1 mL

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

Phenytoin is used as a second line drug, when full dose of phenobarbitone fails to resolve seizures. If used, it should only be mixed with saline and not with dextrose as it precipitates in dextrose.

Continue supportive management while preparing for referral to higher centre for further management.

Assess and manage where referral not possible

It may not be possible to make referral in all cases for various reasons (parents may refuse; transport may be unavailable or the distance to higher facility may be more). In such cases, examine for emergency signs (i.e. not breathing, gasping, respiratory rate less than 20 breaths per minute, bleeding, or shock) and provide immediate management. Continue to assess and monitor the newborn.

Table 1.5: Assessment & Management of emergency conditions

Assessment	Emergency Signs	Actions
• **Record temperature**	• **Low Body temperature (temperature <35.5°C)**	✓ If temperature < 35.5°C, rewarm under radiant warmer in servo mode with temperature setting at 36.5°C Assess temperature every half hour (in axilla). If warmer not available, put in skin to skin contact
• **Look at breathing & count respiratory rate:** ◆ Not breathing at all, even when stimulated; or gasping; or ◆ Slow breathing - Respiratory Rate <20/min ◆ Apnoea – Breathing with prolonged intermittent pauses lasting >20 seconds or less, if associated with bradycardia (<100 bpm)/cyanosis	• **Not breathing at all or gasping respiration**	✓ If not breathing at all/gasping, position and clear airway, stimulate to breathe, administer positive pressure ventilation with bag & mask.
• **Check for severe respiratory distress** ◆ Respiratory Rate >70/min ◆ Severe chest indrawing ◆ Grunting • **Check for central cyanosis** Blue skin/tongue and lips	• **Severe respiratory distress** • **Central cyanosis**	✓ ***Give oxygen; attach pulse oximeter and monitor oxygen saturation.***
• **Assess circulation** If newborn has cold hands/peripheries with capillary refill longer than 3 seconds and weak and fast pulse (>160/minute), then classify as shock.	• **Shock**	✓ If in shock, give IV fluid bolus 10 ml/kg normal saline over 20-30 minutes. Repeat bolus, if circulation does not improve.
• **Check for abnormal movements** Repetitive jerking movements of limbs or face, continuous extension or flexion of arms and legs; may be generalized, focal or multifocal convulsions. Many a times, convulsions in newborns are subtle (eg staring, repetitive blinking of eyes, or repetitive movement of mouth or tongue etc.) • **Check for consciousness level** Assess whether the baby is sleeping, lethargic or unconscious	• **Convulsions /Unconsciousness**	✓ If convulsing, give IV 10% Calcium gluconate at 2ml/kg in equal dilution with distilled water, slowly under cardiac monitoring. If seizure persists, start Injection Phenobarbitone 20mg/kg loading dose (diluted with normal saline).
• **Perform bedside DIAGNOSTICS** a Check blood glucose levels b. Check oxygen saturation		✓ Prevent and treat hypoglycemia. If not possible to check blood glucose levels, Give 10% Dextrose bolus @2ml/kg slowly over one minute ✓ Maintain SpO_2 between 91 to 95%

✓ ***Dress the newborn in warm clothes and a cap and cover with a warm blanket.***

✓ ***Refer after pre-referral dose of antibiotics and on i/v fluids and oxygen support***

◆ Give Inj. Vit K1, if not given earlier around birth

Activity 1.3:

DRILL TO REVISE THE CRITERIA FOR RECOGNISING VARIOUS SIGNS IN NEWBORNS

SIGN	CRITERIA
Shock	
Hypothermia	
Cyanosis	
Hypoglycemia	
Severe Respiratory Distress	
Jitteriness	
Subtle convulsions	
Apnoea	

Activity 1.4:

CASE STUDIES

1. A 7 days old baby weighing 2.5 kg is admitted with refusal to feeds, fast breathing, cold extremities and CRT of 5 seconds. What are the steps for stabilization of this newborn?
2. A 7 days old baby girl with birth weight 2.8 kg is brought with the inability to breastfeed.
   On examination you find that the newborn has subtle seizures, temperature is 36°C and respiratory rate is 56/min.
   Write down initial steps of management.

CHAPTER 2
Referral and Transport of Sick Babies & Communication with the Family

REFERRAL AND TRANSPORT OF SICK BABIES & COMMUNICATION WITH THE FAMILY

Babies who are seriously ill at the time of presentation and cannot be cared for at NBSU need to be transferred to a special neonatal care unit (SNCU). In such instances, communication with the family is important for ensuring that the referral to the SNCU materializes successfully. It is also necessary to arrange for timely transport and provide care during transfer.

Components of Neonatal Transport

1. Assessment and stabilization of baby
2. Communication with the family
3. Communication with the referral facility
4. Pre-referral and during transport stabilization
5. Pre-referral antibiotics
6. Referral note
7. Arrange for a health care provider to accompany, where feasible
8. Arrange vehicle for transport

1. Assessment and stabilization of baby

This has already been discussed in chapter 1.

2. Communication with the Family

Effective communication is crucial to make informed decisions. It maintains a healthy association between the health care personnel and the parents, thus preventing conflicts. Communication begins at the first contact with health facility, till the baby leaves after discharge or treatment.

- Communication can be *verbal* which includes spoken language. Communication may also be *non-verbal* which involves use of correct body posture, gestures and eye contact.
- Communicate in a simple language which the family understands. Technical jargon should always be avoided.
- Communication should be culturally sensitive and appropriate.
- Goal of effective communication is to reduce parental anxiety and help them make appropriate choices.
- Communication should preferably be done by senior health personnel or person with expertise.

Communication at admission:

Parents are anxious when they bring their baby to the health facility with a complaint. Assess the condition of the baby and inform the family about the following:

- Whether the newborn needs admission/referral
- Prognosis of the baby, treatment options and likely duration of treatment
- Allay the anxiety about finances by providing information about free treatment benefit to baby and mother and for eligible beneficiaries under Ayushman Bharat PM Jan Arogya Yojana (PM-JAY) or Janani Shishu Suraksha Karyakram.

The mother should be encouraged to stay in the health facility with the baby. She should be counseled to provide care to her baby including feeding, which should be transitioned to spoon and finally direct breastfeeding as baby improves. In addition, the healthcare provider should ensure communication regarding all other associated problems of her infant.

Communication before referral and transport:

Few babies who are sicker may need specialized neonatal care which may not be available at FRU or NBSU. Such babies will need to be referred to a higher centre. Ensure to:

- Allow parents to see and touch their infant prior to transport.
- Explain the baby's condition to the parents and the reason(s) why the baby needs to be sent to SNCU/ higher centre. Answer any questions they may have.
- Explain where to go and indicate whom to contact along with care to be provided during transport.

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

3. Communication with the referral facility

Refer promptly to nearest SNCU/appropriate health facility providing comprehensive neonatal health care. Before the newborn is referred, communicate with the concerned doctor/authority regarding the referral.

4. Pre-referral and during transport stabilization

All babies need to be assessed for four vital parameters- TOPS (Temperature, Oxygenation, Perfusion and Sugar). Babies need to be stabilized for all these parameters before & during transport:

A. Temperature: Ensuring a warm transport may be challenging. Maintain temperature 36.5-37.5°C

- Wrap the baby well in layers with head, hands and feet covered.
- Skin to skin contact or KMC to be provided during transport.
- Windows of transport vehicle to be kept closed to prevent heat loss.
- Wherever available, baby should be transported using a transport incubator.

B. Airway and oxygenation: Ensure clear airway and breathing. Maintain saturation between 91-95%. The following points need to be monitored:

- The neck should be kept slightly extended by placing a shoulder roll, avoid hyperextension. Avoid placing pillow/sheet below the head.
- The airway patency should be ensured. A mucous extractor should be kept handy for suction during transport.
- Babies who need oxygen should be transported with nasal cannula/prongs attached to an oxygen source with flow of 0.5 to 1 L/min. The adequacy of oxygen in gas cylinder should be ensured, before starting.
- If baby becomes apnoeic during transport and if a trained health attendant/provider is present in the ambulance, provide positive pressure ventilation using a bag and mask.

C. Perfusion: Adequate perfusion is indicated by heart rate between 120-160/minute and a CRT <3 seconds.

D. All babies who are sick and cannot be fed enterally will need to be continued on IV fluids:

- During transport, the patency of the IV cannula should be maintained.
- The fluid rate should be monitored to avoid extra fluid administration.

E. Blood Sugar: The blood glucose levels should be maintained > 45mg/dL. It should be checked before the newborn leaves the health facility and after arrival at the referral health facility. Enteral feeds/IV fluids should be given to maintain blood glucose levels during transport.

5. Pre referral antibiotics

The antibiotics of choice to be given before transport are ampicillin and gentamicin (dosage details in chapter 1). All newborn with emergency signs, suspected sepsis, hypoglycaemia or abdominal distension should be given a dose of antibiotics.

6. Referral note

The referral note should mention the following:

- Case particulars- Name, age, gender, address
- Chief complaints

- Condition on arrival at health facility- Temperature, oxygenation, perfusion, sugar
- Management and treatment details provided for stabilization, including antibiotics
- Reason for referral
- Condition at referral
- Contact details of the referring health personnel

Ask the participants to go through the referral note given in the annexure. (page-136)

7. Arrange for a health care provider to accompany, where feasible

Some transport vehicles (Advance Life Support) have trained personnel who can monitor and provide necessary supportive care/resuscitation during transportation. They can be informed about the condition of the newborn and the care that needs to be continued on the way.
If such a vehicle is not available, health care personnel should accompany wherever feasible.

8. Arrange vehicle for transport

Arrange the hospital vehicle or a vehicle available under the JSSK.

The baby should be referred and transported safely from the health facility to a higher centre. The transport facilities can be availed free of cost through the **National Ambulance Service**. The Government of India has provided for free transport to the mother and infant (upto one year of age) under the Janani Shishu Suraksha Karyakram (JSSK). Wherever available, prefer transportation in an ALS (Advanced Life Support) ambulance.

The GPS fitted vehicles target to reach the beneficiary within a fixed response time of 30 to 45 minutes. The facilities under this initiative, include:

- Free transfer from home to facility,
- Inter facility transfer in case of referral, and
- Drop back for mother and newborn, after 48 hours of delivery.

The transport vehicle should be equipped to shift the baby in a secure manner and stabilize the baby en-route. The minimum requirements that should be available in a transport vehicle are shown below:

Table 2.1: Medical equipment required for transport of newborn

Essential	Desirable (in ALS ambulance)
• Suction pump- manual/electric • Flow-meter with humidifier • Oxygen cylinder • Stethoscope • Laryngoscope& ET Tubes (2.5,3 & 3.5) • IV fluid stand/hook • Glucometer • Pulse oximeter with neonatal probes • Gloves, surgical masks, hand rub	• Transport incubator • Trolley stretcher with back tilt and collapsible wheels • Monitor- multiparameter with neonatal probes and cuffs • Infusion pump (with battery backup) • Transport ventilator • Surgical kit

The following is a list of supplies to be carried during transport as Transport kit:

Table 2.2: Medical supplies required for transport of newborn

• Self-inflating silicone bags (250 and 500mL) • Ventilation mask • Mucous sucker • 5-10 mL Syringes, needles • Intracath- 24 G • Thermometer • Naso-gastric tube • Adhesive plaster	• 10% dextrose • Normal saline • Cotton • Antiseptic solution • Sterile gloves • Nasal prongs • Feeding cup • Small blankets

If a SNCU/Referral unit is very far or not available, the baby should be managed in the NBSU.

The prognosis and outcome of the baby should be explained in detail to the family.

Activity 2.1:

ROLE PLAY SCENARIO

A 2 days old baby, with birth weight 1.6 kg is brought to your facility with refusal to feed and subtle convulsions. You have taken steps to stabilize the baby and now you are preparing for referral and transfer.

I. How will you communicate the situation to the parents?

II. What steps will you take to complete the referral process?

CHAPTER 3
Assessment of Newborns for Admission in NBSU

ASSESSMENT OF NEWBORNS FOR ADMISSION IN NBSU

Babies who are sick, but do not present with an emergency sign(s) require detailed assessment as described below:

- Detailed history of the baby and the mother.
- Complete examination of the baby
- Performing appropriate laboratory investigations, and
- Recording all information, including:
  - Relevant history
  - Examination findings and laboratory investigations

3.1. History

Review the referral notes or records of the birth, if available. A good history along with the findings of the examination and laboratory investigations, will point towards a probable diagnosis.
Ask the mother or attendant and validate from records:

About the BABY

- What is the problem?
- When did the problem first start?
- How old is the baby?
- How much did the baby weigh at birth?
- Was the baby born at term? If not, at how many weeks' gestation was the baby born? (Check records)
- Where was the baby born? Did anybody assist the birth?
- Did the baby cry spontaneously at birth? (Check records)
- Did the baby require resuscitation? (Check records)
- Did the baby move and cry normally after birth?
- Has the baby's condition changed since the problem was first noted? Is the problem getting worse? If so, how rapidly and in what way?
- What kind of care, including specific treatment, has the baby already received? (Check records)
- Is the baby having problems while feeding, including any of the following?
  - Poor or no feeding since birth or after a period of feeding normally;
  - Coughing or choking during feeding;
  - Vomiting after a feed.

About the MOTHER

- Review the mother's medical, obstetric, and social history.
- Ask the mother if she has any questions or concerns (e.g. special concerns or anxiety about breastfeeding).
- If the mother is not present, find out where she is, what her condition is, and whether she will be able to care for the baby, including breastfeeding or expressing breast milk.

Pregnancy

- What was the duration of pregnancy?
- Is there a history suggestive of a chronic disease during pregnancy, (check from records for HIV status, hepatitis B, tuberculosis, diabetes, or syphilis)? Is there a history of any complications during pregnancy? If so, what, and if she received any treatment? (Check records)

Labour and Birth

- Did she develop any complications, such as fever, any time from the onset of labour to three days after birth?
- When did the membranes rupture (assess if the duration was more than 18 hours before birth)?
- Was the labour or birth difficult or complicated, including any of the following:
  - Prolonged labour
  - Caesarean section
  - Instrumental vaginal delivery (e.g. forceps or vacuum extraction)
  - Malposition of the baby (e.g. breech)
  - Any other complications.
- Did she develop any complications after the birth?

3.2. Examine the Baby

- Examine the baby under a radiant warmer;
- Allow the mother to be present during the examination;
- Record the axillary temperature;
- If the baby has not been weighed yet, weigh the baby, and record the weight;
- While talking to the mother and before undressing the baby, observe the baby for:
  - Colour
  - Respiratory rate
  - Posture
  - Movement
  - Reaction to stimuli
  - Obvious abnormalities

Record axillary temperature

You have already learnt how to record the temperature. Newborn with mild/moderate hypothermia (Axillary temperature 35.5-36.4°C) or hyperthermia (axillary temperature>37.5°C) in the absence of other signs should be managed in NBSU as described in the subsequent section.

Record weight

All babies presenting to the facility must be weighed.

- Newborns weighing 1500-1800 grams can be managed at either NBSU or SNCU depending on the place of delivery and sickness. In case baby requires referral, ensure prereferral stabilization.
- Those weighing more than 1800 grams, do not require urgent referral and can be managed at NBSU. However, all babies above 1800 grams, having emergency signs should also be referred after stabilization
- Babies above 1800 grams, with no emergency signs, but having feeding problem or any other sickness should be managed in NBSU.

Assess breathing

1. Count the breaths in one minute to decide if the newborn has fast breathing. The newborn must be calm and quiet when you count the respiratory rate. If the newborn is crying or agitated, you will not be able to obtain an accurate count of the newborn 's breaths. The cut-off rate to identify fast breathing is 60 breaths per minute or more. If the count is 60 breaths or more, the count should be repeated, because the breathing rate of a newborn is often irregular. The newborn may occasionally stop breathing for a few seconds, followed by a period of faster breathing. If the second count is also 60 breaths or more, the newborn has fast breathing.

Fast breathing is considered serious in a newborn and needs management in a health facility. Babies with only fast breathing can be managed in NBSU. If the baby has severe respiratory distress (as explained in earlier section), baby should be referred to SNCU.

Assess feeding

Ask the mother how is the baby feeding at the breast. Any difficulty mentioned by the mother is important. A newborn who was feeding well earlier but is not feeding well now, may have a serious illness. **These newborns, who are either not able to feed or are not feeding well, should be evaluated urgently in a health facility**. Babies requiring continuous IV support or oxygen should be managed in SNCU.

Assess for irritability/restlessness/jitteriness

A baby who cries constantly and is not consolable by the mother is irritable or restless. The differences between jitteriness and convulsions are already covered in the previous section. **If any other specific clinical sign is noted in a baby, in addition to lethargy or the baby has two or more non- specific signs, the baby may be suffering from sepsis or asphyxia. Lethargy or unconsciousness is an emergency sign and needs to be managed in SNCU**. Given below is the differential diagnosis which can be of help if referral is not possible.

Table 3.1: Differential diagnosis in a newborn presenting with lethargy, unconsciousness or convulsions

Condition	Symptoms and signs
• Perinatal asphyxia • Hypoxic ischaemic encephalopathy • Birth trauma • Intracranial haemorrhage	• Onset in first 3 days of life • History of difficult delivery • Gestation: Term or preterm
• Haemolytic disease of the newborn • Kernicterus	• Onset in first 3 days of life • Jaundice • Pallor • Serious bacterial infection • No H/o Inj. vitamin K at birth
Neonatal tetanus	• Onset at age 3–14 days • Home delivery, asepsis not maintained • Irritability • Difficulty in breastfeeding • Trismus • Muscle spasms
Meningitis	• Lethargy • Fever • Apnoeic episodes • Convulsions • High-pitched cry • Tense or bulging fontanelle
Sepsis	• Fever or hypothermia • Inability to feed • Respiratory distress • Shock (lethargy, fast breathing, cold skin, prolonged capillary refill, fast weak pulse, and sometimes low blood pressure)

Assess diarrhoea

Infective diarrhoea is seldom seen in exclusively breast fed babies, however if the baby presents with diarrhoea suspect sepsis. Assess for dehydration and also ask for blood in stool.

- If the baby has signs of dehydration or blood in stool, establish an IV line and start IV fluid, while arranging for referral.
- Blood in stool in a young infant may be because of serious infection or surgical problem. Such babies should be given 1 mg intramuscular dose of Vitamin K and referred to higher centre with pre-referral dose of antibiotics.

Look for abdominal distension

Abdominal distension may be a sign of serious illness (sepsis, necrotizing enterocolitis or gastrointestinal malformation or obstruction) and needs management in a higher centre.

