Republic of Rwanda
Ministry of Health

Rwanda Biomedical Centre
Healthy People, Wealthy Nation

NATIONAL NEONATAL CARE PROTOCOL

THIRD EDITION | 2020

FOREWORD

Though neonatal mortality in Rwanda has reduced significantly, it is still unacceptably high and a major contributor to infant and under five mortality rates.

In 2015, the world set out new targets in the Sustainable Development Goals (SDGs) to be achieved by 2030. The SDG target is to reduce neonatal mortality to 12 deaths per 1,000 live births and under-five mortality to 25 deaths per 1,000 live births. Addressing the unique set of risks faced by newborn infants is one of the strategies to reach the SDG goal related to under five mortality. One of the ways to tackle this problem is to empower clinicians to develop and implement best practices guided by national guidelines and protocols.

The Ministry of Health has strongly prioritized decreasing maternal and neonatal mortality rates, and this impetus has led to the updating the existing neonatal protocol and neonatal units' equipment manual. The guidelines offer critical updates which will be followed in all health facilities caring for newborns thus offering evidence based and standardized neonatal care in Rwanda. In addition to updating existing chapters from the second edition of the national neonatal protocol, this third edition includes new sections on quality of care, family centered care, newborn referrals, congenital anomalies and palliative care for newborns.

The knowledge and guidance found within this protocol will empower those caring for newborns within existing resources and provides methods for reducing mortality and morbidity in the first month of life. Furthermore, it will improve on the quality of care provided to newborns and improve the experience of care for their families.

It is my hope and best wish that this publication and the accompanying manual will contribute to increased awareness and build knowledge of those caring for neonates in our health sector and improve the lives of Rwanda's population.

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ABBREVIATIONS

AOP:	Apnea of prematurity
BPD:	Broncho-pulmonary Dysplasia
CHD:	Congenital Heart Disease
CFT:	Capillary Refill Time
CRP:	C-reactive protein
CXR:	Chest X-ray
DIC:	Disseminated Intravascular Coagulation
DOL:	Day of Life
EBM:	Expressed Breast Milk
ELBW:	Extremely Low Birth Weight
EMTCT:	Elimination of Mother to Child Transmission of HIV
FBC:	Full Blood Count
HIE:	Hypoxic Ischemic Encephalopathy
HR:	Heart Rate
HSV:	Herpes Simplex Virus
IV:	Intravenous
IVF:	Intravenous Fluids
IVH:	Intraventricular Hemorrhage
KMC:	Kangaroo Mother Care
LBW:	Low Birth Weight
IPC:	Infection Prevention and Control
IUGR:	Intrauterine Growth Retardation
MAS:	Meconium Aspiration Syndrome
MSAF:	Meconium Stained Amniotic Fluid
NAIT:	Neonatal Alloimmune Thrombocytopenia.
NEC:	Necrotizing enterocolitis
NG:	Nasogastric
NGT:	Nasogastric Tube
NPO:	Nil Per OS/ Nothing by Mouth
NS:	Normal Saline

OGT:	Oral-Gastric Tube
PO:	Per Os/ By Mouth
PTX:	Pneumothorax
PPHN:	Persistent Pulmonary Hypertension of the Newborn
RDS:	Respiratory Distress Syndrome
RL:	Ringers Lactate
RR:	Respiratory Rate
ROP:	Retinopathy of Prematurity
RPR:	Rapid Plasma Reagin
TB:	Tuberculosis
TcB:	Transcutaneous Bilirubin
TTN:	Transient Tachypnea of the Newborn
VLBW:	Very Low Birth Weight
WBC:	White Blood Cell
WHO:	World Health Organization

CHAPTER 1: ROUTINE CARE OF THE WELL NEWBORN

1.1. Major components of routine newborn care

1.1.1. Maternal history

Review maternal history to identify whether the unborn neonate falls under the high-risk category (refer Chapter 2):

- Maternal medical/obstetric/social and family information
- Current pregnancy including antenatal screening tests
- Labor and birth
- Assess risk factors for sepsis

1.1.2. Delivery preparation

- Ensure a clean and safe delivery environment respecting infection, prevention and control practices
- Be prepared for potential resuscitation for every delivery
- Prevent hypothermia
  - Close windows, curtains, and doors to avoid drafts
  - Prepare a radiant warmer and warm towels
  - If possible, raise the temperature of ambient air to 25^{o}C

1.1.3. Immediate newborn care

- Place the newborn on the mother's chest to provide skin-to-skin contact
- Dry the newborn with a warm towel on the mother's chest
- Stimulate and suction only if visible secretions
- Assess the newborn's breathing at the time of drying:
  - If the newborn is crying or breathing adequately, proceed with routine care.
  - If the newborn is not breathing or gasping, initiate resuscitation **within the golden minute** (See Chapter 3, Neonatal Resuscitation)
  - Keep the newborn skin to skin for 1 hour even when mother has a C-section and cover the newborn with a warm towel
  - Cut the cord 1-3 minutes after delivery while providing essential newborn care on the mother's abdomen

- Early cord clamping (< 1 minute after delivery) is only recommended if the newborn is not breathing and must be moved for immediate resuscitation
- Assign Apgar score to describe the newborn's condition at 1, 5 and 10 minutes of life.
- Initiate breastfeeding within 1 hour after delivery.

Table 1: Apgar Score

Apgar Score	0	1	2
Heart rate	Absent	< 100 beats/min	> 100 beats/min
Respiration	Absent	Slow, irregular	Good, crying
Muscle tone	Limp	Some flexion of extremities	Active motion
Reflex/irritability (response to stimulation)	No response	Grimace	Sneeze or cough
Color	Blue or pale	Body pink, extremities blue	Pink

1.1.4. One hour after delivery Physical examination

- Conduct newborn physical examination (head to toe)
- Measure head circumference, length and weight and chart on percentile charts

Vitamin K

- Administer to all newborns to prevent hemorrhagic disease of the newborn. Give 1 mg IM for full term and 0.5 mg IM for preterm newborns/newborns < 1.5 kg.

Antibiotic eye ointment

- Administer Tetracycline 1% eye ointment to all newborns to prevent eye infections

Thermoregulation

- Well term newborns should be wrapped in dry cloth, wear a hat, and keep face visible
- Delay giving bath up to 24 hours
- Show mother how to avoid and recognize hypothermia after delivery.

Breastfeeding

- Breastfeed the newborn as soon as possible after birth (within an hour)
  - For HIV exposed newborns, refer to EMTCT chart for additional guidance
- Well newborns must be breastfed every 2-3 hours or on demand. Do not allow the newborn to sleep for more than 3 hours without feeding.