Look for pallor/bleeding from any site

- If baby has pallor, take a blood sample, and measure haemoglobin. If the haemoglobin is less than 10 g/dl (haematocrit less than 30%), refer to higher centre for blood transfusion.
- If baby has bleeding, look for site of bleeding (e.g. umbilicus, male circumcision site, or venipuncture site). Stop visible bleeding, if possible. Avoid sampling and Intramuscular injections
- If there are signs of shock, the baby should be referred to SNCU after initial management, as described in the section on emergency signs.

Look for Jaundice

- Examine baby preferably in natural daylight.
- To check for jaundice, press gently on the baby's forehead or nose. If the skin looks yellow where it was pressed, it's likely the baby has mild jaundice.
- To assess the extent of jaundice, refer to chapter 5.1.
- Many babies, particularly small babies (less than 2.5 kg at birth or born before 37 weeks gestation), may have jaundice during the first week of life. In most cases, the level of bilirubin that causes jaundice is not harmful and does not require treatment. **However, any jaundice visible in the first 24 hours of life on palms and soles should be assumed to be serious**. Such cases are managed in SNCU/tertiary care facility. Management of jaundice is described in chapter 5.

Look for congenital malformations: Look for the following

- Cleft lip
- Cleft palate
- Club foot

These congenital malformations are not life threatening and may not require immediate referral. The provider must connect with Rashtriya Bal Swasthya Karyakram (RBSK) manager after reporting the congenital defect, for facilitating any further support required by the family, in terms of surgery etc. which is available free of cost under RBSK. Congenital defects which are life threatening should be stabilized and referred to SNCU for example- a baby with meningomyelocele should be transported after covering the same with saline soaked sterile gauze during transport.

3.3. Admission to NBSU

Neonates requiring admission to NBSU fall in two categories – firstly those with emergency signs who require immediate stabilization followed by referral and secondly those who fulfill criteria for admission to NBSU. (See Table 3.2).

TABLE 3.2: Criteria for admission to NBSU

1. **Newborns presenting to FRU/NBSU with emergency signs**
2. **Newborns not having emergency signs, weight above 1800 gm and any of the following signs of sickness:**
   - **Feeding problem**
   - **Breathing Rate** 60-70/min
   - **Hyperthermia** (axillary temperature >37.5°C)
   - **Hypothermia** (35.5°C -36.4°C)
   - **Jaundice requiring only phototherapy**
   - **Newborns with suspected sepsis**
3. Weight 1500-1800 grams, with no sign of sickness #
4. Newborns who cannot be transferred to SNCU or referral facility due to any reason
5. Newborns back-referred (from SNCU) to NBSU for completion of treatment

 # Newborns weighing 1500-1800 grams can be managed at either a functional NBSU or SNCU depending on the place of delivery and sickness

Exercise 3.1:

DRILL TO DISCUSS CRITERIA FOR ADMISSION TO NBSU

Sign/s	Admission for stabilization or management
Jitteriness	
Subtle convulsions	
Abdominal distension	
Axillary temperature <35.5°C	
Cold extremities with capillary refill time > 3 seconds	
Baby 2.5 Kg with cleft lip	
Respiratory rate > 70/min; with severe chest in-drawing	
Baby weighing 1.9 kg with refusal to feed	
Baby 1.8 kg & accepting feeds	
Baby with diarrhoea	
Jaundice on palms and soles	
Temperature 39°C	
Baby with bluish discoloration of lips	

CHAPTER 4
Supportive Care

SUPPORTIVE CARE

While babies with emergency signs and also those without emergency signs, but who fulfill the criteria for admission to SNCU would be referred, there may be situations, where referral is not possible. Further management of these cases, along with those who should be managed in a NBSU (Table 3.2) is given below.

4.1. Maintain Temperature

- For babies with low body temperature (< 35.5°C), use radiant warmer for maintaining temperature (the steps have been described in the previous section).
- The best way to maintain temperature of a baby with mild hypothermia (35.5-36.4°C) is to place the baby in skin-to-skin contact with the mother (or any adult).

Take following steps to prevent hypothermia:

- Maintain room temperature of at least 26°C. Also check that there is no heat source or fan directed straight at the newborn or draught of air from open windows, ventilators and doors.
- Always keep the baby dry and well covered. Remove wet clothing, if any. Cover the head, hands and feet with cap, mittens and socks, respectively and continue breastfeeding.
- Bathing should be postponed, till 24 hours after birth in normal weight baby and 7 days in low birth weight baby; hospitalised neonates should instead be sponged with lukewarm water daily.
- Pay special attention to prevent hypothermia during examination or investigations and before removing clothes.

When Skin to Skin contact is not possible:

1. Keep the room warm with a home heating device.
2. Clothe the baby in multiple layers: in 2 layers for normal weight term babies and three/four layers for low birth weight babies;
3. Let baby and mother lie together on a soft, thick bedding;
4. Cover the baby and the mother with additional quilt, blanket or shawl, especially in cold weather.
   - Provide Kangaroo Mother Care (KMC) to all low birth weight babies. KMC can be started in the hospital as soon as the baby's condition permits (i.e. the baby is haemodynamically stable). Details are provided in the **annexure**.

KMC can be initiated immediately in all babies, except those clinically unstable. The ongoing medical support, like intravenous fluids and tube feeding are not contraindications to KMC. In India KMC is prioritized in babies weighing less than 2000 grams.

Video 3
KMC

Hyperthermia (axillary temperature above 37.5°C): may be either due to an environmental cause or it may be a sign of infection (usually in a term neonate).

If baby has hyperthermia, maintain optimal room temperature, correct environmental factors (such as removal of any heat source), ensure that the baby is not overly clothed or covered by blankets. Antipyretics are not recommended. Adequate amount of fluids should be given.

Perform sepsis screening in babies, where fever continues after excluding environmental cause.

4.2. Administer Vitamin K

Give vitamin K1 (phytomenadione) 1 mg IM once, if not given earlier in babies weighing more than 1000 gms; and 0.5 mg for those weighing less than 1000 gms.

4.3. Feeding

Most newborns weighing 1800 grams or more will be able to suckle at the breast. Those who cannot breastfeed should be given expressed breast milk with a cup. Infants unable to feed from a cup should be given intermittent bolus feeds through an oro-gastric tube. When the newborn starts to suckle well and is gaining weight, reduce the cup/orogastric feeds gradually.

Table 4.1: Feeding initiation and protocol for stable babies

Birth weight (gm)	1200-1800 (gm)	>1800 (gm)
Initial	Orogastric	Breastfeeding. If unsatisfactory, give cup feeds
After 1-3 days	Cup feeding	Breastfeeding
1-3 weeks and beyond	Breastfeeding	Breastfeeding

Breastfeeding is ideal for all newborns and should be supported. Breast milk is the ideal feed for all infants, including LBW infants. Anything other than breast milk is less than optimal.

Feed the newborn, mother's own expressed breast milk.

In exceptional situations, when mother's own milk (MOM) is not available, donor human milk can be given, only when safe milk-banking facilities are available. Formula feeds should only be given, if neither of the above is possible. Babies should be fed every two hours and the amount to be fed should be calculated according to the weight and day of life (Table 4.2).

Video 4
Expression of breast milk & feeding by paladai/cup and spoon

4.4. Fluid Therapy

Fluid management is important in managing some of the small and sick newborns who cannot be given enteral feeds. These cases are best managed in SNCU. In certain situations, where referral is not possible, service providers will be required to provide intravenous fluids. Refer to table 4.2 for daily fluid requirement for newborns.

Table 4.2: Daily Fluid requirement of newborns (ml/per kg body weight)

Day of life	Fluids in ml/kg/day	
	Birth Weight ≥1.5 Kg	Birth Weight <1.5 Kg
1	60	80
2	75	95
3	90	110
4	105	125
5	120	140
6	135	150
7	150	150

Type of fluid:

- During the first 2 days of life, give 10% dextrose as IV infusion. After the first 2 days of life, use IV dextrose with low sodium, such as commercially available Isolyte P.

Administration of IV fluids:

- Use syringe infusion pump or paediatric microdrip infusion set to administer IV fluids in newborns.
- Calculate the drip rate: first calculate the total fluid requirement per day and divide by 24. This will give the estimate of fluids in ml per hour which can be set on the syringe infusion pump. In microdrip set, 1 ml=60 micro drops. The number of drops per minute is equal to ml of fluid per hour. So if a baby needs 5 ml/hour, then set the drop rate at 5 drops per minute).
- Record the drip rate and volume infused every hour in the case sheet.
- Weigh the infant daily. Watch for weight loss/gain and urine output and increase/reduce IV fluids accordingly.
- Check IV catheter site for signs of leakage, swelling or redness, in which case IV access at a new site should be established.
- Introduce breastfeeding or milk feeding by orogastric tube, as soon as it is safe to do so.

Transition from IV fluids to feeding:

Newborn may be transitioned from IV fluids to enteral feeds or may be shifted from one mode of feeding like orogastric to cup feeding or to breastfeed.

- Transition from IV fluid therapy to enteral feeds must be attempted as soon as the newborn stabilizes and is fit to receive oral feeds.

- Whenever baby is shifted from IV fluids to enteral feeds, the initial volume should be 12- 24 mL/kg/day.
- Increase the amount of enteral feeds to 20-30ml/kg/day, signifying that smaller increments are to be done in smaller babies.
- The volume of enteral feeds introduced should be subtracted from total fluid requirement per day (table 4.2). Give rest as IV fluids. The total daily fluid requirements is to be met from feeds and fluids.
- IV fluids can be omitted when the baby is able to consume feeds equal to two-thirds of total fluid requirement.
- When the baby is not on breastfeeding, put baby on the empty breast (after milk expression), before every feed to help promote lactation and enable the baby to learn how to suck (non-nutritive sucking).
- Whenever feeding transition is done, introduce new mode for only some of the feeds to begin with (example 1 per shift). Subsequently, add newer mode in remaining feeds, if baby shows consistent weight gain for consecutive days.

Example of fluid calculation:

A stable baby weighing 1.6 Kg. on day 1 will require 60mL/kg/day of feed or fluids. Therefore, total requirement = 60 ml x 1.6 Kg = 96 ml. If this can be given as enteral feeds then the total volume needs to be divided into 12 aliquots = 96/12= 8ml. The final order will be = 8mL expressed breast milk by orogastric tube every two hours. However, if this needs to be given as IV fluid, then the total volume needs to be divided by 24 = 96/24 = 4 mL per hour, as IV fluid.

Excessive weight loss (greater than 3-5% in 24 hours): Check for inadequate feeding, and manage underlying conditions, if any (cold stress, excessive insensible water loss or systemic illness).

Video 5
OG tube insertion & feeding

4.5. Watch and Treat Apnoea

Small babies are prone to episodes of apnoea, which are more frequent in very small babies (less than 1.5 kg at birth or born before 32 weeks gestation) but they become less frequent as the newborn grows.

If active, or crying, the newborn is obviously breathing. Look for slow breathing with prolonged intermittent pauses (lasting >20 seconds) with or without central cyanosis or bradycardia. If present, it means newborn has apnoea.

- Monitor all small babies for occurence of apnoea.
- If the newborn stops breathing, stimulate the newborn to breathe by rubbing the newborn's back.
- If the newborn does not begin to breathe by tactile stimulation, resuscitate the newborn using a bag and mask.
- In addition, maintain temperature, oxygen saturation and glucose levels.
- If the apnoeic episodes become more frequent, refer to SNCU for further management.

4.6. Family Participatory Newborn Care

Family participatory newborn care is a partnership between parents and service providers, wherein they work together, while the baby is in the newborn care unit and share responsibility for caring for the baby. Involving mother or parent-attendants has shown to be associated with numerous benefits including decreased length of stay, enhanced parent–infant attachment and bonding and improved well-being of pre-term infants, better allocation of resources, and greater patient and family satisfaction. Interventions for which there is positive evidence, include-skin-to-skin care and support for breastfeeding (KMC), as well as better understanding of baby's developmental needs.

Family participatory care (FPC) in newborn care units entails supervised delivery of care to haemo-dynamically stable, sick & preterm newborns by the parents/attendants, in addition to the standard care provided by the healthcare providers in the nursery.

Thus FPC has two distinct interventions:

1. Building capacity of caregiver
2. Supervising and supporting the caregiver
   The process of skill building, under supervision, enables parents to participate not only in delivery of care during hospitalization, but also allows for continuum of care at home.

Detailed operational guidelines on FPC have been issued by the Government of India and should be referred to for making newborn care family participatory.

4.7. Rooming in of Babies Weighing 1800-2500 Grams

- Babies weighing 1800-2500 grams, being cared for by the mother in the postnatal ward, require temperature maintenance and adequate breast feeding.

Temperature maintenance:

- The best way to maintain temperature is by placing the baby in skin-to-skin contact (KMC) with the mother (or any adult). KMC can also be used to keep a baby warm during transport and at home.

Breastfeeding:

- Optimum nutrition for the baby is its own mother's milk. Mother should be advised and supported to exclusively breastfeed her baby. The healthcare worker needs to assess the adequacy of breastfeeding. In case of any concern regarding adequacy of breastfeeding, the newborn can be weighed on the same weighing scale that was used to weigh the infant at birth. Excessive weight loss (normal 8-10% of birth

weight by 3-4 days of age) would indicate inadequate breastfeeding. In such a situation, check for frequency of feeding, positioning, attachment and look for any breast or nipple problems.

- If breastfeeding less than 8 times in 24 hours, advise to increase frequency of breast feeding.
- If not well attached or not suckling effectively, teach correct positioning and attachment.
- If unable to breastfeed, help mother express her milk and feed this expressed breast milk with katori spoon/paladai.
- If breast or nipple problem, help the mother to treat breast or nipple problems.

4.8. Stabilization of neonate discharged and referred from SNCU

Babies may be transferred back to NBSU/FRU after treatment from SNCU/District hospital for antibiotic completion and assisted feeding. The following should be done in such babies:

- Assess and stabilize.
- Record the current weight of the baby
- Record the diagnosis and treatment received at SNCU
- Plan completion of antibiotics, if required, as mentioned on referral/discharge note from SNCU
- Encourage breastfeeding and support assisted feeding, if necessary
- Communicate with the referring doctor, for any clarification, on treatment to be continued.
- Communicate with the family about progress and treatment plan of the baby
- Inform ASHA/ANM of their respective area, regarding home visits and continuation of medications, if any

4.9. Discharge From NBSU

Infant should be discharged once the following criteria are fulfilled:

Criteria for discharge from NBSU

- Baby is maintaining normal body temperature (in room temperature/when cared for by the mother)
- Baby not requiring IV fluids/medications
- Baby is accepting breastfeeds/assisted feeds well and gaining weight for 3 consecutive days
- IV antibiotic therapy has been completed
- Baby admitted for neonatal jaundice and has completed treatment with phototherapy
- Mother has been counselled for danger signs*, assisted feeding (as required) , KMC (as required) and follow up plan.

*Danger signs: Refusal to feed; Fast or difficult breathing, Cold or Hot to touch, jaundice involving palms and soles Pallor/Cyanosis, Abdominal distension, Abnormal movements, Bleeding from any site or Diarrhoea with blood in stool.

Preparation for Discharge

- Prepare discharge summary. Birth weight, discharge weight, length and head circumference should be mentioned in the discharge summary. Standard format has been provided in annexure.
- Inform ASHAs/ANM about the discharge and home based follow up
- Baby should have received the following vaccines- BCG, zero dose OPV (can be given till 14th day of life) and birth dose of hepatitis B (within 24 hours of birth). There is no lower weight limit for vaccinating a newborn.
- Advice screening for preterm babies to be done at a higher centre for:
  1. ROP for all babies < 2000 gms gms; at 4 weeks;
  2. BERA (Brainstem evoked response audiometry) at 40 weeks corrected age
- While communicating the discharge instructions to mother:
  - Use words that she understands
  - Use teaching aids that are familiar to her
  - Give feedback when she practices. Praise what was done well and make corrections, if necessary
  - Allow more practice, if needed
  - Encourage the parent/mother to ask questions and answer all the questions.

- **Advise mother to give home care: Breastfeed infant exclusively, keep infant warm, keep cord clean and dry, importance and correct method of handwashing & danger signs.**

Nutritional supplements for LBW babies

1. Supplements are required for low birth weight babies and should be started, once the baby is accepting full oral feeds.
2. **Vitamin D:** All LBW infants, who are exclusively breastfed should receive 400 IU daily of vitamin D. The supplementation should continue until one year of age. Most available vitamin D drops contain 400 IU/ml.
3. **Multivitamin drops with zinc:** All LBW infants, who are exclusively breastfed should receive 1 ml/day from 2 weeks of age, till 40 weeks post menstrual age.
4. **Calcium and phosphorous:** All very low birth weight babies (birth weight< 1500 gms) should receive elemental calcium and phosphorous at 120-160 mg/Kg/day and 60-80 mg/Kg/day, respectively. This may be continued till 40 weeks post menstrual age. For optimal supplementation, the preparations having the calcium and phosphorous in 2:1 ratio should be used.
5. **Iron:** Elemental iron supplementation at 2 mg/Kg/day started at 2 weeks in <1500 grams is effective in preventing anaemia of prematurity and should be continued till one year of age.

Table 4.3: Nutritional supplements for LBW babies

Supplement	Indicated in which babies	When to start	Dose	Till when to administer
Vitamin D	All LBW babies (<2.5 kg) who are exclusively breastfed	When baby starts accepting full feeds	<2.5 kg: 400 IU	Till one year of age
Multivitamin drops with Zinc	All LBW babies (<2.5 kg)	From 2 weeks of age	1 ml/day	Till 40 weeks post menstrual age
Calcium & phosphorus	VLBW babies <1.5 kg	When baby starts accepting full feeds	120-160 mg/kg/day elemental calcium; 60-80 mg elemental phosphorus	Till 40 weeks post menstrual age
Iron	VLBW babies <1.5 kg	From 2 weeks of age	2 mg/kg/day	Till one year of age ; followed by routine IFA supplementation as in all children

Danger signs in the newborn/young infant

Explain danger signs: Danger signs should be explained to the mother before discharge and she should be advised to bring the baby to the facility, if any of the following danger sign is observed:

Danger signs to be explained to mother:

- Refusal to feed
- Fast or difficult breathing,
- Cold or Hot to touch,
- Jaundice involving palms and soles /Pallor/Cyanosis,
- Abnormal movements,

In addition the following also need urgent care at the facility:

- Abdominal distension
- Bleeding from any site
- Diarrhoea with blood in stool

- Low weight babies (1.8-2.5 Kg) should be followed up within 14 days of discharge. Date and time of follow up should be informed to the parents . The same must be recorded in the discharge summary.

4.10. Infection Prevention and Control

Sepsis is a major cause of neonatal morbidity and mortality. Thus, infection control is an integral part of neonatal care. Infection control practices consist of the following:

1. Disinfection of equipment
2. Disinfection of surroundings
3. Hand washing practices
4. Additional practices

Table 4.4: Disinfection of equipment

S.no	Equipment	Disinfection/Sterilisation process	Frequency
1.	Radiant warmer	Clean canopy and mattress with detergent solution	Daily. Every time after shifting a baby
2.	Cot	Clean with 3% phenol/5% Lysol/2% glutaraldehyde	Daily
3.	Suction apparatus	Suction jar should be cleaned with detergent	Suction tube should be changed daily Suction jar should be cleaned daily
4.	Oxygen hood	Clean with detergent	Daily and after every use
5.	Bag and mask	Disinfect-Clean with detergent and wash Sterilize- Immerse in 2% gluteraldehyde for 4 hours followed by rinsing with water	Disinfect daily and after every use. Sterilize weekly.
6.	IV set	Maintain asepsis during connecting/disconnecting. Avoid ends to touch surroundings	Change every 24 hours
7.	Feeding utensils	Clean with soap and water and boil in water for 10 minutes	After every feed
8.	Thermometer	Wipe with alcohol swab	After every use

1. Disinfection of newborn care unit:

A. Disinfection of surroundings:

- Clean with 3% phenol or 5% Lysol once a day.
- Wet mopping should be done at least 3 times a day.
- Dry dusting should be avoided.
- Surface cleaning of the unit may be done using 2 percent glutaraldehyde.
- Concentration of the available Bacillocid may vary from place to place and therefore each unit should also look at the manufacturer's instructions to prepare the appropriate solution.

B. Housekeeping routines:

a. Segregation of waste- This should be done as per bio-medical waste management guidelines. Sharps should be discarded separately in puncture proof containers.

b. Disposal of waste- Waste containers should be colour coded and covered with lids and lined by plastic bags. Bins should be emptied regularly and spillage should be avoided.

c. Cleaning of spillage- use 10 gram of bleach in 1L of water. The area should be covered with this solution for 20 minutes. It should be mopped with a disposable cloth which should be discarded after use.

2. **Hand washing:** This is the single most effective step to reduce infection. It should be done before and after contact with any patient or body fluid or after leaving patient surroundings. The essential steps of hand washing are as shown below:

Rub palms together

Rub the back of both hands

Interface fingers and rub hands together

Interlock fingers and rub the back of fingers of both hands

Rub thumb in a rotating manner followed by the area between index finger and thumb for both hands

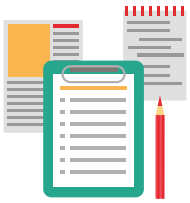
Rub fingertips on palm for both hands

Rub both wrists in a rotating manner. Rinse and dry thoroughly

Hands should be allowed to dry on their own without use of any mop/cloth/paper.

3. **Additional practices**- In addition, adopt policies which promote:
   a. Early enteral feeding
   b. Exclusive breastmilk feeding
   c. Rooming in with mother
   d. Maintenance of maternal hygiene

The health care facility should also avoid cross-infection at all times by practicing strict hand hygiene.



Exercise 4.1:

CASE STUDIES

1. Ranno delivered a 2.0 Kg baby 48 hours ago. There are no emergency signs. The baby is feeding well at the breast and maintaining temperature. How will you manage this baby?
2. Baby of Shanti, weighing 2 kg, was admitted with fast breathing on day 1 of life. He was started on IV fluids. On day 3, his distress has stabilized. How will you plan the feeding transition? When will you plan for discharge?
3. Baby of Malti, weight 1900 grams is being discharged from NBSU at day 6 of life after receiving phototherapy. What feeding advice will you give to the mother? What supplements will you advise, in what quantity and for how much duration?

Exercise 4.2:

INDICATE THE MODE OF FEEDING AND VOLUME OF FEEDS TO BE STARTED IN THE FOLLOWING BABIES (FILL IN BLANKS IN LAST TWO COLUMNS)

S.No.	Day of life	Weight	Feed mode	Volume
1.	Day 1	1500g		
2.	Day 1	1900g		

CHAPTER 5
Management of Jaundice and Sepsis in Newborn

MANAGEMENT OF JAUNDICE AND SEPSIS IN NEWBORN

5.1. Management of Jaundice

More than 50% of normal newborns and 80% of preterm newborns develop jaundice due to immaturity of liver, short life span of red cells and increased enterohepatic circulation of bilirubin. However, in some babies bilirubin levels may be high. If not managed early, can result in neurological manifestations.

Jaundice may be normal (physiological)

Any baby who has Physiological jaundice will have following features:

- Icterus appears after 24-36 hours, peaks around 4-5th day (term), 7th day (LBW) and resolves by 10-14th day
- Serum bilirubin generally does not rise above 15 mg/dl in term and 12 mg/dl in preterm babies
- Skin and eyes yellow, but none of the signs of abnormal jaundice (given below).

A baby who has physiological jaundice can be sent home on exclusive breastfeeding. The baby should be re-assessed for any fresh symptoms or progression of jaundice, after 48 hours of discharge.

Jaundice may be abnormal (pathological)

- Starting on the first day of life
- Lasting > 14 days in term and > 21 days in preterm infants
- Severe jaundice: palms and soles of the infant are yellow

Assessment of jaundice

When a neonate is clinically jaundiced, the total serum bilirubin (TSB) is usually >5-7mg/dl.
Jaundice in newborn progresses in cephalocaudal (head to toe) direction and thus the extent of yellowness of the skin is useful to **assess** the level of bilirubin. **Kramer's criteria is used to clinically assess jaundice. However, serum bilirubin levels must be done to guide management.**

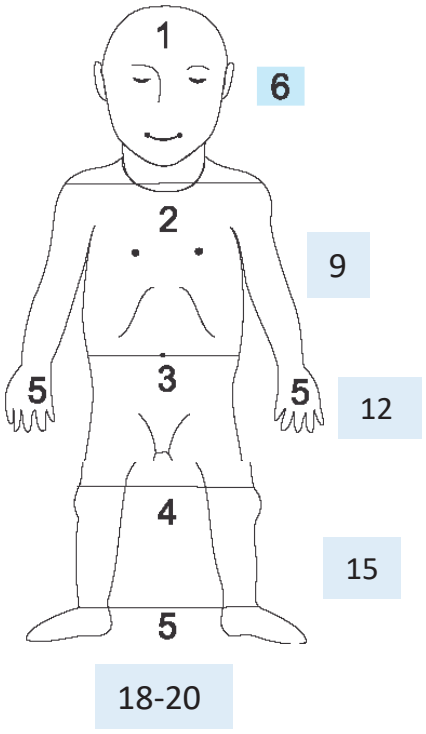


Figure 5.1: Clinical visual perception of jaundice: Kramer 1969

Investigations to be done:

1. **Send blood samples for estimation of**
   - Total serum bilirubin
   - Mother and baby's blood group (Collect cord blood when mother's blood group is known to be O or Rh negative)
2. **Look for associated risk factors for jaundice like:** Sepsis, asphyxia or haemolysis due to blood group incompatibility (mother O+ and baby A+/B+ or mother Rh negative and baby Rh positive). If these are suspected, then relevant investigations (like sepsis screen, baby's peripheral blood smear for evidence of haemolysis and haemoglobin levels, etc.) should be performed.
3. **Determine baby's weight and gestational age {from mother's last menstrual period (LMP)}** - To interpret bilirubin values for phototherapy and exchange transfusion according to baby's gestational age.

Management of newborns with jaundice:

Management of jaundice is directed towards reducing the level of bilirubin and preventing central nervous system toxicity and has two main components:

1. Prevention of hyperbilirubinemia: by early and frequent feeding
2. Reduction of bilirubin: This is achieved by phototherapy, and/or exchange transfusion.

The decision to treat depends on the severity and the cause of jaundice.

Phototherapy: a treatment for jaundice, where the exposure of skin to a specialised light source, converts unconjugated bilirubin molecules into water soluble isomers that are excreted by the body.

Phototherapy should be initiated (after sending blood sample for TSB), if:

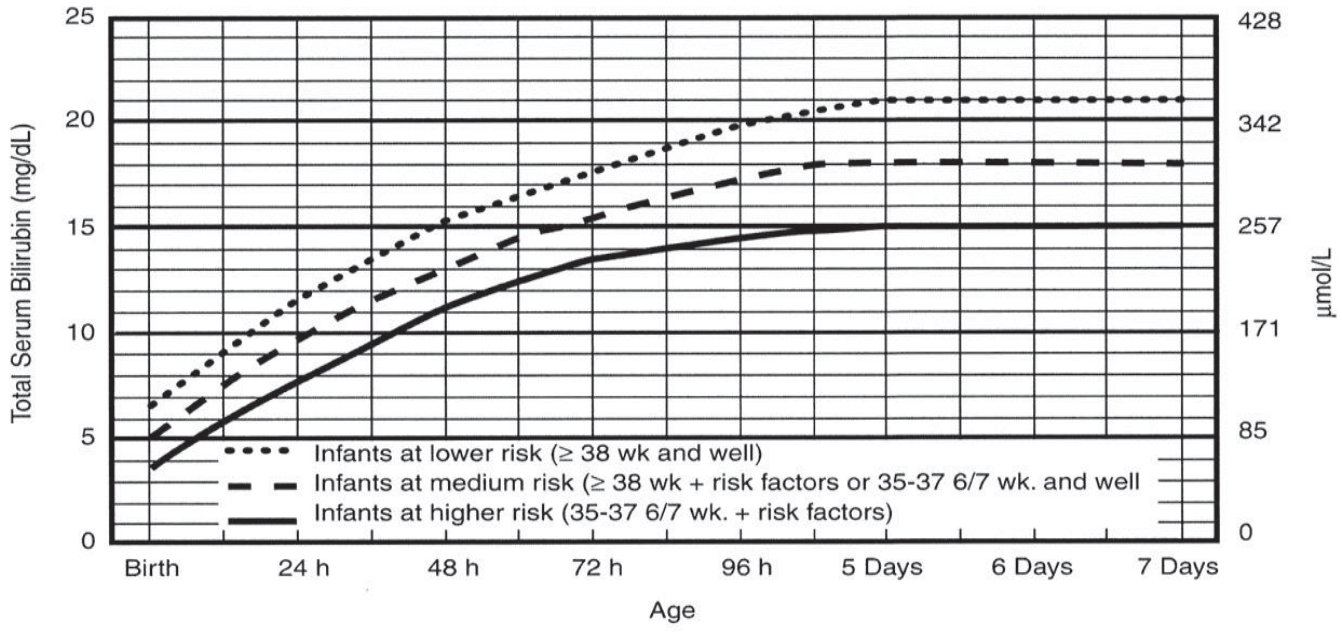
- Jaundice appears on day 1
- Jaundice is severe i.e. involving palms and soles
- S. Bilirubin level is in phototherapy range as per American Academy of Paediatrics (AAP) charts (Refer Figure 5.2).

Continue phototherapy until the serum bilirubin level is 2-3 mg lower than the phototherapy range.
Important information:

1. Prophylactic phototherapy is not recommended
2. Sunlight exposure or exposure to artificial light at home like a bulb has no effect on bilirubin levels

Treatment of jaundice based on serum bilirubin level

Jaundice is treated as per the following AAP charts in neonates ≥35 weeks as shown in Fig 5.2. This chart correlates the level of Serum bilirubin with the age of the newborn and the risk associated including gestation age. The level of the bilirubin is to be matched with the age and the action is to be taken according to the three different graphs, based on the risk associated and gestation age.



- Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin.
- Risk factors = isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis, or albumin < 3.0g/dL (if measured)
- For well infants 35-37 6/7 wk can adjust TSB levels for intervention around the medium risk line. It is an option to intervene at lower TSB levels for infants closer to 35 wks and at higher TSB levels for those closer to 37 6/7 wk.
- It is an option to provide conventional phototherapy in hospital or at home at TSB levels 2-3 mg/dL (35-50mmol/L) below those shown but home phototherapy should not be used in any infant with risk factors.

Figure 5.2: Chart for phototherapy as per AAP Guidelines 2004

Exchange transfusion is not described in this training package. The AAP chart for exchange transfusion is included, in case exchange transfusion is required, so that the infant can be transferred quickly and safely to another facility where exchange transfusion can be performed.

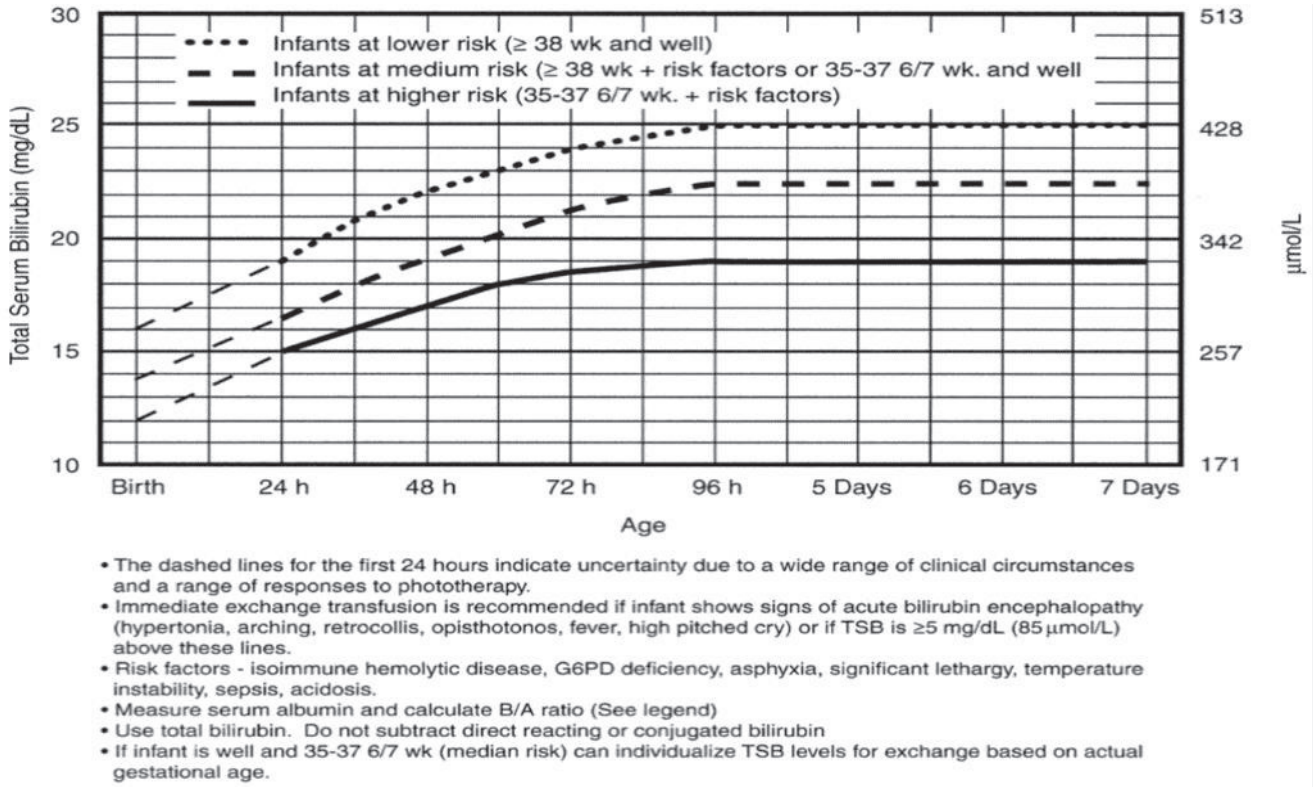


Figure 5.3: Chart for exchange transfusion as per AAP Guidelines 2004

Table 5.1: Guidelines to start phototherapy for <35 weeks and birth weight <2000 g

Birth weight (gms)	Serum Bilirubin Levels (mg/dl) (Phototheraphy)		Serum Bilirubin levels (mg/dl) to refer for exchange transfusion
	Sick	Healthy	
<1000	**05-07**	**04-06**	**10-12**
1001-1500	**07-10**	**06-08**	**12-15**
1501-2000	**08-10**	**10-12**	**15-18 mg/dl**
2001-2500	**10-12**	**12-15**	**18-20 mg/dl**

Source: Martin & Fanaroff, Neonatal -Perinatal medicine, 8th edition, p1450

Care of babies under phototherapy: (Details under skill station annexure)

1. Cover eyes with an eye patch
2. Place baby naked only with the nappy to cover genitalia
3. Place baby, as close as possible (15-30 cm) to light source, avoiding hyperthermi
4. Check temperature every 4 hourly to monitor for hypo/hyperthermia
5. Check weight daily
6. Frequent breast feeding
7. Increase in allowance for fluid, if there is any evidence of dehydration
8. Change position frequently, after each feed
9. Measure serum bilirubin every 12 hours or earlier, if required.
10. Do not place anything on top of the phototherapy unit (this may block the air vents)
11. Low birth weight babies can have their socks, caps and mittens on, while under phototherapy for preventing hypothermia.
12. Use Fluxmeter to check for and ensure optimal irradiance.

Side Effects

1. Transient maculopapular rash on the trunk
2. Hyperthermia/Hypothermia
3. Increased insensible water loss and dehydration
4. Loose stools
5. Bronzing of the skin

Ineffective Phototherapy

1. Baby covered or frequently removed from phototherapy
2. Low irradiance (tubes old, flickering, black ends, bulbs covered with dust or reflectors dirty)
3. Distance between phototherapy lights and baby is more than recommended
4. Hemolytic conditions can cause bilirubin to rise, in spite of phototherapy

When to refer

1. Serum bilirubin increasing despite phototherapy
2. Neurological signs develop
3. Jaundice requiring exchange transfusion
4. Jaundice persisting after three weeks and/or associated with clay coloured stools

Exercise 5.1:

CASE STUDIES

1. Ram, a 5 days old baby, born full term with birth weight of 2.8 kg, is brought to health facility with jaundice on the face and chest which developed over last 24 hours. Baby is feeding well. There are no risk factors.
   a. How will you manage this baby?
   b. What advise should be given to the mother?
2. Baby Prerna was born at 34 weeks and has been brought to FRU with yellow palms and soles. The baby is four days old.
   a. How will you manage this baby?
   b. What additional information and investigations are required?

5.2. Management of sepsis in newborn

Neonatal sepsis is a clinical syndrome characterized by signs and symptoms of infection in the first month of life. It encompasses various systemic infections of the newborn such as septicemia, meningitis, pneumonia and urinary tract infections (UTls). Depending on the age of onset, two patterns of the diseases have been recognized: early onset sepsis(EOS) and late onset sepsis(LOS). Table 5.2 enlists the features suggestive of both.