Umbilical cord care

- Keeping the cord dry promotes early detachment of the umbilical stump

- Always wash hands before handling umbilical cord
- Ensure aseptic care in the clamping and cutting of the umbilical cord, keep the cord clean and dry; do not apply anything.
- Check for oozing blood every 15 minutes; if blood oozes, place a second tie.

Monitoring the newborn

- Never leave the mother and newborn alone within 1 hour after birth.
- Monitor the following parameters every 15 minutes for the first hour, every 30 minutes for the 2nd hour, and hourly for the 3rd to 6th hours and then every 8 hours until discharge:
  - Breathing: grunting, chest in-drawing, fast breathing (> 60/min), oxygen saturation (if available)
  - Temperature
  - Color: evaluate the color of trunk and extremities; if cyanosed check the lips and tongue for central cyanosis
  - Cord: check for bleeding
  - Poor activity and tone
- Verify identification, place name band, and re-check prior to any medication administration.
- Before discharge, ensure newborn receives a full postnatal care exam, including urine and stool outputs, and counselling according to the postnatal care guidelines.

Immunization

- Refer the newborn for BCG, Polio 0 and Hepatitis B immunizations
- Educate about subsequent vaccination according to national protocol

1.2. Infection prevention and control (IPC)

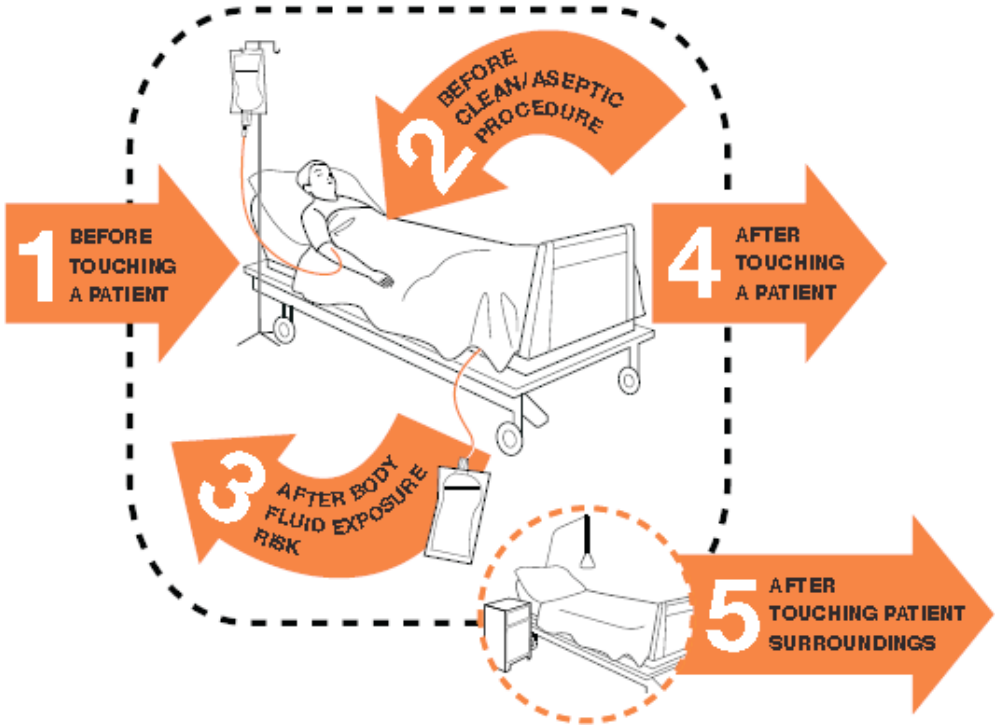
- Remember always to maintain infection, prevention and control procedures
- Visitors with fever, signs of acute respiratory or gastrointestinal illness are discouraged from visiting

Hand hygiene

- Hand hygiene is the simplest and most cost-effective way to prevent the transmission of infection.

- Hand-rub with waterless antiseptic solution:
  - Alcohol hand rubs are appropriate for rapid hand decontamination between patient contacts
  - If alcohol hand-rub not available: Mix alcohol and glycerin solution: 2 mls of glycerin+ 100 ml of alcohol 70–90%; clean hands with 3 to 5 ml of solution
  - Not a substitute for hand washing if hands are soiled
- Hand wash with clean water and soap
  - Dry hands with clean towel or air dry after washing
  - Common towels must not be used, as they facilitate transmission of infection

Figure 1: Five moments for hand hygiene



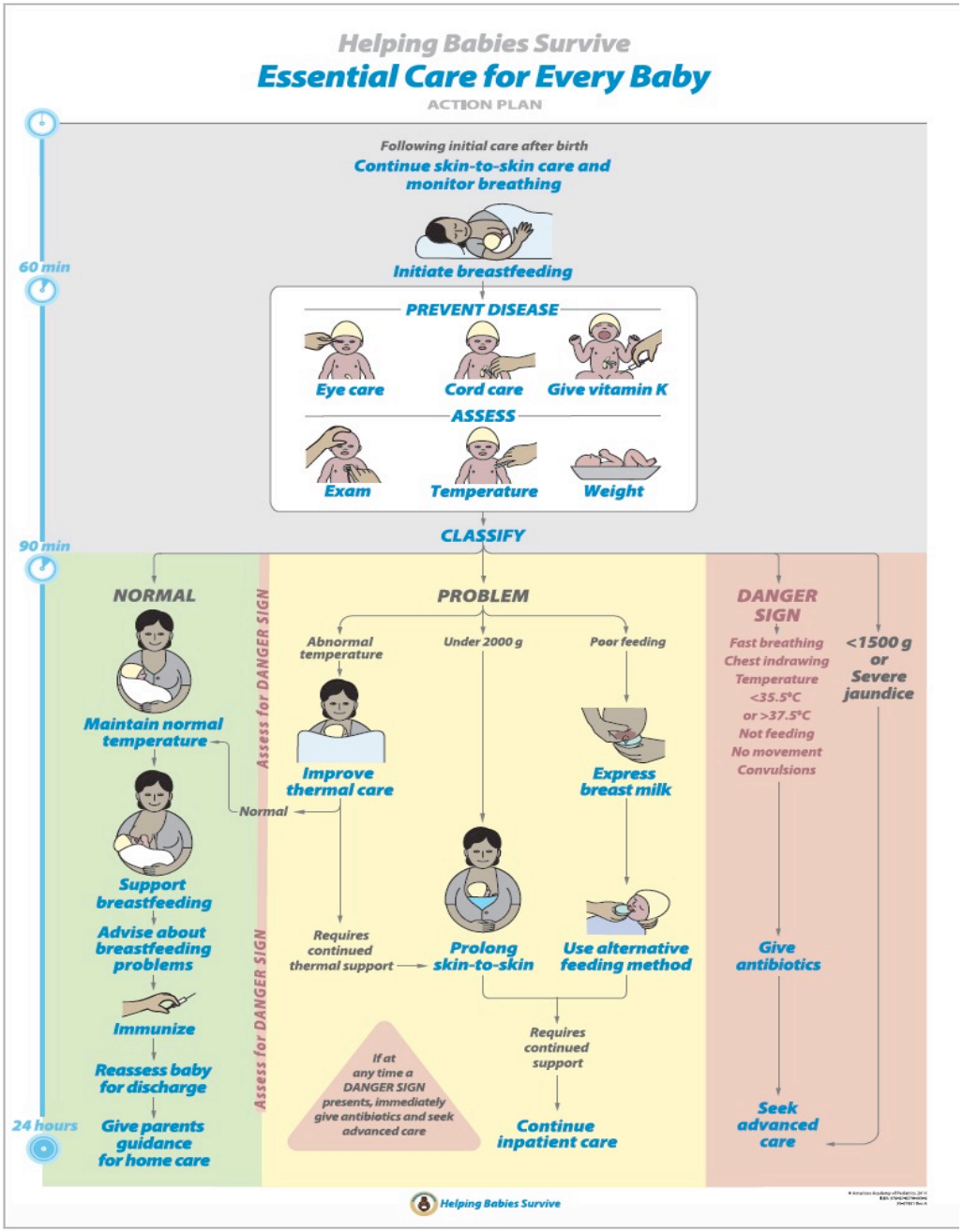
Source: *World Health Organization, 2014*