Table 5.2: Early versus late onset sepsis

	Early onset sepsis (EOS)	Late onset sepsis (LOS)
Time of onset of signs & symptoms	Appears within 72 hours of birth	Appears after 72 hours of age
Source of pathogens	Maternal genital tract/the delivery area	External environment of community or hospital (nosocomial)
Risk Factors	• Very low birth weight (<1500g) • Prematurity • Prolonged rupture of membranes (>24 hours) • Foul smelling liquor • Multiple (>3) per vaginum examinations in 24 hours • Intra-partum maternal fever (>37.8°C)	• Very low birth weight, prematurity • Lack of breastfeeding • Delayed enteral feeding • Frequent handling • Disruption of skin integrity with needle pricks and use of intravenous fluids • Poor hygiene • Poor maintenance of asepsis in neonatal units including improper hand washing techniques • Superficial infections (pyoderma, umbilical sepsis) • Previous or prolonged hospitalization
Predominant manifestation	Respiratory distress due to congenital (intrauterine) pneumonia	Commonly presents as septicemia, pneumonia or meningitis
Clinical picture of sepsis	Highly variable, signs and symptoms may be minimal, subtle, or nonspecific	
When to suspect sepsis	Any newborn with risk factors, any newborn brought with emergency sign, assess a newborn for sepsis, if there is history of - feeding difficulty, fast breathing, hypo or hyperthermia, poor weight gain and lethargy	

Table 5.3: Common clinical features of neonatal sepsis

General Symptoms	Refusal to suckle, not arousable, comatose, poor cry, poor weight gain, abdominal distension, vomiting, poor perfusion, shock, bleeding
Suggestive of pneumonia	Cyanosis, tachypnea, chest retractions, grunt, apnoea/gasping
Suggestive of meningitis	Fever, seizures, blank look, high pitched cry, excessive crying/irritability, neck retraction bulging fontanelle
Diarrhoea	Diarrhoea is suspected if there is passage of watery stool or an increase in usual stool frequency
Sclerema	Sclerema neonatorum manifests as diffuse hardening of the subcutaneous tissue resulting in a tight smooth skin that feels bound to the underlying structures
Renal failure	Renal failure can be suspected clinically by presence of oedema/excessive weight gain and oliguria/anuria

Diagnosis of sepsis

Isolation of microorganisms from blood, CSF, urine or pus is diagnostic of sepsis. In clinically suspected cases of sepsis, blood culture should be sent prior to starting antibiotics. As culture facility may not be available at most NBSUs, indirect method such as sepsis screen may be used to diagnose sepsis.

Sepsis screen: This is a combination of laboratory parameters which help in predicting sepsis in newborns, with clinical features suggestive of sepsis. It should be done in all babies with probable sepsis and in babies born to mothers with risk factors for sepsis. A positive "sepsis screen" takes into account two or more positive tests as given below:

Sepsis screen

Perform sepsis screen if

- Sepsis is suspected clinically, or
- There are two or more risk factors in an asymptomatic baby

Positive sepsis screen:

- TLC <5000/cu.mm
- Neutropenia (Absolute Neutrophil Count < 1800/cu.mm)
- Immature neutrophil (band cells) to total neutrophil (I/T) ratio > 0.2
- Micro ESR (ESR> 15mm 1st hour)
- C-Reactive Protein–positive

Management

Supportive care and antibiotics are two equally important components of the management of sepsis.

A. Supportive care to neonate diagnosed with sepsis:

- All newborns who present with danger signs should be managed first using TABC approach (described earlier in Chapter1) and referred.
- In case referral is refused/not possible and sepsis is strongly suspected, supportive care should be provided, in addition to specific antibiotic therapy.

Maintain TABC

1. Maintain normothermia
2. Position and clear airway if required
3. Ensure optimum oxygenation (maintain SpO_2 91-95%)
4. Shock to be treated with NS bolus of 10ml/kg over 30 mins
5. Maintain normoglycemia
6. If hemodynamically compromised, avoid enteral feed and give maintenance IV fluids. Start orogastric feeds, as soon as hemodynamically stable.
7. Consider referral for exchange transfusion, if there is sclerema.

Antibiotic Policy:

Each facility is required to have its own policy based on profile of pathogens and, local sensitivity patterns. Antibiotic therapy should cover the common causative bacteria, namely, *Escherichia coli, Staphylococcus aureus and Klebsiella pneumoniae.*

Administration of Antibiotics:

- Give Injection ampicillin and gentamicin, as first line of treatment.
- Give cloxacillin (if available) instead of ampicillin, if there are extensive skin pustules or abscesses, as these might be signs of Staphylococcus infection.
- Antibiotics should be given slowly, after dissolving in 5-10 ml fluid using a microdrip set or infusion pump.
- Never mix two antibiotics in same syringe.
- If baby has been referred/shifted from SNCU, total duration of antibiotics should be as per treatment plan from SNCU. In babies admitted and managed at NBSU/FRU alone, antibiotics should be given for 7-10 days.

Any baby who is being treated with antibiotics but fails to improve by 48-72 hours of admission should be referred to SNCU/referral unit.

Table 5.4: Antibiotic schedule and dosage in neonatal sepsis

Antibiotic	Dosage	Frequency*		Route	Duration
		(a) 0-14 days of life	(b) >14 days of life		
Ampicillin or Cloxacillin	50mg/kg/dose	12 hourly	8 hourly	IV	7-10 days
and					
Gentamicin	5mg/kg/dose	24 hourly	24 hourly	IV	7-10 days

*This frequency of antibiotics is valid in babies weighing < 2kg. In baby weighing ≥ 2kg, the frequency remains as (a) from 0-7 days of life and (b) from > 7 days of life.

Meningitis

Suspect meningitis if signs of serious bacterial infection are present, particularly if the infant is:

- Drowsy, lethargic or unconscious
- Convulsing
- Has a bulging fontanelle
- Irritable
- Has a high-pitched cry.

Treat with antimicrobials as given below in the table.

Table 5.5: Antibiotic for meningitis

Antibiotic for meningitis	Each dose	Frequency		Route	Duration
		0-7 days age	> 7 days age		
Birth wt < 2 kg					
lnj Cefotaxime*	50 mg/kg/dose	12 hrly	8 hrly	IV	3 weeks
lnj Amikacin**	15 mg/kg/dose	24 hrly	24 hrly	IV	3 weeks
Birth wt > 2 kg					
lnj Cefotaxime*	50 mg/kg/dose	8 hrly	6 hrly	IV	3 weeks
lnj Amikacin**	15 mg/kg/dose	24 hrly	24 hrly	IV	3 weeks

Treatment of local bacterial infection

- If the umbilicus is red or draining pus; or if skin pustules are present, give oral antibiotic at home.
- Give oral amoxicillin twice daily for 5 days in cases with local bacterial infection in the doses described in table 1, 3.
- Teach the mother to treat local infections at home.

To treat skin pustules or umbilical infections, apply gentian violet paint twice daily.

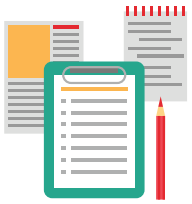
The mother should:

- Wash hands
- Gently wash off pus and crusts with soap and water
- Dry the area
- Paint with gentian violet 0.5%
- Wash hands.

Care of the baby where referral is not possible or refused

Any neonate with emergency signs or sepsis, who is being treated with antibiotics but fails to improve by 48-72 hours of admission, needs to be referred to SNCU.

Under special circumstances where referral is not possible or is refused, newborns can be **provided supportive care as explained earlier (Maintain Temperature, Airway, Breathing, Fluid, Feeding) and administered antibiotics. However, efforts to refer should continue.**



Exercise 5.2:

Baby Tara, 10 day old baby has come with refusal of feeds, fever and excessive crying. On examination, temperature is 39°C, heart rate is 170/minute, respiratory rate 66/minute, capillary refill time is 3 seconds. There is pus discharge from umbilicus. Her weight is 2.5 kg and blood sugar is 50mg/dl.

a. Are there any emergency signs ?

b. How will you proceed?

CHAPTER 6

Postnatal Care of Newborn in Health Facility

POSTNATAL CARE OF NEWBORN IN HEALTH FACILITY

The immediate postnatal period – first 48 hours after birth- when the mother and baby are in the hospital– is critical to their health and survival. Postnatal care within two days of birth, in facilities provides an opportunity for preventive care practices and routine assessments to identify and manage common conditions in the baby.

All babies delivered at the health facility should be monitored and provided routine care, support for feeding difficulties, appropriate treatment for danger signs* and prompt referral if required. [* danger signs are same as described in Chapter 1 & and Mother & Child Protection Card (MCP)]

Care in the labour room

All the following actions to be performed after one hour of skin to skin care and initiation of breast feeding.

- Documentation such as time of birth, time of initiation of breast feeding, weight, gender and any other relevant information of all newborns.
- Ensure facility/state specific identification marking for baby
- Cord should be kept clean, dry & free of any application (antiseptic etc.).
- Weigh all the infants after breast feeding initiation, preferably on a digital scale
- Injection Vitamin K 1 should be administered intramuscularly [0.5 mg for babies weighing less than 1000 g and 1.0 mg for those weighing above 1000 gms at birth] on the antero-lateral aspect of the thigh using a 26 gauge needle and one ml syringe.

Do not perform stomach wash in newborns at birth

The baby should be thoroughly examined at birth from head to toe to clinically screen for any life threatening congenital anomalies, malformations and birth injuries# and findings should be recorded in the case sheet. Remember that routine passage of catheter in the stomach, nostrils and the rectum is not recommended but do give special attention to identify and document the anal opening. Some of the birth defects to be reported as per RBSK Operational Guidelines are: (Refer to pictures in annexure 1)

1. Neural Tube Defect
2. Down's Syndrome
3. Cleft Lip & Palate
4. Talipes (club foot)
5. Developmental Dysplasia of Hip
6. Congenital Cataract
7. Congenital Deafness
8. Congenital Heart Disease

(# cephalohematoma, brachial plexus injury, facial paralysis, fracture & dislocation of hip)

The health provider must show the newborn to the mother and other family members, with particular attention to the identity tag on the newborn and must communicate to them the time, birth weight, gender and condition of the newborn.

Physiological Conditions

Mothers observe their babies very carefully and are often worried by minor physical peculiarities or developmental variations, which may be of no consequence and do not warrant any therapy.

Condition	Description	Action: Reassure Mother
Mastitis Neonatorum	Engorgement of breasts in term babies of both sexes on the third or fourth day and may last for days or even weeks due to persistence of maternal hormones.	Local massage, fomentation and expression of milk should not be done as it may lead to infection.
Vaginal bleeding	Seen in female babies about three to five days after birth because of withdrawal of maternal hormones. The bleeding is mild and lasts for two to four days.	Additional vitamin K is unnecessary.
Mucoid vaginal secretions	Most female babies have thin, grayish, mucoid, vaginal secretions	Should not be mistaken for purulent discharge.
Tongue Tie	A fibrous frenulum with a notch at the tip of the tongue.	Does not interfere with sucking or later speech development.
Nonretractable prepuce	Normally nonretractable in all male newborn babies, should not be diagnosed as phimosis. The urethral opening is often pinpoint and is visualized with difficulty.	Mother should be advised against forcibly retracting the foreskin.
Hymenal tags	Seen at the margin of hymen in two-third of female babies	
Umbilical hernia	Manifest after the age of two weeks or later.	Most of these disappear spontaneously by one or two years of age.

Developmental Variations

Peeling skin	Dry skin with peeling and exaggerated transverse sole creases are seen in all post term and some term babies
Milia	Yellow – white spots on the nose or face due to retention of sebum, are present in practically all babies and disappear spontaneously
Toxic erythema/ Erythema Neonatorum	An erythematous rash of unknown cause with a central pallor appearing on the second or third day in term neonates, which begins on the face and spreads down to the trunk and extremities in about 24 hours. This should be differentiated from pustules which need treatment. It disappears spontaneously after two to three days without any specific treatment.
Storkbites (Salmon patches or naevus simplex):	These are discrete, pinkish- gray, sparse, capillary hemangiomata commonly seen at the nape of neck, upper eyelids,forehead and root of the nose which invariably disappears after a few months.
Mongolian blue spots	In babies of Asiatic origin irregular blue areas of skin pigmentation are often present over the sacral area and buttocks, though extremities and rest of the trunk may also be affected. These spots disappear by the age of six months.
Subconjunctival hemorrhage	Semilunar arcs of sub-conjuctival hemorrhage are a common finding in normal babies. The blood gets reabsorbed after a few days without leaving any pigmentation.
Epstein Pearls	These are white spots, usually one on either side of the median raphe of the hard palate. Similar lesions may be seen on the prepuce. They are of no significance.
Sucking callosities	The presence of these button like, cornified plaques over the centre of upper lip has no significance.

Daily care in the postnatal ward

Doctors and nurses at NBSU should take rounds in the postnatal wards daily. They should observe the newborn for the following:

1. Cry, activity, reflexes

- During the first few days of life, babies sleep throughout the day and they are awake, noisy and troublesome during the night.
- Babies cry when they are hungry or in discomfort. Discomfort may be due to the unpleasant sensation of a full bladder before passing urine, painful evacuation of hard stools or soiling by urine and stools. An experienced mother or nurse can usually distinguish between the cry used as a signal for food and the cry of discomfort. Persistent crying needs examination and detailed evaluation for inflammatory conditions and other causes.

2. Weight

Weight should be monitored daily. Most healthy term babies lose weight during the first 2 to 3 days of life and regain birth weight by the end of first week; averaging 20-30 gram per day; whereas a preterm takes 10-14 days of age to regain birth weight.

3. Adequacy of breast feeding

An adequately fed baby passes urine at least 6-8 times in a day. Regular and optimal feeding will avoid any excessive weight loss. Any weight loss >5% in a 24-hour period is abnormal.

4. Maintenance of temperature

Ensure that the baby is kept warm. Advice the mother to:

- Keep the baby clean and dry at all times. Maintain room temperature in all weathers.
- During winter: pre-warm the linen and clothes of the baby before dressing. Cover the baby adequately using cap socks and mittens.
- During summer: dress the baby in loose cotton clothes and keep indoors, as far as possible.Exposure of the baby to direct sunlight during the hot summer months can lead to serious hyperthermia.

5. Jaundice

All the infants must be examined in daylight for the development and severity of jaundice, twice a day for first few days of life. Visual assessment in daylight is the preferred method

6. Passage of urine/meconium

Any baby who has not passed meconium for 24 hrs after birth or urine within 48 hours needs to be evaluated. Many babies pass urine (even stools) after each feed during the first 3 months of life.

- Transitional stools: (Day 3 to 4 of life) are often semi-loose and greenish-yellow with increased frequency and settle within 24 to 48 hours, need no treatment. Reassure mother if baby continues to feed well.
- Stools: Breast fed babies pass frequent golden yellow, sticky, semi loose stools and often while being fed or soon after a feed. This is due to exaggerated gastrocolic reflex, which may persist for a couple of weeks. These infants, however generally continue to gain weight satisfactorily

7. Vomiting

Many normal babies regurgitate or spit out some amount of milk soon after feeds. This is often due to faulty technique of feeding and aerophagy. Counsel all mothers regarding feeding and burping. Investigate further, if the vomiting is persistent, projectile, or bile stained or is associated with abdominal distension or tenderness.

8. Danger signs

- Poor feeding
- Undue lethargy
- Sudden rise or fall in body temperature
- Respiratory difficulty, apnoeic attacks or cyanosis
- Seizures
- Appearance of jaundice within 24 hours of age or yellow staining of palms or soles

Newborn may also require further investigation or referral for the following:

- Excessive crying
- Drooling of saliva or choking during feeding
- Persistent vomiting
- Bleeding from any site

Advice at discharge

1. Maintenance of body temperature – as explained earlier
2. **Breast feed** every two to three hours on a semi-demand schedule both during day and night. During each feed, one breast should be completely emptied before the baby is put to the other breast. Exclusive breastfeeding should be advised and the mother should be counselled that there is no need for additional water or other fluids except under medical supervision.
3. **Skin care/bathing** Always take special precautions during bathing to prevent draught and chilling. Daily baths may be avoided during the winter months and the baby can be sponged in a warm room to avoid exposure and to keep the baby clean.
4. **Care of the umbilical stump:** Do not apply any medication on the cord, leave it open without any dressing. The cord usually falls after 4 to 10 days.
5. **Care of the eyes:** Some neonates may develop persistent epiphora (watering) due to blockage of nasolacrimal duct by epithelial debris. The mother should be advised to massage the nasolacrimal duct area (by massaging the either side of the nose adjacent to the medial canthus) 5 to 8 times daily, each time before she feeds the baby. **Routine application of antiseptic ointment/drops for prevention of ophthalmia neonatorum is not recommended**

Immunization: It is recommended to give BCG vaccine, zero dose of oral polio vaccine and Hepatitis B vaccine as per schedule and document it in the MCP Card. The mother should be informed about the date of the next visit and the same should be shown in the MCP card.

Checklist before discharge from postnatal ward

Ideally all normal newborns should be discharged after 48 hours, along with the mother once the following criteria are fulfilled:

- Newborn is free from any illness, including significant jaundice
- The newborn has been immunized
- Adequacy of breastfeeding has been assessed in all newborns, indicated by:
  - Passage of urine at 6 to 8 times over 24 hours
  - Onset of transitional stools
  - Baby sleeping well for 2-3 hours after feeding.
  - Normal weight loss pattern.

- Mother is free from any significant illness and confident to take care of her infant.
- Mother has been oriented with the use of MCP card, including danger signs and home visits by ASHA.
- Next follow up visit has been explained and scheduled.
- Mother may continue with a variety of beneficial traditional practices such as oil massage or inconsequential such as putting black mark on forehead.
- However, she should be discouraged to follow harmful traditional practices: like applying kajal/surma in eyes as it may transmit infections, cause injury or even cause lead poisoning.

Follow up

Preferably, each baby should be followed up in the clinic for assessment of growth and development, early diagnosis and management of illnesses and health education of parents. Routine use of MCP card should be done to promote monitoring and awareness of parents. Immunization visits can be used for assessment of newborn by service provider.

SKILL STATIONS

SKILL STATIONS

Day 1: Neonatal Resuscitation

Time: 2-5 pm

Stations: Four

The sequence of actions required during neonatal resuscitation will be practiced here. The details are present in the NSSK Training Module.

Station 1: Initial steps
Station 2: Bag and mask ventilation
Station 3: Chest compressions
Station 4: Umbilical vein cannulation and Medication

Equipment & Supplies

• Gloves • Neonatal Mannequin (that allows for bag and mask ventilation) • Baby sheets -2 • Shoulder roll • Suction apparatus - DeLee's mucus trap, suction machine with suction catheter 10 and 12F • Self-inflating resuscitation bag - 250 ml and 500 mL	• Face mask - size 0 and 1 • Pulse oximeter, stethoscope • Syringes 1ml, 10 ml, 20ml • Sterile blade, Scissors • Adhesive tape • Sterile cotton swabs, gauze, spirit and betadine • Umbilical catheter, Feeding tube • Adrenaline, Normal saline

Preparation

Check equipment and supplies (This drill must be performed on a daily basis by the participants at their facility)

- Check the Radiant warmer and ensure that it is in working condition.
- Place two baby sheets under the warmer
- Check the resuscitation equipment, including the mannequin and ensure functionality.
- Check suction apparatus, ensure that the pressure is <100 mm of mercury.
- Block the mask by making a tight seal with the palm of your hand, and squeeze the bag:
  - If you feel pressure against your hand, the bag is generating adequate pressure;
  - If the bag re-inflates when you release your grip, the bag is functioning properly.

Station 1
Initial steps

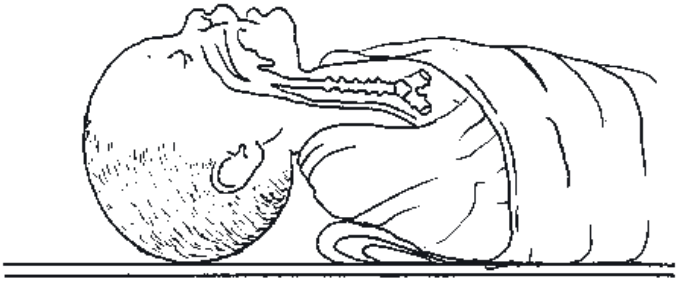
Provide **warmth** by placing the baby under a radiant warmer
Position the head to **open the airway; clear the airway** as necessary
Dry the baby
Stimulate the baby to breathe, and **reposition** the head to maintain an open airway

Provide Warmth

- Place the baby on a firm, warm surface under a radiant warmer which was switched on in manual mode 20 minutes earlier.

Opening the Airway

- Position the baby
- Place the baby on her/his back;
- Position the baby's head in a slightly extended position to open the airway (the neck should not be as extended as for adults). A rolled-up piece of cloth under the baby's shoulders may be used to extend the head.



Correct position of the head for ventilation

Clear the Airway

- If **mucus or vomitus is present,** clear the airway by suctioning first the mouth and then the nostrils. A suction machine or Delee trap can be used. Catheter size to be used is 10F. For meconium and thick secretions use 12F catheter.

Do not suction deep in the throat as this may decrease the baby's heart rate.

- **Dry** the baby and remove any wet linen.
- **Stimulate to breathe** if still not breathing, by rubbing the baby's back twice.

Evaluate: You should evaluate the newborn's respiration and heart rate:

- If the baby is breathing and has a heart rate of >100/min, manage other emergency signs.

If the baby is not breathing (is gasping or has apnoea) or has a heart rate below 100 beats per minute (bpm), you should immediately proceed for bag and mask ventilation.

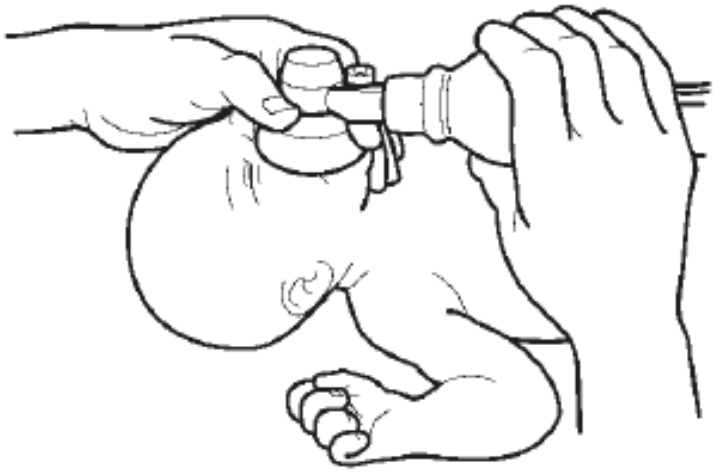
Station 2

Bag and mask ventilation

Indications: Apnoea/gasping "OR" Heart rate < 100/min after initial steps "OR" persisting central cyanosis despite oxygen, administration.

Ventilating with a Bag and Mask

- Recheck the baby's position and ensure that the neck is slightly extended.
- Position the mask and check the seal:
  - Place the mask on the baby's face so that it covers the baby's chin, mouth, and nose;
  - Check for chest rise after ventilating five times.



Positioning the mask and checking the seal

- If there is chest rise, ventilate the baby at a rate of 40-60 breaths/min. Maintain the correct rate (approximately 40-60 breaths per minute) and pressure during ventilation:
  - If the **baby's chest is not rising** after five ventilatory breaths, take the following corrective steps
    - Reapply the **mask** on the baby's face to make a good seal
    - **Reposition** the neck

  Provide 5 breaths and continue looking for chest rise, if there is still no chest rise the following two actions should be performed:
    - **Suction,** if secretions are present
    - **Squeeze,** the bag harder to increase ventilation pressure
- After 30 seconds of effective Positive Pressure Ventilation (PPV), evaluate the newborn again to ensure that ventilation is adequate, before moving to the next step. With appropriate ventilation, in almost all cases, the heart rate would rise to above 100 beats per minute (bpm). You can slowly withdraw PPV if there is spontaneous breathing and heart rate is above 100/min.
  - Babies who receive PPV for <1 minute and are breathing well should be provided observational care with the mother in skin to skin contact and breast feeding initiated.
  - Babies who receive PPV for >1 minute should be shifted to the NBSU or transferred to SNCU, while continuing PPV.
- If during evaluation you find that the heart rate is below 60 bpm, you should proceed to provide chest compressions while continuing bag and mask ventilation.

Station 3

Chest compressions

Indications: Heart rate <60/min after 30 seconds of effective ventilation.

- In order to support circulation start chest compressions, while continuing PPV. At this stage provide 100% oxygen. It is strongly recommended to attach a pulse oximeter and perform endotracheal intubation (if skilled), if not done earlier. This is for more effective coordination of chest compressions and PPV.

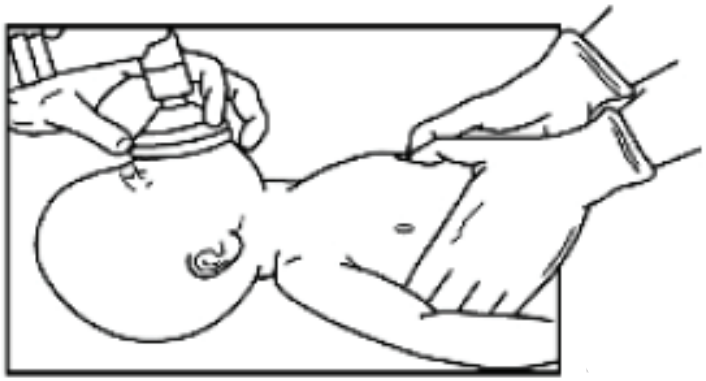
Compressions and ventilation should be coordinated. For every 3 compressions, 1 breath is delivered. Thus, the ratio is 90 chest compressions coordinated with 30 breaths per min.

Technique of chest compressions: The technique for providing chest compressions is the "Thumb Technique":

- Place thumbs just below the line connecting the nipples on the sternum (see below).
- Compress one third the anterior–posterior diameter of the chest.

The sternum should be depressed to a depth of approximately one third of the antero-posterior diameter of the chest.

While releasing the pressure, the thumbs should remain in contact with the chest to avoid relocating the compression area and delay in providing the next compression.



Station 4

Umbilical vein catheterisation

Equipment and Supplies

- Sterile gloves
- Sterile umbilical catheter or ordinary feeding tube:
- Syringes- 1ml, 10ml and 20ml
- Swabs or cotton-wool balls soaked in antiseptic solution
- Sterile blade
- Sterile forceps
- Suture
- Adhesive strapping, or thin paper tape (to secure catheter)
- Fresh umbilical cord for demonstrating umbilical vein catheterization

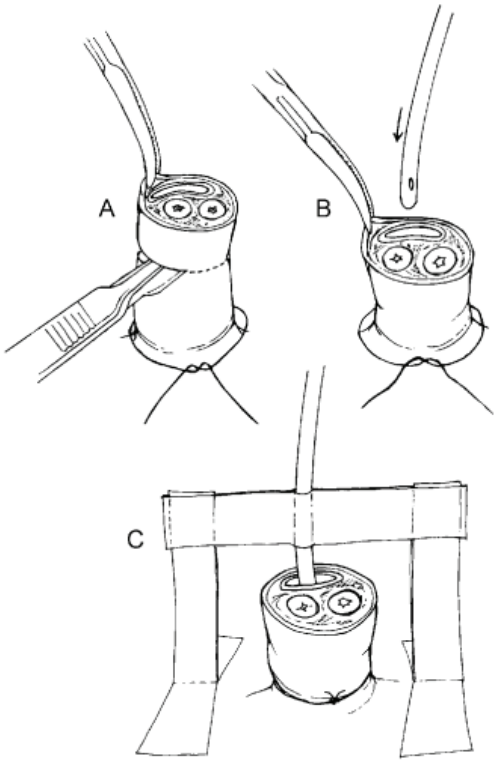
Procedure

- Gather necessary equipment and supplies.
- Wash hands and wear sterile gloves.
- Prepare the umbilicus and surrounding skin by cleaning in an outward circular motion starting at the umbilicus with a swab or cotton-wool ball soaked in alcohol, allow to dry. Repeat the procedure with Povidone iodine swab and finally with alcohol swab once more, using a new swab or cotton-wool ball each time and allowing to dry each time.
- Fill the umbilical catheter with normal saline using a closed syringe (i.e. with the plunger completely inside the barrel of the syringe) attached to the end of the catheter.

Ensure that there is no air in the catheter and that a closed syringe is attached to the end of the catheter; a sudden deep breath by the baby just after the catheter has been inserted may result in an air embolus if air is inside the catheter.

Place sterile drapes over the baby's body so that only the umbilical area is exposed.

- Place a cord tie or suture around the base of the umbilicus to control bleeding, and using a sterile blade, cut the cord to a length of 1 to 2 cm
- Identify the two umbilical arteries, which are thicker-walled and usually contracted, and the single umbilical vein, which usually has a wider opening and is found above the arteries (at 12 o' clock position)



Inserting an umbilical vein catheter

- Hold the catheter in one hand (applying gentle traction to the cord with forceps in the other hand, if necessary) and insert the catheter into the umbilical vein, guiding the catheter 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 5 to 7 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.

Never force the umbilical catheter, if resistance is encountered.

- 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.
- Secure the catheter with suture material or adhesive tape to prevent it from being dislodged.

Medication:

Drugs used in newborn resuscitation

	Epinephrine	Normal Saline
When	HR < 60 bpm, despite ongoing chest compressions with ventilation	No-response to resuscitation or presence of shock or history of sudden onset blood loss
Dose Route	IV, ET	IV, IO
Dose	0.1-0.3 cc/kg, 1:10,000 (IV)	10 cc/kg
Administration	Quickly	Over 5-10 min

How to prepare epinephrine?

Epinephrine is available as 1ml ampoule of 1:1000 concentration; however for neonate take one ml of 1:1000 solution and add 9 ml of normal saline. This makes 10 ml of 1:10,000 concentration.

How to administer epinephrine?

Epinephrine should be given intravenously. If administration is delayed due to placement of intravenous access, the endotracheal route may be used to administer the drug. But the endotracheal route results in lower and unpredictable blood levels that may not be effective. Some clinicians may choose to give a dose of endotracheal epinephrine while the venous access is being established.

What is the dose of epinephrine during neonatal resuscitation?

The recommended intravenous dose in newborns is 0.1 to 0.3 mL/kg of a 1:10,000 solution (equal to 0.01 to 0.03 mg/kg). You will need to estimate the baby's weight after birth.

When the drug is given intravenously through a catheter, you should follow the drug with a 0.5 to 1 ml flush of normal saline to be sure that the drug has reached the blood.

How should you give epinephrine during neonatal resuscitation?

Administer epinephrine rapidly - as quickly as possible

What is the expected response after giving Epinephrine?

Check the baby's heart rate 60 seconds after administering epinephrine. As you continue positive-pressure ventilation and chest compressions, the heart rate should increase to more than 60 bpm within 60 seconds after you give epinephrine. If this does not happen, you can repeat the dose every 3 to 5 minutes. In addition, ensure that:

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

Strongly consider placement of an endotracheal tube (if skilled), if one has not already been inserted. Once in place, ensure that the tube has remained in the trachea during cardiopulmonary resuscitation activities. If the baby is pale and there is evidence of blood loss, and there is a poor response to resuscitation, you should consider the possibility of volume loss.

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

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

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

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

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

- 0.9% NaCl ("Normal saline")
- O Rh-negative packed red blood cells should be considered as part of the volume replacement when severe fetal anemia is documented or expected. If timely diagnosis permits, the donor unit can be cross-matched with the mother who would be the source of any problematic antibody. Otherwise, emergency-release of O-Rh negative packed cells may be necessary. (Only if facilities and expertise is available)

What is the dose of volume expander?

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

How to give volume expander?

A volume expander must be given into the vascular system. The umbilical vein is usually the most accessible vein in a newborn, although other routes (e.g., intraosseous) can be used. If hypovolemia is suspected, fill a large syringe with normal saline or other volume expander while others on the team continue resuscitation.

How rapidly to give volume expander?

Acute hypovolemia, resulting in a need for resuscitation should be corrected fairly quickly, although some clinicians are concerned that rapid administration in a newborn may result in intracranial hemorrhage, particularly in preterm infants. No clinical trials have been conducted to define an optimum rate, but a steady infusion rate over 5 to 10 minutes is reasonable.

Day 2: Skills related to Clinical Care

Time: 2-5 pm

Stations: Four

Station 1: Kangaroo Mother Care
Station 2: Breastfeeding and expression of breast milk
Station 3: Assisted feeding
Station 4: Infection prevention

1. Kangaroo Mother Care (KMC)

Equipment and supplies

1. Mother with her low birth weight baby
2. KMC Chair
3. Gown (Disposable or Cotton gown)
4. Baby socks, cloth/disposable diaper and head cap
5. A doll/mannequin
6. Cloth for wrapping the baby

Procedure

Kangaroo mother care (KMC) is care of a small baby, who is continuously carried in skin-to- skin contact by the mother and exclusively breastfed. It is the best way to keep a small baby warm and it also helps establish breastfeeding. KMC, however, requires that the mother stays with the baby or spends most of the day at the hospital.

Beginning KMC

- Counsel the mother and the family. Ensure that the mother has support from her family to stay at the hospital or return when the baby is ready for KMC. Discuss with the family, if possible, how they can support the mother so she can provide KMC.
- Explain to the mother that KMC may be the best way for her to care for her baby once the baby's condition permits. Enumerate the advantages of KMC:
- Clothes for the mother: light, loose clothing that is comfortable in the ambient temperature, provided the clothing can accommodate the baby.
- Clothes for the baby: pre-warmed shirt open at the front, a napkin, a cap, and socks.
  - Place the baby in an upright position directly against the mother's skin in between her breasts
  - Ensure that the baby's hips and elbows are flexed into a frog-like position and the baby's head and chest are on the mother's chest, with the head in a slightly extended position.
  - Use a soft piece of fabric (about 1 square metre), folded diagonally in two and secured with a knot. Make sure it is tied firmly enough to prevent the baby from sliding out if the mother stands, but not so tightly that it obstructs the baby's breathing or movement.

- After positioning the baby, allow the mother to rest with the baby, and encourage her to move around when she is ready.
- KMC should be provided for as long as possible and never less than one hour at a time.

Monitoring the baby's condition

- If the baby is in continuous KMC, measure the baby's temperature twice daily.
- Teach the mother to observe the baby's colour & breathing pattern. If the baby stops breathing, have the mother stimulate the baby to breathe by rubbing the baby's back for 10 seconds and inform the nurse/ doctor.
- Teach the mother to recognize danger signs (e.g. apnoea, decreased movement, lethargy, or poor feeding).
- Respond to any concerns the mother may have. If the baby is feeding poorly, determine if the mother's technique is correct or if the baby is still too immature, or the baby is sick.

2. Breastfeeding and Expression of Breast Milk

Equipment and Supplies

1. Lactating mother with a healthy baby -2 in number
2. Doll/mannequin
3. 3-4 baby sheets
4. Katori & Spoon
5. Paladai

2.1 Breast feeding

Procedure

Assessment of breastfeeding

i. Ask mother to feed her baby if she has not fed in the previous one hour
ii. Check for signs of good attachment and positioning
iii. Observe for effective sucking and swallowing.
iv. Demonstrate the same to the participants.

2.2 Expression and Storage of Breast Milk

As assisted feeding will be the major activity required for small babies in the NBSU, it is useful for all service providers and mothers to know how to express and store the milk. The providers at the facility must actively ensure that the mothers of the admitted babies are encouraged to come to NBSU to learn the technique. Expression of breast milk is required for all those babies who cannot feed directly from the breast and to help mothers to continue breast milk production/relieve engorgement.

Technique

1. Sit or stand comfortably after thoroughly washing hands using soap and hold the clean container near her breast.
2. Put the thumb on the breast above the nipple and areola, and first finger on the breast below the nipple and areola. Support the breast with other fingers. Press thumb and first finger slightly inwards towards the chest wall.
3. Press breast behind the nipple and areola between fore finger and thumb. Sometimes in a lactating breast it is possible to feel the sinuses. They are like pods of peas. If one can feel them then press on the lactiferous sinuses beneath the areola.
4. Press and release, press and release. At first no milk may come, but after pressing a few times, milk starts to drip. Use the same technique in all segments of the breast to ensure that milk is expressed completely.
5. Adequate breast milk expression may take 20-30 minutes, at least 3-5 minutes for each breast, alternately and then, repeat the process on both sides. Having the baby close or handling the baby before may help the mother to have a good let-down reflex.

Do's

1. Demonstrate correct technique, if expression of milk is painful.
2. Milk should be expressed frequently -at least 8 times in 24 hours to stimulate and maintain milk production

Don'ts

1. Rub or slide fingers along the skin but should be more like rolling.
2. Squeeze the nipple; pressing or pulling the nipple does not help expression of milk
3. Try to express for a shorter time.

Storage

The expressed breast milk (EBM) should be stored in a container washed thoroughly with soap and water. The container of expressed breast milk (EBM) should be covered with a clean cloth or a lid. EBM can be kept at room temperature for 8 hours, and in the refrigerator for 24 hours.