Equipment cleaning

- Equipment that are dedicated to a single patient should remain at the bedside
  - Stethoscope, thermometer, if feasible for each newborn to have their own
- Equipment that is shared must be cleaned between patients
  - Glucose monitor, saturation monitor, scales, thermometers if shared, etc.

- All surfaces in inpatient care areas should be cleaned daily including counter tops, tables, and medication cart as follows:
  - 0.5% Chlorine or 70% alcohol solution to clean surfaces and equipment
  - Anios can be used for cleaning masks and tubing
  - Allow to dry before use on another patient

Figure 2: Essential Care of Every Baby Algorithm



CHAPTER 2: ASSESSMENT, TRIAGE AND STABILIZATION OF THE HIGH-RISK NEWBORN

2.1. Newborns who are likely to need special assistance

Fetal risk factors

- Preterm (gestational age < 37 weeks) or post term (> 42 weeks)
- Premature rupture of membrane
- Fetal malformation
- Multiple gestations
- Low birth weight under 2,000 g and/or IUGR
- Macrosomia /born from diabetic mothers
- Abnormal fetal heart rate or movements
- Cord tied around neck
- Meconium stained amniotic fluid

Maternal risk factors

- Previous history of stillbirth, fetal loss, or early neonatal death
- Maternal infections
- Maternal age (< 18 & > 35 years)
- Maternal diseases like diabetes mellitus, renal diseases, anemia and maternal hypertension
- Maternal malformation

Delivery complications

- Prolonged labor
- Hemorrhage, Placental abruption. Uterine rupture
- Eclampsia or pre-eclampsia
- Cord prolapse
- Oligohydramnios or polyhydramnios
- Malpresentation: transverse lie, breech presentation, shoulder dystocia
- Chorioamnionitis or foul-smelling amniotic fluid
- Maternal administration of a narcotic within four hours of birth, deliveries that require instrumentation (e.g. vacuum deliveries) or caesarean delivery for maternal or fetal compromise.

2.2. Immediate assessment and stabilization

- Newborns with any of the following are an emergency and must be managed immediately:
  - Hypothermia (< 36.5^{o}C)
  - Apnea or gasping respiration
  - Severe respiratory distress (rate > 70, severe retractions, grunt)
  - Central cyanosis
  - Shock (cold periphery, capillary refill time (CRF) > 3 seconds, weak and fast pulse)
  - Coma, convulsions or encephalopathy
- All newborns should be assessed and have temperature, vital signs, and weight documented within 30 minutes of admission to the neonatal unit
- If gestational age of the newborn is unknown, conduct a Ballard assessment to estimate (see appendix 1).

Thermoregulation (refer to chapter 4)

- Measure axillary temperature immediately on admission or within 30 minutes of birth (normal: 36.5 –37.5°C)
- If hypothermic, (temp < 36.5°C), consider skin to skin as the first option and if not applicable use external heat source like radiant warmer, warming lamp or incubator or wrap in warm towels.
- If hyperthermia, remove or reduce external heat sources
- Start KMC immediately for stable preterm /low birth weight newborns in delivery ward to maintain warmth during any transfer.

Fluids and nutrition (refer to chapter 5)

- Absolute contraindications for enteral feeds are listed in chapter 5.

Hypoglycemia (refer to chapter 6)

- Check blood glucose levels within 1 hour of birth
  - Goal glucose > 45 mg/dL (2.5mmol/L)
  - Moderate hypoglycemia 25 to < 45 mg/dL (1.4-2.5mmol/L), see chapter 6.
  - Severe hypoglycemia if levels < 25 mg/dl (1.4 mmol/l), give a bolus of G10% 2 mls/kg over 5 minutes and continue management according to chapter 6.

Respiratory (refer to chapter 7)

- If in respiratory distress or desaturating (oxygen saturation < 90 %), provide appropriate respiratory support depending on severity;
  - Nasal cannula/prongs or simple face mask to deliver oxygen
  - Continuous Positive Airway Pressure (CPAP), as indicated in chapter 7.
  - Keep monitoring oxygen saturation to maintain the saturation between 90-95% to prevent retinopathy of prematurity (ROP) and broncho-pulmonary dysplasia (BPD)
- Give caffeine or aminophylline to preterm newborns < 1.5 kg and < 33 weeks gestation
- Give surfactant if available and able to safely intubate for those newborns ≤ 32 weeks in respiratory distress and requiring oxygen therapy.
- If newborn is not breathing, keep manual ventilation with bag and mask until there is a clear plan.