Station 3 Assisted feeding

1. Gavage feeding

Equipment & Supplies

- Sterile oro-gastric (OG) feeding tube (6F)
- 2-5 mL syringe (for aspiration)
- Sterile 10 ml/20 ml syringe (for feeding)
- Kidney dish or bowl
- Stethoscope
- Scissors
- Normal saline
- Adhesive tape

Procedure

1. Take 6 Fr catheter
2. Measure length from angle of mouth to tragus to midpoint between umbilicus and xiphisternum
3. Insert the tube from mouth till the desired length has been introduced
4. Check position using a syringe & a stethoscope to auscultate the gush of air
5. Tape the tube to the side of mouth, and close outer end after removing the syringe
6. To instill feed-Take a 10 ml syringe barrel without the plunger and insert nozzle into the open end of the feeding tube. Pour milk in to the syringe and wait for it to go down slowly by gravity. After a feed, close the open end.
7. The baby should be placed in the right lateral position for 15 to 20 minutes to avoid regurgitation. There is no need to burp a gavage-fed baby.
8. Check abdominal girth at next feeding session & proceed to feed, if no increase in girth. If the girth increases by 2 cm, do a pre-feed gastric aspirate and analyse the amount and content to decide about continuing/discontinuing feeds.
9. While pulling out a feeding tube, it must be kept pinched and pulled out gently.
10. Always confirm the position of the tube prior to giving a feed.

2. Katori spoon/Paladai feeding

1. Take baby in the lap hold the baby semi upright with head well supported.
2. Stimulate the angle of mouth and rest the spoon/paladai with 1-2/5 ml milk at the angle of the mouth.
3. Pour milk slowly into open mouth & watch for swallowing. Gently stroke behind the ear or on the sole if the baby goes to sleep.
4. Continue feeding in this manner, till the desired amount has been fed.
5. Burp the baby
6. Place in lateral position with head supported a little higher than the rest of the body.

Station 4

Infection prevention

Supplies:

This is also facilitator's responsibility

- Laptop to play the infection prevention video
- Soap & Running water
- Hand washing chart

Infection prevention:

1. Show video of infection prevention
2. Hand washing drill for all participants

I. Hand washing: Duration – 40-60 seconds

1. Remove watch, bangles and rings
2. Fold sleeves up till the elbows
3. Wet hands till elbows
4. Apply soap
5. First rub hands with both palms facing each other
6. Then rub palm of right hand over the left dorsum and left palm over the right dorsum
7. Rub palm to palm with fingers interlocked to clean the web spaces
8. Then interlock both the palms with rotational movements for cleaning the knuckles
9. Rub both the thumbs with the palm of the opposite side
10. Fingers over the opposite palm on both sides
11. Wash the wrists
12. Keep elbows dependent during the entire procedure so that water drips from palm to elbow
13. Air dry or with disposable sterile paper/napkins.

Day 3: Hospital Visit and Equipment Demonstration

Time: 11 am -2 pm

Stations: Four

Station 1: Visit to Postnatal Ward
Station 2: Visit to SNCU
Station 3: Equipment – Warmer, Photothrapy & Oxygen Therapy
Station 4: Bedside Skills – Use of Glucometer, IV Access, IM Injection & Blood Sampling

Station 1 Visit to Postnatal ward

- Participants visit the postnatal ward to practice the skills in assessment of newborns (history & examination) & general care
- Facilitator will demonstrate history taking and examination of a newborn.
- The group will be divided in two and each group will be given a case for history taking and examination.

Station 2 Visit to SNCU

- Participants visit the SNCU and are assigned cases (sick & small newborns) to assess and discuss the management protocols
- The group will be divided in two and each group will be assigned a case for history taking, examination and management. The case will be discussed by the facilitator.

Station 3 : Equipment

1. Radiant Warmer

Equipment & Supplies

Radiant warmer and adhesive tape.

Parts

1. Bassinet (for placing the neonate)
2. Radiant heat source (Quartz/ceramic or similar heating rod)
3. Skin probe (for measuring baby's skin temperature)
4. Air probe
5. Control panel (Displays and control knobs)
6. Mode selector (selects manual or servo mode)
7. Heater output control key/knob (to increase or decrease the heater output manually)
8. Heater output display (indicates heater output)
9. Temperature selection key/knob (select the desired skin temperature)
10. Temperature display (displays temperature of baby 's skin, the set temperature and air temperature)
11. Alarm display for power failure, system failure, skin probe failure, skin temp. high/low & heater failure.

Working

1. Connect to mains and switch on
2. Select the manual mode and keep heater output to maximum for 15-20 minutes for pre-warming the bassinet and linen.
3. Select servo mode and set the desired skin temperature to 36.5°C. Heater output adjusts automatically to keep baby at set temperature
4. Place baby in the bassinet. Cover head with cap, feet with socks and hands with mittens.
5. Connect skin probe to baby's abdomen with a skin friendly tape
6. If baby is hypothermic one may use the manual mode.
7. In manual mode, record baby's axillary temperature every 30 minutes till hypothermia is corrected. Do not leave the baby unattended when operating in this mode. Switch to servo mode once temperature is 36.0°C

Cleaning & Disinfection

Bassinet

1. Soap/detergent - daily
2. Clean using disinfectant like 2% Bacillocid or glutaraldehyde when the bassinet is unoccupied or weekly (move the baby while using disinfectant)

Probe

1. Clean using Isopropyl alcohol swab before and after each use.

Dos & Donts

1. Place skin probe in the right upper abdomen in the supine position and in the flanks if baby is prone.
2. Use skin friendly adhesive tape to secure the probe in place. Do not place probe on bony structures. Ensure that the skin is dry or else prepare using alcohol/spirit swab to ensure good adhesion to the skin.
3. Check repeatedly to ensure that the sensor probe is in position.
4. Check temperature manually at least once per shift.
5. Always respond to alarms promptly and take corrective measures.
6. Do not apply probe to bruised skin.
7. Do not reuse disposable probes.

Problem	Action
1. No power on turning instrument on	- Check power supply, plug, fuse - If above okay, call engineer
2. Power on, heater not on	- Call engineer
3 No skin temperature display	- Faulty skin sensor (replace/call engineer)
4. Display temperature and baby temperature variation > 1°C	- Needs calibration, call engineer

Trouble Shooting

Side effects and dangers

1. Hyperthermia (especially in the manual mode if temperature is not monitored or in the servo mode when the probe gets displaced). To prevent hyperthermia, ensure probe is properly attached and the temperature of baby is monitored when the warmer is used in manual mode.
2. Hypothermia (due to equipment failure). To prevent hypothermia, the equipment should be maintained in good condition and alarms should be attended to immediately.

2. Phototherapy Machine

Phototherapy involves exposure of the newborn with jaundice to blue light/CFL/LED of wave length 450-460 nm. The light waves convert the bilirubin to water soluble nontoxic forms which are then easily excreted. The advantages of phototherapy are that it is noninvasive, effective, inexpensive and easy to use. Frequent feeding every 2 hours and change of posture should be promoted in a newborn receiving phototherapy.

Equipment & Supplies

- Phototherapy machine (The recommended type is either CFL or LED)
- Eye shades/cover
- Nappy to cover genitalia
- Mannequin (optional)

Types of Phototherapy Units

All phototherapy units have a designated light source to provide irradiance ranging from 6 – 40 uw/cm^2/nm in the wavelength of 420 -460 nm. The various types available are Conventional, CFL & LED units.

Parts

Source of light

1. **Fluorescent lights (Conventional phototherapy)**
   - 6-8 white fluorescent light OR
   - A combination of 2 special blue and 4-6 white fluorescent lights with a plexiglass shield.
   - White tubes
   - Blue tubes
   - Tube life is 1000 hours/6 months, whichever is earlier.
   - Irradiance provided 6-8 uw/cm2/nm (White light), 8-12 uw/cm2/nm (Blue + White light)

2. **Compact Fluorescent lights (CFL)**
   - Compact high intensity bulbs (4 blue and 2 white) enclosed in the unit with reflecting grills
   - Irradiance provided 12-18 uw/cm2/nm
   - Lamp life is 2000 – 3000 hours

3. **Light emitting diode (LED)**
   - Multiple high intensity gallium nitrate LED encased in a unit
   - Irradiance provided 20-40 uw/cm2/nm
   - Bulb life is 20000 - 30000 hours
   - Other parts
   - Radiator fan (as applicable)
   - Hour meter (as applicable)

Working

1. Connect to mains.
2. Switch on the unit & check that all tubes/lamps are working.

Cleaning

1. Soap/Detergent once daily
2. Clean with disinfectant once a week
3. Keep the lamps, the covering shield and the grill clean

Dos & Donts

1. Cover eyes with an eye patch
2. Place baby naked, only with the nappy to cover genitalia
3. Place baby as close as possible to light source avoiding hyperthermia
4. Check temperature every 4 hourly to monitor for hypo/hyperthermia
5. Check weight daily
6. Frequent breast feeding
7. Increase in allowance for fluid if there is any evidence of dehydration
8. Change position frequently after each feed
9. Measure serum bilirubin every 12 hours or earlier if required.
10. Do not place anything on top of the phototherapy unit (this may block the air vents)
11. Low birth weight babies can have their socks, caps and mittens on while under phototherapy for preventing hypothermia.
12. Use Fluxmeter to check for and ensure optimal irradiance.

Problem	Action
1. No power on turning instrument on	- Check power supply, plug, fuse - If above okay, call enginee
2. Fan not working	- Call engineer
3 Timer not working	- Call engineer
4. Standard Blue units - Tubes not coming on - Blackening/flickering of tubes	- Tubes faulty/choke needs change - Tubes need change

Trouble Shooting

Ineffective Phototherapy

1. Baby covered or frequently removed from phototherapy
2. Low irradiance (tubes old, flickering, black ends, bulbs covered with dust or reflectors dirty)
3. Distance between phototherapy lights and baby is more than recommended
4. Hemolytic conditions can cause bilirubin to rise in spite of phototherapy

Side Effects

1. Transient maculopapular rash on the trunk
2. Hyperthermia/Hypothermia
3. Increased insensible water loss and dehydration
4. Loose stools
5. Bronzing of the skin

Maintenance

1. **Change lights if:**
    1. Irradiance as measured with flux meter < 15
    2. Lamp life > 1000 hours of use for fluorescent tubes, for LED > 20000-30000 and for CFL 2000 – 3000 hours/as per manufacturer's instruction manual
    3. If Flux meter and hour meter are not available, then change fluorescent tubes every 3 months
    4. Tube ends are black or flickering or not working

2. **Comprehensive/Annual Maintenance contract**

3. Oxygen Therapy/Delivery

Equipment & Supplies

- Nasal prongs/Cannula
- Headbox/Oxygen hood
- Oxygen supply/source (oxygen cylinder with humidifier, concentrator)

Following oxygen delivery devices are used in neonates:

1. Nasal prongs: Nasal prongs provide FiO2 between 25 to 45% with flow rates of 0.5-2 L/min. They come in various sizes and the appropriate neonatal size prongs should be used. These are the most preferred mode of providing oxygen.
2. Oxygen hoods: The flow rates in the oxygen hood should be maintained between 3-5 L/min. These are capable of providing FiO2 between 30 to 90%. They have occludable portholes on the sides. With one port hole opened it provides a FiO2 close to 40-50%, while with both opened it provides 30-40%. With both port holes closed, 80-90% FiO2 can be achieved.

Precautions

1. Prewarm and humidify oxygen, especially when the flow rates are >2 L/min
2. Oxygen saturation should not cross 95% in preterm infants as hyperoxia leads to widespread free radical injury. Set appropriate alarm limits on pulse oximeter 90/96.
3. Use oxygen analyzer to check the FiO_2 when Oxygen therapy is initiated and thereafter, whenever a change in the flow rate is made or a change in the respiratory status of the neonates has occurred.

Oxygen Concentrators

An **oxygen concentrator** is a device providing oxygen therapy to a patient at minimally to substantially higher concentrations than available in ambient air. Oxygen concentrators are less expensive than liquid oxygen and are the most cost-effective source of oxygen therapy and more convenient alternative to tanks of compressed oxygen.

Room air contains 21% oxygen combined with nitrogen and a mixture of other gases. A miniaturized compressor inside the machine pressurizes this air through a system of chemical filters. This chemical filter is made up of silicate granules called, Zeolite. The Zeolite will sieve the nitrogen out of the air, concentrating the oxygen. Through this process, the system is capable of producing medical grade oxygen up to 96%, consistently. Most of the portable oxygen concentrator systems available today provide high concentration of oxygen and also maximize the purity of the oxygen.

Safety

The concentrator's instruction manual indicates as to what maintenance is necessary; here are some general guidelines to follow:

- The concentrator needs good, clean air to operate properly. Hence, operate the concentrator in a well-ventilated area.
- Wash the filters periodically (at least once in a week).
- Replace the filters periodically (at least once in a year).
- Ensure examination of the concentrator, at least once in a year by the company engineer.

There are also some very important safety issues to be kept in mind. Oxygen is most dangerous in the presence of fire. Keep flammable materials away, and do not allow any heat sources to be near a working oxygen concentrator. In both clinical and emergency-care situations, oxygen concentrators have the advantage of not being as dangerous as oxygen cylinders, which can, if ruptured or leaking, greatly increases the combustion rate of a fire.

Oxygen concentrators are considered sufficiently foolproof to be used in neonatal units. They can be used for more than one patient by using flow splitters. However, they need a power source.

Parts

1. Machine with compressor
2. Flow meter with/without splitter
3. Humidification bottle

Working

1. Plug onto the power supply.
2. Switch on the concentrator using the ON/OFF button.
3. Once the concentrator is on, a yellow light will come up.
4. Next, adjust the flow to 3-4 liters. This light will be on till the desired concentration of oxygen is achieved, which in most concentrators is nearly 90-93%, after which it goes off.
5. Every manufacturer has its own way of showing the achieved desired concentration, In some concentrators this yellow light will become green after achieving the desired concentration.

Maintenance

1. Coarse filter –Ensure it is dust free, wash daily
2. Zeolite granules –Change every 20,000 hrs
3. Bacterial filter –Change every one year

Trouble shooting

Problem	Possible cause	Corrective action
Machine too noisy	Coarse filter blocked by dust	Wash filter daily
Machine or room gets heated	Machine is near the wall	Keep away from wall or outside the room for free circulation of air
Yellow light is not going off	Desired oxygen concentration not reached	May be due to high humidity or the flow rate is more, which exceeds the capacity of zeolite material. Decrease the flow rate.
Compressor heats up	Malfunctioning of compressor	Look at the fan, it may be jammed, and hence may need repair.

Station 4:

Oxygen Cylinder

- Ensure the oxygen cylinder is secured on a flat surface on a trolley
- Attach regulator, flow meter and humidifier to the cylinder
- Attach the humidification bottle to the flow meter and fill with clean water up to the mark level on the bottle (between 1/3 and 2/3)
- Use a spanner/key to open the cylinder

- Check whether the flow indicator moves along with the bubbles in the humidifier when the flow meter is opened
- Attach the oxygen tube to the humidifier
- Connect the oxygen tube to the nasal prongs/oxygen hood to deliver oxygen to the patient

Bedside skills

1. Glucometer
2. IV Injection
3. IM Injection
4. Blood sample collection

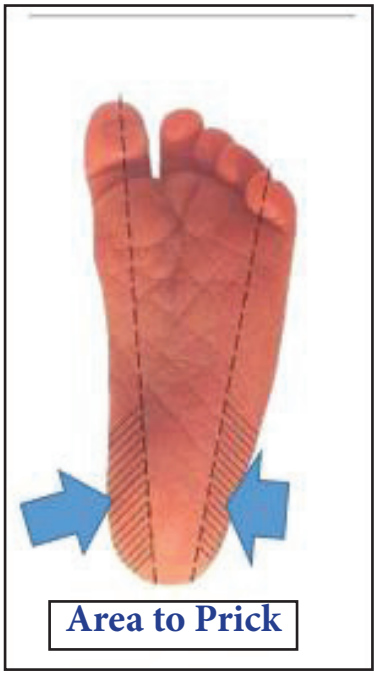
1. Using a glucometer to test Blood Sugar

Equipment & Supplies

- Glucometer
- Glucometer test strips
- Sterile needle (26G) or lancet
- Alcohol for skin preparation
- Cotton swabs

Procedure

- Check the expiry date before using the strips
- Insert a new strip into the glucometer. The meter will turn on automatically
- For taking the blood sample, heel is the most commonly used site. Warm the heel by holding the heel in your palm, while gently squeezing it for a few minutes.
- Prepare the site with spirit and always allow spirit to dry. Do not use povidone/betadine for cleaning
- Make a needle stick puncture on the postero lateral aspect of heel. Avoid the middle portion of heel and avoid making deep punctures (osteomyelitis of the heel bone, calcaneus).
- Allow blood to collect and form a droplet. Apply the blood droplet to the test strip when the blood droplet symbol appears in the glucometer window.
- The glucometer will count down and display the result of blood glucose level. Read the result from the glucometer display panel and record it.
- Discard the used strips and lancet/needles as per the biomedical waste management (BMW) guidelines.



Note: You can also directly prick over the vein to obtain blood sample. This less painful compared to the heel prick.

2. IV injection

IV Access

The training for gaining an intravenous access shall be done on a model which is provided. Each participant shall carry out this skill on this given model.

1. Select the vein (dorsum of hand/foot)
2. Wash hands and dry
3. Wear gloves
4. Prepare skin by cleaning with spirit, povidone iodine and spirit, let dry between applications
5. Hold the limb proximally to make the vein prominent
6. Pierce skin distal to the intended site of puncture
7. Insert needle into the vein (feeling of give way)
8. Ensure free flow, thread the needle further up into the vein
9. Secure the intracath by adhesive tape
10. Secure splint if needed (generally not needed)
11. Flush the cannula with normal saline 0.5ml
12. Inject fluid/medications
13. Check distal limb for adequacy of circulation

3. Intramuscular (IM) Injections

General Principles

- **The sites for IM injections include the:**
  - Quadriceps muscle group of the upper, outer thigh. This site is preferred because of the small risk of giving the injection intravenously, hitting the femur with the needle, or injuring the sciatic nerve.
  - Gluteus muscle group in the buttock. This muscle group is difficult to use for IM injection because of variable amounts of fat and subcutaneous tissue and the danger of injury to the sciatic nerve and major blood vessels in the region. If using this site, use only the upper, outer quadrant of the muscle, and always aspirate before injecting.
  - Deltoid muscle group. This site can be used for giving immunization but should not be used for giving other injections.

- **Minimize pain associated with injection by:**
  - Using a sharp needle of the smallest diameter that will allow fluid to flow freely (e.g. 22- to 24-gauge)
  - Ensuring that no material for injection is in the needle at the time of insertion into the skin
  - Using a minimal volume for injection (e.g. 2 ml or less at any single injection site).

- Avoiding rapid injection of drug/vaccine.
- Using alternative injection sites for subsequent injections.

- **Potential complications of IM injections include:**
  - inadvertent intra-arterial or intravenous injection.
  - infection from contaminated injection material.
  - neural injury (typically the sciatic nerve after injections in the buttock).
  - local tissue damage due to injection of irritants.

- **Avoid these complications by:**
  - selecting the safest agents for injection.
  - choosing the proper injection site.
  - establishing anatomic landmarks.
  - cleansing the skin thoroughly.
  - alternating sites for subsequent injections.
  - aspirating before injecting the drug/vaccine.
  - avoiding tracking the drug into superficial tissues.
  - using a needle of adequate length to reach the intended injection site.

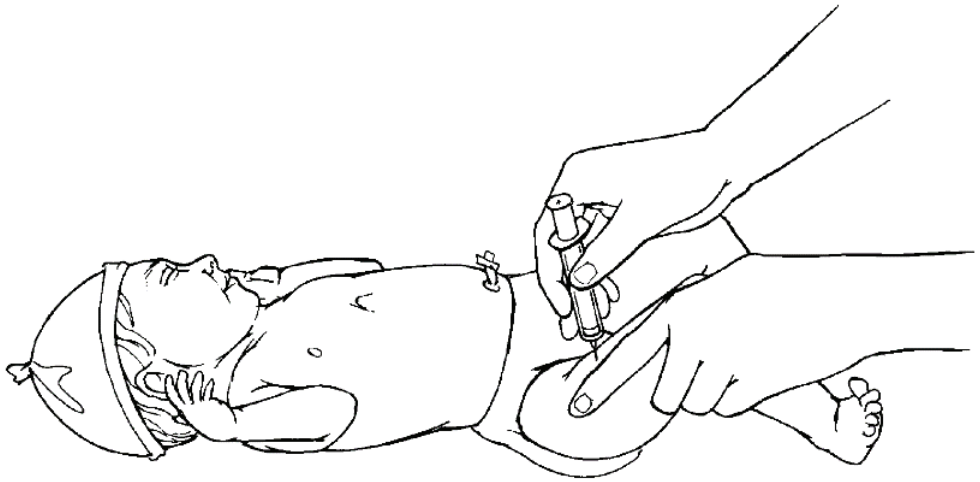
Supplies

- Sterile 1-inch needle of the smallest size that will allow fluid to flow freely (e.g. 22- to 24-gauge)
- Sterile syringe of the smallest size available that has adequate markings for proper dose (e.g. 1- to 3-ml)
- Dry cotton-wool ball

Procedure

- Gather necessary supplies.
- Wash hands.
- Select the site for injection.
- Draw the drug for injection into the syringe.
- Ensure that the drug and dose are correct.
- Clean site with alcohol swab.
- Grasp the centre of the target muscle between the thumb and forefinger, if possible.
- Insert the needle at a 90-degree angle through the skin with a single quick motion.
- Withdraw the plunger of the syringe slightly to ensure that the tip of the needle is not in a vein (i.e. no blood should enter the needle):
  - If the needle is in a vein:
  - Withdraw the needle without injecting the drug
  - Apply gentle pressure to the site with a dry cotton-wool ball to prevent bruising

- Place a new, sterile needle on the syringe
- Choose a new site for injection
- Repeat the procedure described above.
- If the needle is in the muscle, inject the material with steady pressure for three to five seconds.
- Upon completion of the injection, withdraw the needle and apply gentle pressure with a dry cotton-wool ball.
- Record the site of the injection and rotate the site of subsequent injections.



Intramuscular injection into quadriceps muscle group

4. Pulse Oximeter

Equipment & Supplies

- Pulse oximeter
- Alcohol swab
- Power supply (socket)

Procedure

- Place the pulse oximeter along with monitor on a stool or on the wall mounted tray. Clean the probe with alcohol (from the tip of the probe to the machine end) and let it dry.
- Connect the power cable to the electric socket and turn monitor on.
- Identify a well perfused site preferably in the hand (finger) or foot, toe to apply the probe.
- Place the probe in the site identified so that the probe surfaces face each other with the site between the two faces.
- Look at the display panel for appearance of waveform/number. Reposition the probe till the display shows wave forms. Secure the probe using the velcro extension.

- Identify the alarm settings and for SpO_2 and heart rate. Set high and low alarm limits for saturation (2% above and below desired limits; desired for preterm 91 to 95%) and desired heart rate 100 to 160/min.
- Read and record the findings in the case sheet after the number/waveforms are stable. Monitor and record heart rate, SpO_2 at least 1-2 hourly. Observe and change site, at least once in 6-8 hours.
- Finger tip pulse oximeter is not reliable in newborns and hence should not be used.

Precautions:

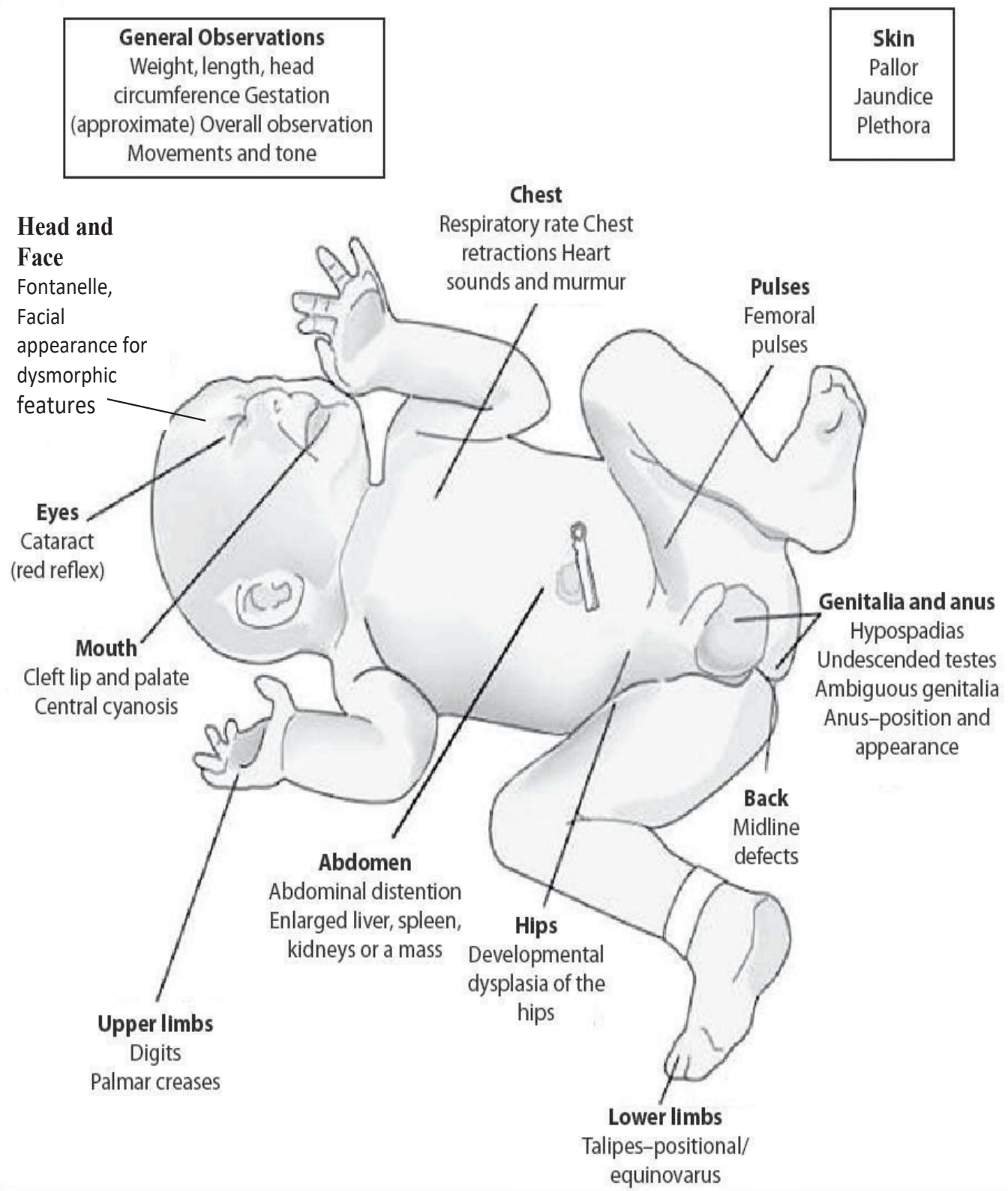
- Avoid oedematous, bruised sites and excessive pressure.
- Avoid excess ambient light to shine on the probe, if so cover with an opaque material
- Do not tie the BP cuff proximal to the limb where the probe is fixed
- Do not run the oximeter on battery alone if back up power is available

Disinfection of pulse oximeter

- Clean probe with spirit swab before every application
- Use moist cloth (with soap and water) to clean monitor

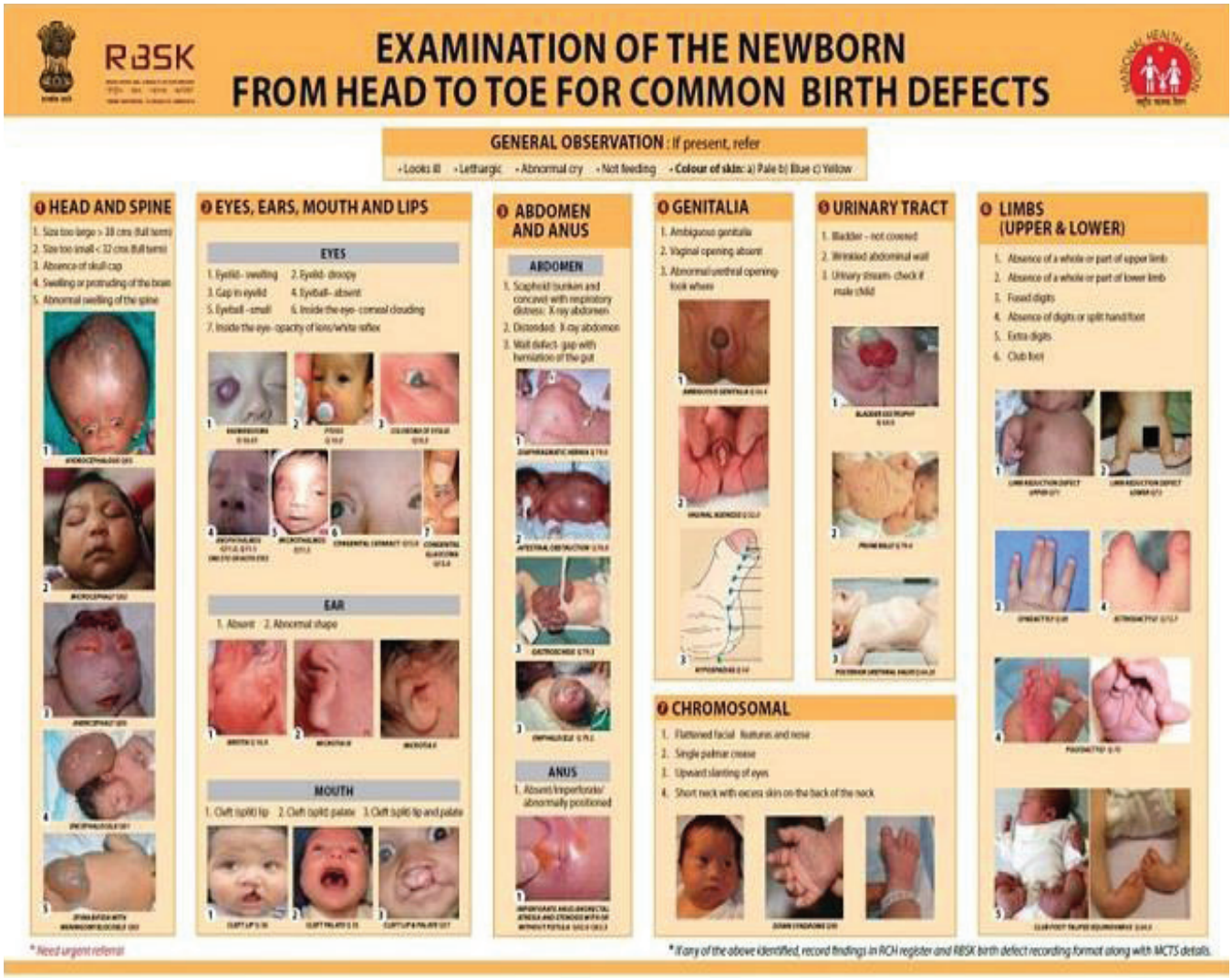
ANNEXURE

Annexure 1: Examination of a newborn from head to toe for common birth defects



Source (RBSK)

EXAMINATION OF A NEWBORN FROM HEAD TO TOE FOR COMMON BIRTH DEFECTS



Annexure 2: NBSU Stationery and Formats

1. NEWBORN STABILIZATION UNIT (NBSU) ADMISSION REGISTER

New Born Stabilization Unit, CHC / CH_____, District_____

Month……..Year…..……

To be Filled at the Time of Admission by Sister on Duty																			To be Filled at the Time of Discharge by Sister on Duty				
Admission Date (DD/MM/YY) / Admission Time	Hospital IPD NO.	NBSU Reg. No.	Baby of : (Mother's Name)	Father's Name	Sex	Age	Wt. on Admission.	Caste	Complete Address	Contact No. (Relative / Parent)	Name of ASHA / AWW	Contact No.	Place of Delivery with Name	Type of Admission	Maturity	Indication for Admission	Provisional Diagnosis	Name and Sign. Of Person Entering Details	Final Diagnosis	Out Come	Date of DISCHARGE / LAMA / REFERRAL / DEATH	Time of DISCHARGE / LAMA / REFERRAL / DEATH	Doctor Incharge
		District/Year/ Monthly S.No./ Yearly S.No.			Male/ Female/ Ambigu -ous	In Days and Write in Hours if birth <48 Hrs.	In Kgs	GEN/OBC/SC/ST	MENTION FULL ADDRESS WITH BLOCK NAME / SHC / VILLAGE (MENTION WARD NO. FOR URBAN AREA)				Ambulance/ Home / (Pvt. Hospital / Govt. Hospital) Name	1. INBORN 2. OUTBORN (Hospital Referred) 3. OUTBORN (Community Referred)	PRETERM (<37 Wks)/ FULLTERM (37- <42 Wks)/ POSTTERM (= > 42 Wks)	PICK UP FROM CASE SHEET	PICK UP FROM CASE SHEET		PICK UP FROM CASE SHEET	DISCHARGE / LAMA / REFERRAL / DEATH	DD/MM/YY		

2. NEWBORN STABILIZATION UNIT (NBSU) NEONATAL CASE RECORD SHEET

NEWBORN STABILIZATION UNIT (NBSU)

Community Health Center / Civil Hospital ....., District.....

NEONATAL CASE RECORD SHEET

(Developed by National Health MIssion)

NBSU Reg. No..... RCH No.

Doctor In charge.....

Baby of (Mother's Name)			Sex: Male / Female / Ambiguous
Father's Name			Category: General / OBC / SC / ST
Complete Address with Village Name / Ward No.			
Contact No. & Relation	1.	2.	
Date and Time of Birth	...../...../20..... ..... :	Birth Weight (grams) :	
Date and Time of Admission	...../...../20..... ..... :	Age on Admission :	Wt. on Admission (grams) :
Date and Time of Discharge	...../...../20.....	Age on Discharge :	Wt. on Discharge (grams) :
Type of Admission	Inborn / Out born (Health Facility Referred) / Out born (Community Referred)		
Place of Delivery	Home / Ambulance/ Pvt. Hospital / Govt. Hospital (Name) :		
Referred From		Mode of Transport : Self Arranged / Govt. Provided	

Indication for Admission (⬭ Encircle the most relevant single indication, If multiple indication also mention all relevant numbers in the end as per priority, mention even if admitting for stabilization)

1. Prematurity <34 weeks
2. Low Birth Weight <1800 gm.
3. Perinatal Asphyxia
4. Neonatal Jaundice
5. Resp. Distress (Rate>60 or Grunt / Retractions)
6. Large Baby (>4 Kg. at 40 weeks)
7. Refusal to Feed
8. Central Cyanosis
9. Apnea / Gasping
10. Neonatal Convulsions
11. Baby of Diabetic mother
12. Oliguria
13. Abdominal Distension
14. Hypothermia <35.4 ºC
15. Hyperthermia >37.5 ºC
16. Hypoglycemia <45 mg%
17. Shock : Cold Periphery with CFT >3 sec & Weak Fast Pulse
18. Meconium Aspiration
19. Bleeding
20. Diarrhoea
21. Major Congenital Malformation
22. Unconsciousness
23. Any Other (.....)
24. **Multiple Indication** - Mention All Relevant Numbers: a ..... b ..... c ..... d .....

Provisional Diagnosis:

***Presumptive Diagnosis** (⬭ Encircle the most relevant single diagnosis, If multiple causes also mention all relevant numbers in the end as per sequence)

- Other LBW (1000 gm – 2499 gm) : P 07.1
- Prematurity (28-<37 Weeks) : P 07.3
- Small for Gestational Age (IUGR) : P 05.1
- RDS of Newborn (HMD) : P 22.0
- Transient Tachypnoea of Newborn : P 22.1
- Acquired Pneumonia : J 15
- Birth Asphyxia : P 21.0
- HIE of Newborn : P 91.6
- Neonatal Sepsis : P 36.9
  Meningitis : G 00
  Convulsions of Newborn : P 90
  (Hypoxic, Hypoglycaemic, Hypocalcaemic, CNS Infections, Birth Trauma, Metabolic, Other, Unknown Cause)
- Neonatal Jaundice : P 59
- Neonatal Diarrhoea : A 09
- Hypothermia of Newborn : P 80
- Environmental Hyperthermia of Newborn : P 81.0
- Congenital Malformation :
  (a) Cong. Hydrocephalus : Q 03
  (b) Meningomyelocele : Q 05
  (c) Imperforate anus : Q 42.3
  (d) Cleft Palate : Q 35
  (e) Cleft Lip : Q 36
  (f) Cleft Palate with Cleft Lip : Q 37
  (g) Congenital Deformities of Hip : Q 65
  (h) Congenital Deformities of Feet : Q 66
  (i) Other Malformation (.....)
- Any Other Diagnosis (.....)
- **Multiple Diagnosis**- Mention All Relevant Codes : a ..... b ..... c ..... d .....

* (Based on WHO, ICD - 10 Version: 2010)

This Sheet has to be filled on Admission by Doctor on Duty

MOTHER'S INFORMATION : Past History, ANC Period and During Labour

Mother's Age …….. Yrs. Mother's Wt ……..…..Kgs. Age at Marriage…….Yrs.

Birth Spacing: < 1 Yr / 1-2 Yr / >2-3 Yr / > 3 Yr / Not Applicable

Gravida :……..... Para :……..... Live Birth :……..... Abortion: …….....

LMP : ...../...../..... EDD : ...../...../..... Gestation Weeks : …….....

Antenatal Visit's : None / 1 / 2 / 3 / 4 T.T. Doses : None / 1 / 2

Hb : ……..... Blood Group : …....