Cardiovascular (refer to chapter 8)

- Assess pulse, capillary refill, and blood pressure
- If tachycardia, think about: hyperthermia, infection, anemia, intravascular volume depletion/ dehydration, cardiac condition
- If bradycardia thinks about: congenital heart block, hypothermia, infection, respiratory failure, apnea
- If signs of poor perfusion and hypotension think about: Hypovolemic shock and blood loss, Septic shock
- If able to accurately measure neonatal blood pressure, mean blood pressure less than gestational age in weeks represents hypotension if associated with features of poor perfusion such as CRF > 3 seconds:
  - Consider fluid bolus 10 ml/kg IV of normal saline over 30 minutes. May be repeated to a maximum of 3 boluses.
  - Order full blood count (FBC) to assess need for blood transfusion. In case of need for transfusion, transfuse with isogroup, isorhesus. However, in emergency situation when there is no time for cross-match, Blood group O negative can be used.
  - Treat infection according to chapter 10.

Hyperbilirubinemia (refer to chapter 9)

- If signs of jaundice within 24 hours of birth, start phototherapy immediately.

- Measure serum bilirubin for newborns with visible jaundice within 24 hours or those with high risk factors for developing jaundice: ABO incompatibility, rhesus factor negative mothers, Low birth weight, sepsis, poor feeding, born to diabetic mother
- Treat with phototherapy as per hyperbilirubinemia protocol. If no serum bilirubin available, immediately start phototherapy if clinical jaundice on more than face and chest if more than 24 hours after birth.

Risk of perinatal infection (refer to chapter 10)

- Risk of bacterial infection is assessed on the basis of:
  - Perinatal risk factors, see chapter 10 on page 52 for full list
  - Exam: cardiorespiratory/temperature instability, lethargy, full fontanel
  - Laboratory Investigations
    - FBC: concerning if WBC < 5,000 or > 20,000, granulocyte > 70%
    - CRP: concerning if positive (> 1 mg/dL) at 12-24 hours of life
    - Chest X ray (CXR): consider if newborn has respiratory distress
    - Blood culture if available
- Administer antibiotics as soon as possible (after blood culture if available) if there is any concern for sepsis refer to chapter 10 for appropriate antibiotics
- Check for other potential maternal infections (HIV, syphilis, hepatitis, herpes), and manage per protocol.

Hypoxic ischemic encephalopathy (refer to chapter 12)

- Use Sarnat staging for assessment of severity and to guide management
- Maintain normal temperature and avoid hyperthermia
- Assess for potential causes of HIE, where possible
- Treatment is mainly supportive care:
  - Start supplemental oxygen if saturation < 90%
  - NPO if respiratory distress, seizures or Sarnat stage II/III
  - Initiate IVF, G10% at 60 mL/kg/day
  - Monitor and normalize glucose and electrolytes
  - Monitor and treat seizures

CHAPTER 3: NEONATAL RESUSCITATION

3.1. Be prepared before every delivery

- All high-risk pregnancies should be referred to a hospital for delivery
- Every delivery must be attended to by a healthcare provider skilled in newborn resuscitation
- Identify a helper before delivery
- Have resuscitation equipment prepared and routinely checked to ensure equipment is functioning properly and are ready for use.
- Ensure radiant warmer in the delivery room is switched on and at least two pre-warmed towels are available.

Table 2: Neonatal resuscitation supplies and equipment

Suction equipment • Bulb suction or penguin • Mechanical suction/electric, tubing and catheter (5F-6F for preterm newborns and 8F for term neonates)	**Ventilation equipment** • Ambu bag 250 ml for preterm and 500 for term newborns • Two facial masks size (0 for preterm and 1 for term Newborn) • Oxygen source with flow meter, if available • Laryngoscope with straight blades (number 0 for preterm and 1 for term) and endotracheal tubes (2.5-3), at the hospital
Other equipment • Radiant warmer • Two or more clean and warm towels • Clock or timer with second hand • Umbilical cord clamp • Cardiac Monitor • Pulse oximeter and probe	**Medication** • Dextrose 10% • Isotonic solution (Normal saline, Ringers lactate) • Epinephrine • For administration: needles, syringes, IV catheters

3.2. Order of priority for resuscitation

Dry and stimulate, then:

A: Airway (clear airway and put head in neutral position as below)

B: Breathing (stimulate and provide positive-pressure ventilation at 30-50 breaths/minute)

C: Circulation (start chest compressions after 1 min if heart rate < 60 beats/min in a 3:1 ratio)

D: Drugs (administer adrenaline and/or volume).

3.3. Neonatal resuscitation in delivery room

For all newborns follow the HBB algorithm below. If need of advanced care, follow neonatal resuscitation protocol on next page in hospitals.

Figure 3: Helping Babies Breathe Algorithm

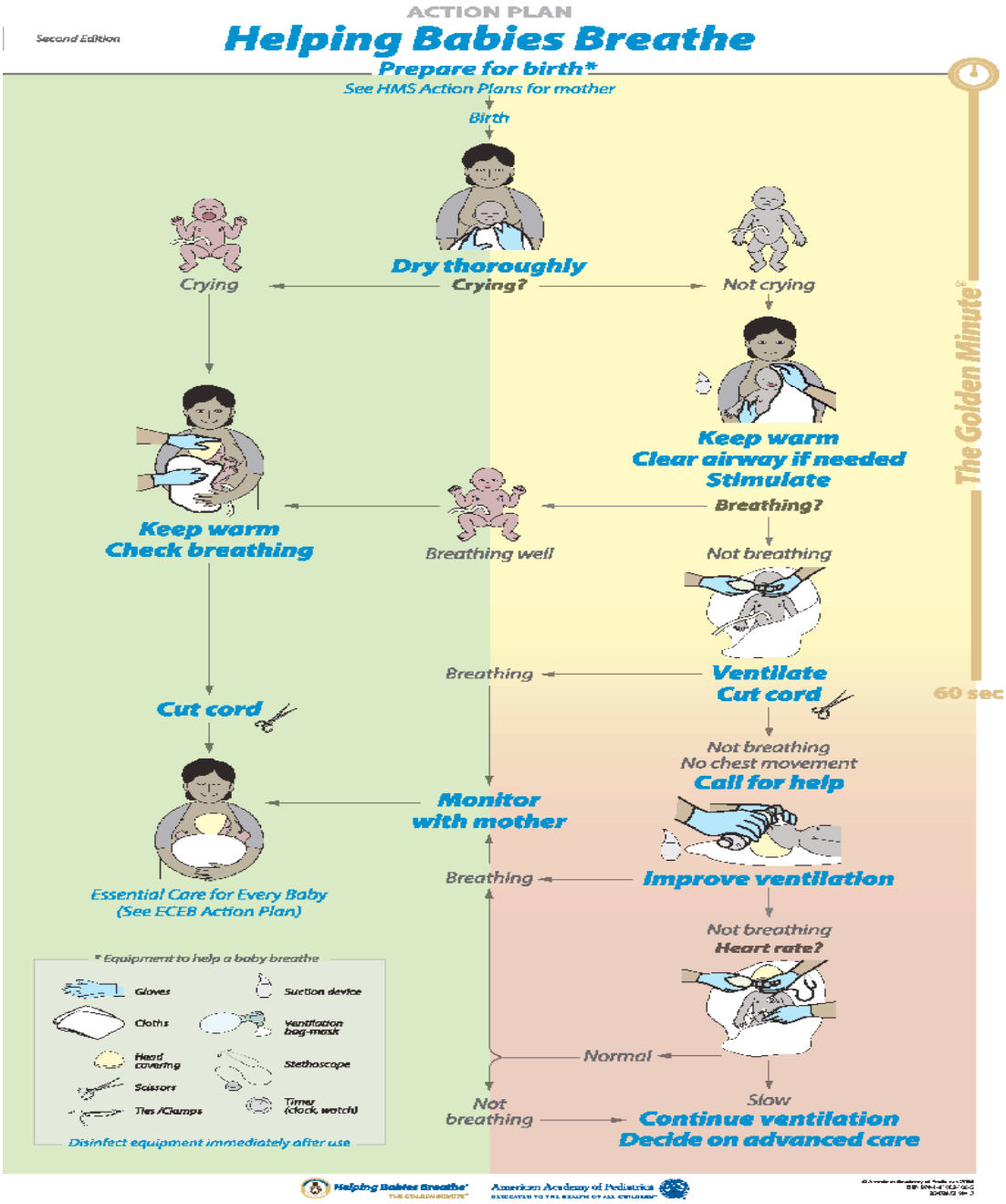
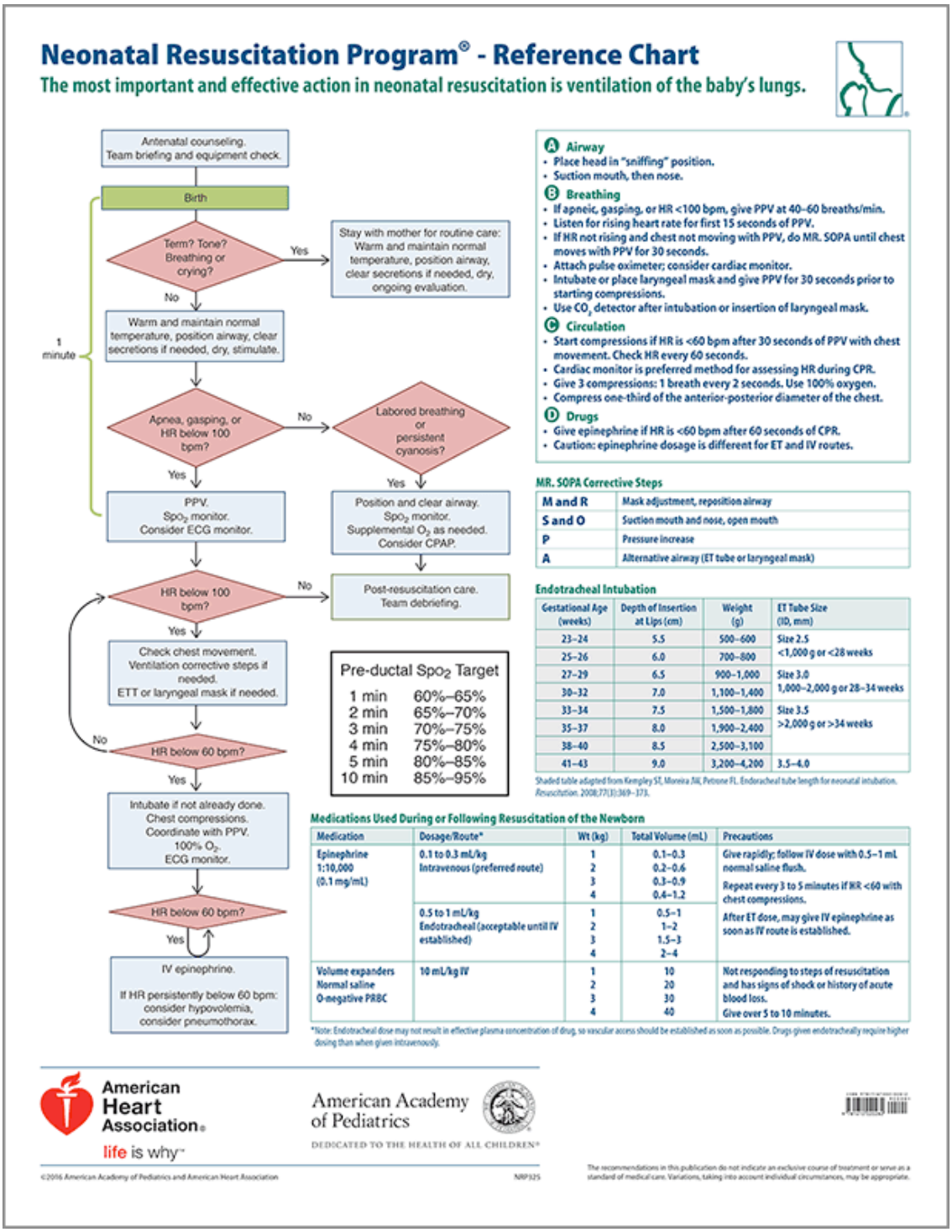


Figure 4: Algorithm for advanced neonatal resuscitation



Adapted from AHA and AAP, 7th edition, 2017

Drugs for neonatal resuscitation

Table 3: Drugs for neonatal resuscitation

Drugs	Concentration	Route/Dosage
Adrenaline	1:10,000	IV: 0.1–0.3 ml/kg
Volume expander	Normal saline (NS 0.9%); Whole blood	IV: 10 ml/kg

The majority of newborns will respond to standard resuscitation. However, if HR persists < 60 beats per minute and trained staff and equipment available, adrenaline may be administered per the dilution chart in appendix 2. If a newborn has adequate respiratory effort, and transitions to a pink color (check mucous membranes), then no further resuscitation is necessary.