PIH : No [ ] Yes [Hypertension / Pre Eclampsia / Eclampsia]

Drug : No [ ] Yes [ ] (.....)

APH : Yes [ ] No [ ] GDM : Yes [ ] No [ ]

VDRL : Not Done / + Ve / -Ve HbsAg : Not Done / + Ve / -Ve

HIV Testing : Done / Not Done

Antenatal Steroids : Yes [ ] No [ ] If Yes, Dexamethasone [ ]

No. of doses : [1] [2] [3] [4] Foul Smelling Discharge : Yes [ ] No [ ]

Leaking P.V. > 24 Hours. : Yes [ ] No [ ] PIH : Hypertension / Pre Eclampsia / Eclampsia

Course of Labour : Uneventful / Prolonged 1st stage / Prolonged 2nd stage / Obstructed

E/O Feotal Distress : Yes [ ] No [ ] Type of Delivery : LSCS / AVD / NVD

Indication for Caesarean, if Applicable : [Cephalo Pelvic Disproportion] [Malpresentation] [Placenta Previa] [Obstructed Labor] [Foetal Distress] [Prolonged Labour] [Cord Prolapse] [Failed Induction (Dystocia)] [Previous LSCS] [Other .....]

Delivery Attended by : [Doctor] [Nurse] [ANM] [Dai] [Relative] [Any Other]……..

Other Significant Information :

If Information is Not Available, Leave the Field Blank, Do Not ✓ "No [ ]"

BABY'S INFORMATION: At Birth

Cried Immed. after Birth	: Yes [ ] No [ ]	Wt. at Birth: …….…….. Kgs.
Gestational age	: ……. in completed weeks	Maturity : Preterm (<37 Wk) / Full term / Post term (≥42 Wk)
Resuscitation Required	: NO [ ] Yes [ ] Tactile Stimulation /Only Oxygen / Bag & Mask [Duration.....min.]/ Intubation / Chest Compression / Adrenaline	
Vitamin K Given	: Yes [ ] No [ ]	Breast Fed within 1 Hour : Yes [ ] No [ ]

BABY'S INFORMATION : On Admission

PRESENTING COMPLAINTS:

GENERAL EXAMINATION

General Condition	: [Alert] [Lethargic] [Comatose]	Temperature ……..ºC Heart Rate……./min
Apnea	: Yes [ ] No [ ]	RR ……./min.
Grunting	: Yes [ ] No [ ]	Chest Indrawing : Yes [ ] No [ ]
Head Circumference	: ……c.m.	
Color	: Pink / Pale / Central Cyanosis / Peripheral Cyanosis	
CRT >3 secs	: Yes [ ] No [ ]	Skin pinch > 2 secs : Yes [ ] No [ ]
Cry	: Absent / Feeble / Normal / High Pitch	
Tone	: Limp / Active / Increase Tone	Convulsions : Present on Admission / Past History / No
Jaundice	: Yes [ ] No [ ] If Yes, extent [Face] [Chest] [Abdomen] [Legs] [Palms / Soles]	
Bleeding	: Yes [ ] No [ ] If Yes ,specify site [Skin] [Mouth] [Rectal] [Umbilicus]	
Bulging Anterior Fontanel	: Yes [ ] No [ ]	Taking Breast Feeds : Yes [ ] No [ ]
Sucking	: [Good] [Poor] [No Sucking]	Attachment : [Well attached] [Poorly attached] [Not attached]
Umbilicus	: [Red] [Discharge] [Normal]	Skin Pustules : [No] [Yes <10] [Yes >=10] [Abscess]
Congenital Malformation	: No [ ] Yes [ ] Hydrocephalus / M.M.C. / Imperforate Anus / Cleft Palate / Cleft Lip / Cleft Palate with Cleft Lip /Cong. Deformity of Hip / Cong. Deformity of Feet / Other.....	
Blood Sugar	: …….	Oxygen Saturation :…….....
Other Significant Information	:	

If Information is Not Available, Leave the Field Blank, Do Not ✓ "No [ ]"

SYSTEMIC EXAMINATION

CVS : .....

RESPIRATORY : .....

PER ABDOMEN : .....

CNS : .....

OTHER SIGNIFICANT FINDING : .....

TREATMENT ADVISED : On Admission

INVESTIGATIONS ADVISED : On Admission

Doctor's Name and Signature

Foot Print of Newborn
(Left Foot)

सहमति पत्र

हमें डॉक्टर द्वारा बता दिया गया है कि हमारा शिशु गंभीर रूप से बीमार है एवं उपचार के दौरान होने वाली जटिलताओं से हमें अवगत करा दिया गया है तथा हमें पूर्ण रूप से विदित है कि उपचार के दौरान समस्याऐं उत्पन्न हो सकती हैं। इन सभी खतरों से अवगत होने के बादा भी हम हमारे बच्चे को नवजात शिशु स्थिरीकरण इकाई (एन.बी.एस.यू.) में उपचार हेतु भर्ती कराने के लिये सहमत हैं।

अभिभावक के हस्ताक्षर

FINAL OUTCOME

Successfully Discharged / Left Against Medical Advice / Referred / Expired

In Case of Death : Mention Cause of Death (✓ The Most Relevant Cause of Death)

1. Respiratory Distress Syndrome
2. Meconium Aspiration Syndrome
3. HIE / Moderate-Severe Birth Asphyxia
4. Sepsis
5. Pneumonia
6. Meningitis
7. Major Congenital Malformation
8. E.L.B.W. (Wt. less than 1000g)
9. Prematurity (<28 weeks of Gestation)
10. Neonatal Tetanus
11. Cause not established
12. Any Other : .....
.....
.....

This Sheet has to be filled on Admission by Doctor on Duty

TREATMENT CONTINUATION SHEET

NBSU Reg. No..... Date of Admission.....

Baby of (Mother's name)..... Sex.....

Birth Weight..... Doctor Incharge.....

	Date..... Wt..... PND.....	Date..... Wt..... PND.....
Oxygen and Other Supportive Care		
I / V Drugs		
I / V Fluids		
Oral Drugs		
Feeding		
Investigations Conducted (Results with Date)		
Planning for Next Day		

This Sheet has to be filled by Doctor Incharge of Patient

PTO

MONITORING SHEET

NBSU Reg. No..... Date of Admission.....

Baby of (Mother's name)..... Sex.....

Weight..... Date.....

Time												
Activity (Dull / Active)												
Temperature												
Colour												
HR / RR												
CRT / B.P.												
O_2 Flow Rate / FIO_2												
Oxygen Saturation												
Blood Glucose												
Urine												
Stool												
Abdominal Girth												
R.T. Aspirate												
IV Patency (Yes / No)												
Blood Collection												
Other												

This Sheet has to be filled by Nurse on Duty

5. NURSES ORDER SHEET

NURSES ORDER SHEET

Treatment Administered	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Time	Total (ml)
Oral Feeds Feeding Tube (ml) Spoon & Cup (ml) Breast Feed (adlib)													
Oral Drugs 1. ..... 2.													
IV Drugs (Also Record Fluid Volume) 1. ..... 2. ..... 3.													
IV Fluids 1. ..... (Enter Rate & fluid given between each time slot)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	
2. ..... (Enter Rate & fluid given between each time slot)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	
IV Infusions 1. ..... (Enter Rate & fluid given between each time slot)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	
2. ..... (Enter Rate & fluid given between each time slot)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	.....ml / hr (.....ml)	
IV Bolus ..... ml													
Blood / Packed Cell / FFP / Platelet (.....ml) Rate..... ml / hr													
Any Other Treatment													
												Total Input in 24 Hours (ml)	.....

6. REFERRAL FORM

REFERRAL SUMMARY

Name of NBSU.....

NBSU Reg. No.		Sex : M / F / A	Age :	Weight (grams) :
Baby of (Mother's Name)		Father's Name :		
Date & Time of Referral	...../...../20..... ..... :	Place of Referral :		
Indication for Referral	Ventilation / Surgical Intervention / Diagnostic Work up / Metabolic Work up / Dialysis / Other			

***Final Diagnosis** (⬭ Encircle the most relevant single diagnosis, If multiple causes also mention all relevant numbers in the end as per priority)

- Other LBW (1000 gm – 2499 gm) : P 07.1
- Prematurity (28-<37 Weeks) : P 07.3
- Small for Gestational Age (IUGR) : P 05.1
- RDS of Newborn (HMD) : P 22.0
- Transient Tachypnoea of Newborn : P 22.1
- Acquired Pneumonia : J 15
- Birth Asphyxia : P 21.0
- HIE of Newborn : P 91.6
- Neonatal Sepsis : P 36.9
- Meningitis : G 00
  Convulsions of Newborn : P 90
  (Hypoxic, Hypoglycaemic, Hypocalcaemic, CNS Infections, Birth Trauma, Metabolic, Other, Unknown Cause)
- Neonatal Jaundice : P 59
- Neonatal Diarrhoea : A 09
- Hypothermia of Newborn : P 80
- Environmental Hyperthermia of Newborn : P 81.0
- Congenital Malformation :
  (a) Cong. Hydrocephalus : Q 03
  (b) Meningomyelocele : Q 05
  (c) Imperforate anus : Q 42.3
  (d) Cleft Palate : Q 35
  (e) Cleft Lip : Q 36
  (f) Cleft Palate with Cleft Lip : Q 37
  (g) Congenital Deformities of Hip : Q 65
  (h) Congenital Deformities of Feet : Q 66
  (i) Other Malformation (.....)
- Any Other Diagnosis (.....
  .....)
- **Multiple Diagnosis-**
  Mention All Relevant Codes :
  a ..... b ..... c ..... d .....

*(Based on WHO, ICD - 10 Version: 2010)

TREATMENT GIVEN

1. Oxygen : Yes / No (If yes duration.....)
2. Phototherapy : Yes / No (If yes duration.....)
3. Antibiotics : Yes / No (If yes fill the details below)

	Treatment Given	No. of Days
a)	.....	.....
b)	.....	.....
c)	.....	.....
d)	.....	.....

- .....
- .....
- .....
- .....
- .....

PRESENTING COMPLAINTS & COURSE DURING TREATMENT

RELEVANT INVESTIGATIONS

CONDITION AT TIME OF REFERRAL

TREATMENT ADVISED ON WAY

1. Keep Baby Warm.
2. Take Care of Airway and Breathing.
3. Monitor Color / Heart Rate / Blood Glucose.

- .....
- .....
- .....

Doctor's Name and Signature

This Sheet has to be filled on Referral by Doctor on Duty

7. DISCHARGE FORM

DISCHARGE NOTES : FOR NBSU RECORD

NBSU Reg. No.			Sex : M / F / A
Baby of (Mother's Name)			Father's Name :
Date & Time of Discharge	...../...../20.... .... :	Age on Discharge :	Wt. on Discharge (grams) :
Final Outcome	Successfully Discharged / Left Against Medical Advice / Expired		

***Final Diagnosis** (⬭ Encircle the most relevant single diagnosis, If multiple causes also mention all relevant numbers in the end as per priority)

- Other LBW (1000 gm – 2499 gm) : P 07.1
- Prematurity (28-<37 Weeks) : P 07.3
- Small for Gestational Age (IUGR) : P 05.1
- RDS of Newborn (HMD) : P 22.0
- Transient Tachypnoea of Newborn : P 22.1
- Acquired Pneumonia : J 15
- Birth Asphyxia : P 21.0
- HIE of Newborn : P 91.6
- Neonatal Sepsis : P 36.9
- Meningitis : G 00
  Convulsions of Newborn : P 90
  (Hypoxic, Hypoglycaemic, Hypocalcaemic, CNS Infections, Birth Trauma, Metabolic, Other, Unknown Cause)
- Neonatal Jaundice : P 59
- Neonatal Diarrhoea : A 09
- Hypothermia of Newborn : P 80
- Environmental Hyperthermia of Newborn : P 81.0
- Congenital Malformation :
  (a) Cong. Hydrocephalus : Q 03
  (b) Meningomyelocele : Q 05
  (c) Imperforate anus : Q 42.3
  (d) Cleft Palate : Q 35
  (e) Cleft Lip : Q 36
  (f) Cleft Palate with Cleft Lip : Q 37
  (g) Congenital Deformities of Hip : Q 65
  (h) Congenital Deformities of Feet : Q 66
  (i) Other Malformation (.....)
- Any Other Diagnosis (.....)
- **Multiple Diagnosis-**
  Mention All Relevant Codes :
  a ..... b ..... c ..... d .....

*(Based on WHO, ICD - 10 Version: 2010)

TREATMENT GIVEN

1. Oxygen : Yes / No (If yes duration.....)
2. Phototherapy : Yes / No (If yes duration.....)
3. KMC : Yes / No (If yes duration.....)
4. Antibiotics : Yes / No (If yes fill the details below)

	Treatment Given	No. of Days
a)	.....	.....
b)	.....	.....
c)	.....	.....
d)	.....	.....

- .....
- .....
- .....
- .....
- .....

COURSE DURING TREATMENT

CONDITION ON DISCHARGE (Mention Vitals, Provisional Diagnosis, General Condition, Persisting Health Problems)

IMMUNIZATION STATUS

- RI Card ☐
- BCG ☐
- OPV (0 Dose) ☐
- Hepatitis B (Birth Dose) ☐

TREATMENT ADVISED ON DISCHARGE

- .....
- .....
- .....

Doctor's Name and Signature

This Sheet has to be filled on Discharge by Doctor on Duty

8. NEWBORN STABILIZATION UNIT (NBSU) DISCHARGE CARD

NEWBORN STABILIZATION UNIT (NBSU)

Community Health Center / Civil Hospital ....., District .....

DISCHARGE CARD

(Developed by National Health Mission)

NBSU Reg. No.....

Doctor In charge.....

RCH No. | | | | | | | | | | | | | | | | | |

Baby of (Mother's Name)			Sex:
Father's Name			Category:
Complete Address with Village Name / Ward No.			Date of Birth:
Contact No. & Relation	1.	2.	
Date and Time of Admission		Age on Admission :	Wt. on Admission (grams) :
Date and Time of Discharge		Age on Discharge :	Wt. on Discharge (grams) :
Place of Delivery		Type of Admission :	
Indication for Admission			
Final Diagnosis			
Final Outcome			

PRESENTING COMPLAINTS :

MOTHER'S INFORMATION : Past History and ANC Period

(Put Same as in Case Record Sheet)

Mother's Age : _____Yrs. Mother's Wt. :_____Kgs. Age at Marriage :_____Yrs

Birth Spacing :_____ L.M.P. :_____ E.D.D.:_____ Antenatal Visit's :_____

T.T. Doses :_____ Gestation Weeks :_____ Gravida :_____ Para :_____

Live Birth :_____ Abortion :_____ Hb :_____ Blood Group :_____

PIH :_____ Drug:_____

APH :_____ GDM _____ VDRL :_____

HbsAg :_____ HIV Testing :_____

Any Other Significant History :

This Card has to be filled on Discharge by Doctor on Duty

MOTHER'S INFORMATION : During Labour

(Put Same as in Case Record Sheet)

Antenatal Steroids :_____ Number of Doses :_____ Foul Smelling Discharge :_____

Leaking P.V. > 24 Hours :_____ PIH :_____ Course of Labour :_____

E/O Feotal Distress :_____ Type of Delivery :_____ Indication of Caesarean, If Applicable

Course of Labor :_____ Delivery Attended by :_____ [_____]

BABY'S INFORMATION : At Birth

(Put Same as in Case Record Sheet)

Cried Immed. after Birth :_____ Wt. at Birth :_____Kgs. Gestational Age_____(in completed weeks)

Maturity :_____

Resuscitation Required :_____ Vitamin K Given :_____ Breast Fed within 1 Hour :_____

BABY'S INFORMATION : On Admission

(Put Same as in Case Record Sheet)

GENERAL EXAMINATION

General Condition :_____ Temperature :_____°C Heart Rate :_____/min Apnea:_____ RR :_____/min

Grunting :_____ Chest Indrawing :_____ Head Circumference :_____c.m.

Color :_____ Cry :_____ CRT > 3 secs : _____

Skin pinch > 2 secs :_____ Tone :_____ Convulsions :_____

Jaundice :_____ Bleeding :_____ Bulging Anterior Fontanel :_____ Taking Breast Feed :_____

Sucking :_____ Attachment :_____ Umbilicus :_____ Skin Pustules :_____

Congenital Malformation :_____ Blood Sugar :_____ Oxygen Saturation :_____

SYSTEMIC EXAMINATION

CVS : .....

RESPIRATORY : .....

PER ABDOMEN : .....

CNS : .....

OTHER SIGNIFICANT FINDING : .....

This Card has to be filled on Discharge by Doctor on Duty

TREATMENT GIVEN

1. Oxygen : Yes / No (If yes duration.....)
2. Phototherapy : Yes / No (If yes duration.....)
3. KMC : Yes / No (If yes duration.....)
4. Antibiotics : Yes / No (If yes fill the details below)

	Treatment Given	No. of Days
a)	.....	.....
b)	.....	.....
c)	.....	.....
d)	.....	.....

- .....
- .....
- .....
- .....
- .....

COURSE DURING TREATMENT

RELEVANT INVESTIGATIONS

CONDITION ON DISCHARGE (Mention Vitals, Provisional Diagnosis, General Condition, Persisting Health Problems)

IMMUNIZATION STATUS

RI Card ☐ BCG ☐ OPV (0 Dose) ☐ Hepatitis B (Birth Dose) ☐

TREATMENT ADVISED ON DISCHARGE

1. Exclusive Breast Feeding till 6 months of Age.
2. Burp well after feed.
3. Maintain Temperature.
4. Immunization as per Schedule.

- .....
- .....
- .....
- .....
- .....

Doctor's Name and Signature

This Card has to be filled on Discharge by Doctor on Duty

Any other information

This Card has to be filled on Discharge by Doctor on Duty

Annexure 3: Mentoring Checklists

1. Emergency triage of new born
2. Management of a newborn with emergency signs
3. Use of radiant warmer
4. Newborn resuscitation
5. Oxygen therapy in new born
6. Umbilical vein catheterization
7. Measuring oxygen saturation using pulse oximeter
8. Use of glucometer
9. Measuring temperature of a newborn
10. Management of severe hypothermia
11. Use of phototherapy unit
12. Management of neonatal seizures
13. Orientation on breastfeeding
14. Management of Sepsis in new born
15. Kangaroo Mother Care (KMC)
16. Technique of expression of breast milk and spoon/paladai feeding
17. Feeding with oro-gastric tube
18. How to clean self-inflating bag
19. Hand washing
20. Personal protective equipment (PPE)
21. Segregation of bio-medical waste and their disposal

Mentoring Checklists are available online on NHM portal under Child Health guidelines:
https://nhm.gov.in/index1.php?lang=1&level=3&sublinkid=1184&lid=368