3.4. Safe provision of oxygen during resuscitation

- For neonates born at ≥ 35 weeks gestation, resuscitation is initiated with room air
- For neonates < 35 weeks gestation, resuscitation is initiated with 21 to 30 percent oxygen.
- The supplemental oxygen concentration should be increased to 100 percent if chest compressions are considered.
- Attach cardiac monitor and pulse oximeter if not done already

3.5. Withholding or withdrawing resuscitation

- In conditions associated with high morbidity and mortality, parental input is critical to guide decisions about initiating resuscitation.
- In newborns with no detectable heart rate after 10 minutes of effective ventilation, resuscitation should be stopped.
- In newborns who continue to have a heart rate below 60/minute and no spontaneous breathing after 20 minutes of resuscitation, resuscitation should be stopped.

All resuscitative procedures should be documented in the neonatal medical file.

CHAPTER 4: THERMOREGULATION

4.1. Principles of thermoregulation

Temperature regulation is critical immediately after birth. Hypothermia (< 36.5°C) can cause:

- Hypoglycemia,
- Metabolic acidosis,
- Hypoxia with increased oxygen demands,
- Increased metabolic rate,
- Clotting disorders,
- Shock,
- Apnea,
- Intraventricular hemorrhage,
- Persistent pulmonary hypertension,
- Decreased surfactant production and function

Newborns at risk of developing hypothermia

- Preterm < 35 weeks gestation
- Low birth weight
- Small for gestational age
- Sick newborns
- Any newborn not adequately kept warm.

Routine thermoregulation care and hypothermia prevention in neonatal units

- Temperature should be monitored at least every 3 hours in the neonatal unit
- Close windows/curtains to prevent drafts
- Keep room temperature at 25°C if possible
- Full term newborns should be kept wrapped in dry warm cloth and wear a hat, with face visible
- Preterm and LBW newborns should be kept in Kangaroo Mother Care
- Provide external heat as needed with electric heat source (radiant warmer or incubator) if available.
- Keep incubators and cots away from windows and walls to prevent radiation heat loss
- When transporting a newborn from maternity or theater, the newborn should be kept

warm ideally in KMC or pre-warmed incubator

4.2. Equipment

Incubator

All preterm newborns who are ≤ 32 weeks of gestation or < 1,250 grams should start to be cared for in an incubator, if available.

Key points when caring for newborns in incubators:

- Ensure incubator is cleaned properly before placing a newborn inside.
- Limit entering the incubator and use portholes to access newborn when possible.
- If using skin probe mode, which is the ideal, check that skin probe is properly adhered to clean and dry skin, placed on the skin and over the abdomen.
- Newborns in an incubator should be cared for without any clothing (a hat can be placed).

Radiant Warmer

- Ensure radiant warmer is cleaned properly before placing a newborn.
- Radiant warmers should be used for procedures, resuscitation and stabilization but are not appropriate for long use. Any newborn on a radiant warmer should be monitored closely.
- Radiant warmers should be used on skin mode, whenever possible, to avoid risk of hyperthermia and burns.

4.3. Kangaroo Mother Care (KMC) for low-birth-weight newborns

- KMC prevents hypothermia, enables frequent breastfeeding, promotes bonding and allows earlier hospital discharge
- Stable VLBW neonates can have intermittent KMC in combination with standard incubator care
- Encourage all family members with stable LBW newborns to use KMC

Methods

- Family members should all be encouraged, educated and supported to provide early KMC
- Intermittent KMC should be started as early as possible, when the newborn is hemodynamically stable.
- Continuous KMC should be started when the newborn is stable, with no or only mild

respiratory distress.

- Good hand hygiene is important to prevent infection

Contraindications to KMC

- Moderate to severe respiratory distress
- Hemodynamic instability
- Systemic signs of sepsis

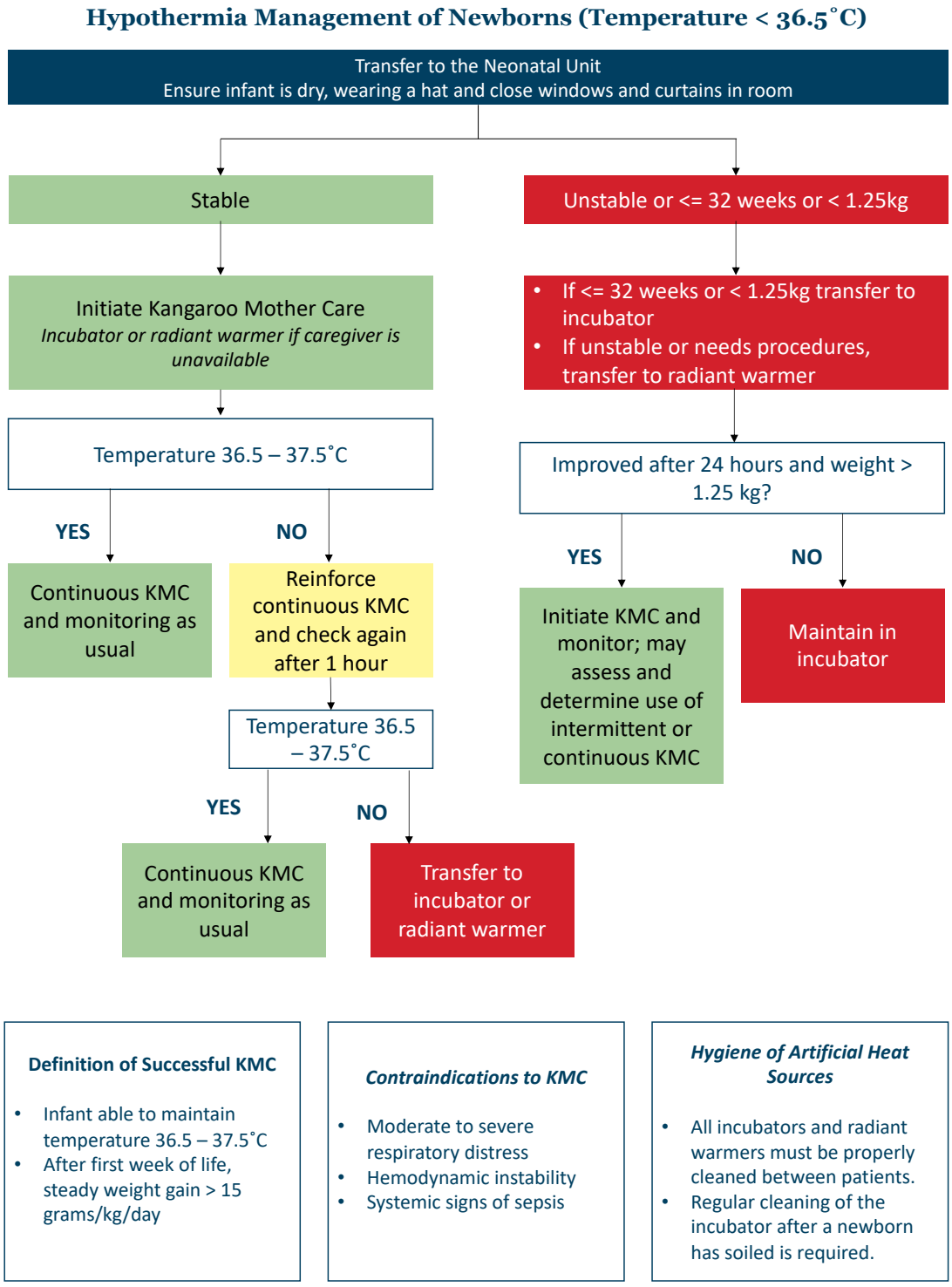
Monitoring during KMC

- Monitor vital signs 1 hour after starting KMC.
- Follow hypothermia algorithm for ongoing temperature monitoring.

Hospital discharge

- Newborns may be discharged to home while still requiring KMC for thermoregulation if:
  - Temperature (and remainder of vital signs) are stable
  - KMC is well tolerated by newborn and mother
  - Family members should be encouraged to continue KMC at home until the newborn is 2.5kg

Figure 5: Management of neonatal hypothermia algorithm



Definition of Successful KMC

- Infant able to maintain temperature 36.5 – 37.5˚C
- After first week of life, steady weight gain > 15 grams/kg/day

Contraindications to KMC

- Moderate to severe respiratory distress
- Hemodynamic instability
- Systemic signs of sepsis

Hygiene of Artificial Heat Sources

- All incubators and radiant warmers must be properly cleaned between patients.
- Regular cleaning of the incubator after a newborn has soiled is required.

CHAPTER 5: NUTRITION AND HYDRATION IN THE NEWBORN

5.1. Breastfeeding

Breastfeeding is important for newborns, children, and mothers

- Children who are not breastfed are more likely to be:
  - Ill or to die from infections such as diarrhea and gastrointestinal infections, and chest infections.
  - Underweight and not grow well
  - Overweight and to have later heart problems
- Women who do not breastfeed are more likely to:
  - Develop anemia and retain fat deposited during pregnancy, which may result in later obesity.
  - Become pregnant soon after the newborn's birth.
  - Develop breast cancer.
  - Have hip fractures in older age.

Mother's milk is all a newborn needs:

- Exclusive breastfeeding is strongly recommended for the first six months. The newborn does not need water, other fluids, or foods during this time.
- Breastfeeding continues to be important after the first six months when other foods are given to the newborn.
- Mother's milk is healthy because it contains antibodies that actively protects against infection and allergies.

General points for breastfeeding

- Breastfeeding is the best method to feed a newborn and will provide all the nutrients needed for growth
- Newborns usually feed at least 8 times a day, every 2–3 hours throughout the day and night
- Even newborn who is unable to breastfeed within the first hour should be provided with colostrum via oral swab/NG tube
- For guidance on initiating breastfeeding, see appendix 3
- Both breasts should be offered at each feeding, alternating the breast offered first
- Lactation Support: Breast milk is made on a supply and demand basis: milk must be

removed from the breast in order for it to make more milk

- Counsel adequate maternal nutrition, hydration and rest, frequent feedings and proper positioning
- Mothers of newborns who cannot breastfeed due to illness, prematurity or any other reason should be advised to begin expressing breast milk early and often (at least every three hours day and night) to encourage milk supply and avoid breast engorgement.
- If the newborn is going to be fed by NG tube, the milk should be saved for this purpose.

- Formula should be reserved to supplement when mothers milk supply is inadequate despite all attempts to increase production.

Supporting mothers who are separated from their newborn

- If a mother and a newborn are separated after birth (e.g., maternal illness or post-operative); then mothers should be encouraged and supported to express early within 6 hours after delivery
- The mother should express colostrum and give to the newborn.
- Support the mother to express milk for ongoing feeding of the newborn and mothers should express every 3 hours even if the newborn is not yet able to feed to maintain milk supply.

5.2. Complications of breastfeeding

Sore nipples

- Mild tenderness usually during first week of breastfeeding.
  - Ensure good latch with proper positioning. Try to vary positioning to avoid repeated pressure to same area of sore nipple.
  - Breastfeed on less painful side first,
  - After feeding, rub breast milk onto nipples. Let them air dry.
  - Topical moisturizer can be applied to nipples to help healing but should be wiped off before next feeding,
  - Consider topical antibiotics for infection if nipples are sore, cracked, red and irritated or crusted, or no improvement in pain with above measures in 2–3 days,
  - Continue to breastfeed with a focus on improving breastfeeding techniques; especially complete emptying of the breast.

Breast engorgement

- Breast erythema, firmness, tenderness or flattened nipples from buildup of breast milk due to missed feedings or inadequate milk removal.
- Treatment
  - Apply cold cloths to breasts between feedings. Gently massage breasts before and during feeding.
  - Hand express milk remaining in breasts after feeding or if missed feeding
  - If the newborn cannot latch on due to flattened nipples, hand express to soften area around nipples
  - Breastfeed or hand express at least every 2 hours until the engorgement is improved

Blocked milk ducts

- Tender breast with hard reddish lump in an otherwise well mother due to an obstructed milk duct
- Treatment
  - Continue breastfeeding; feeding the newborn may help dislodge the plug from the breast
  - Use warm, moist cloths on the breast before and during feedings
  - Breastfeed on the ″plugged□ side every 2 to 3hours
  - Change positioning so that the newborn's chin points towards the plug
  - Massage the plug with downward motion toward the nipple while breastfeeding
  - Plugged ducts should resolve within 24-48 hours

Mastitis

- Hot, painful and swollen breast in a mother with systemic signs of illness due to inflammation and possible infection of milk ducts; typically, of one breast
- Treatment
  - Continue to breastfeed (it is safe for the newborn) with a focus on improving breastfeeding techniques, especially complete emptying of the breast.
  - If it is too painful to breastfeed, hand express milk. Resume breastfeeding as soon as able.
  - Apply warm moist cloths to the affected breast before and during feeding
  - Drain breasts every 2-3 hours by breastfeeding or hand expressing
  - Advise the mother to drink plenty of fluids and eat well
  - Paracetamol if indicated for fever or pain

– Antibiotics if fever or symptoms persist > 12–24 hours.

5.3. Breast milk expression and storage

Storage of expressed breast milk

- Milk should be expressed into a clean container
- Each container should be labeled with the date and time of expressing the milk, and mother's name or newborn's name can be added if wished.
- The oldest milk (earliest date) should be used first if it is still viable for use (see table below).
- Never refreeze human milk after it has been thawed.

Table 4: Acceptable guidelines for storage of human breast milk are as follows

Where	Temperature	Time	Notes
Room Temperature	< 25°C (< 77^{O}F)	4-6 hours	The container should be covered and kept as cool as possible (i.e., keep in a shaded place)
Refrigerator	< 4°C (< 40^{O}F)	4 days	Collect in a very clean way to minimize infectious contamination. Avoid storing in the door shelf or near the door due to fluctuations of temperature.

Warming refrigerated breast milk

- Always warm the oldest breast milk first. Remember "first in, first out". Over time, the quality of breast milk decreases.
- Cold milk can be set it in a container of warm or lukewarm water or, if covered, can be placed under running lukewarm water.

5.4. How to feed a newborn with immature sucking reflex

Assessment of newborn's readiness to feed

- Level of alertness: ensure the newborn is awake by gently rubbing their cheek or bottoms of their feet.
- Assess presence of a rooting reflex and assess for presence of a sucking reflux

Oral stimulation – "non-nutritive sucking"

- For newborns who are not ready to breastfeed, especially very preterm, feed via NGT, and initiate early oral stimulation through non–nutritive sucking (e.g., empty breast, finger).

This is important during NGT feeding or prolonged episodes of NPO to prevent breastfeeding aversion.

- Avoid over tiring the newborn and monitor weight gain especially for preterm newborns.

5.5. Feeding and fluid guidance for sick newborns

General principles

- All fluids (IV and enteral) should be documented on the nursing flow sheet in the national neonatal medical file.
- Fluids and feeding must be reviewed daily
- ″Weight for calculations□ of fluid volume and medications:
- The birth weight should be used as the "weight for calculation" until the current weight is greater than the birth weight.

Establishing feeds in sick and/or LBW newborns

- Early feeding is encouraged. Almost all newborns can be started on trophic feeds, except in the rare cases of an absolute contraindication.
- Enteral and intravenous fluid volumes should be started based upon gestational age and birth weight (appendix 4: Introduction of enteral feeds in newborns).

Example for using feeding tables (appendix 4)

A 1.4 kg newborn is now on day-2 of life, he has been on trophic feeds (15 mls/kg/day) since birth. The remainder of the fluid requirement (appendix 4*)* was given as IV fluids. The mother was initially not producing good volumes of expressed breast milk. Milk is now available, the newborn is tolerating trophic feeds and you want to increase the enteral feeds, in order to do these, follow the flow chart *(*appendix 4*)*.

- STEP 2: Total Daily Fluid Volume (TDF) on Day-2 (Table 1) = 120 ml/kg/day= 168 ml/day
- STEP 3: Feeding Group 1
- STEP 4: Newborn already on trophic feeds. Choose feeding approach, newborn < 1.5 kg, therefore progressive increase in feeds is required
- STEP 5: Newborn to progress from Day-0 (trophic) to Day-1 of Enteral feeds.
- Enteral Fluid Volume (EF) = 40 ml/kg/day = 40 x 1.4 = 56 ml/day = 7 mls three hourly
- Intravenous Fluid Volume (IVF) = 168 (TDF) – 56 (EF) = 112 ml = 4.7 ml/hr

Trophic feeds

- Trophic feeding is the practice of feeding small volumes (e.g., 10-20mls/kg/day) of enteral milk from Day 0, in order to stimulate the development of the immature gastrointestinal tract of the preterm newborn.
- Clinical benefits include improved milk tolerance, greater postnatal growth, reduced systemic sepsis, and shorter hospital stay.
- There is currently no evidence of any adverse effects following trophic feeding in the absence of a NEC or bowel obstruction.

Contraindications to enteral feeding

Table 5: Contraindications to enteral feeding

Absolute contraindications to enteral feeds
• Severe respiratory distress: > 80 rpm (preterm) > 70 rpm (term) • Shock • Unresponsive • Bilious emesis (evidence of bowel obstruction) * • Confirmed or strong suspicion of NEC* • Severe sepsis • Severe (grade 3) HIE in initial stages **NEC and bowel obstruction are the only absolute contraindications to initial trophic feeds.*
Potential contraindications:
The following are **NOT absolute** contraindications to enteral feeding **but** require consideration and judgment from the clinical team with monitoring during feeds: • Tachypnea: Preterm > 70 rpm; term > 60 rpm • Feeding intolerance (not digesting more than 50% of the feed, abdominal distension, vomiting) • Cardiorespiratory instability • Convulsions • Severe hypothermia (<35^{O}C)

5.6. Weight gain and newborn growth

Good practice for weighing neonates

- Weight should be monitored daily.
- All preterm newborns admitted to the neonatal unit should have growth parameters plotted weekly on a gender and gestation age-specific growth chart (see appendix 5 for term and appendix 6 for preterm).
- It is expected that newborns will lose weight (< 10-12%) initially and then regain birth

weight by second week.

Table 6: Optimum growth

Average daily weight gain	Preterm	15-20 gm/kg/day
	Term	> 20 gm/day
Weekly head circumference gain	Preterm & Term	0.5-1 cm/week
Weekly length gain	Preterm	0.8-1cm/week
Weekly length gain	Term	0.5-1cm/week

Poor weight gain – optimizing growth with enhanced calorie feeding (fortification, appendix 7)

If a neonate is not gaining weight adequately, the following steps should be undertaken:

- Maximize volume of feeds, increase up 180-200 mls/kg/day while assessing for tolerance
- Maximize number of feeds to at least 8 times per 24 hours
- Where possible use the "hind-milk (i.e. milk at the end of expressing) as this is calorie rich
- Observe feeding and counsel on any poor techniques
- Ensure mother is eating, drinking and resting
- Look for and treat other causes of poor weight (hypothermia, anemia, increased work of breathing or other underlying diseases).

To fortify EBM:

- The mother should express breast milk, as educated
- Use a standard infant formula for fortification. alternatively, safflower, sunflower or olive oil can be used (appendix 8 for calculations)
- Wash hands with water and soap and wash the top of the box containing the artificial milk before opening.
- Use clean tools. Cups, bottles, etc. should be washed with water and soap and then ideally boiled for at least one minute
- Use an appropriately sized syringe (plunger removed) to measure/scoop out the formula/oil to be added.
- The fortification volume of oil does not always need to be mixed. For example, it can be syringed directly into the newborn's mouth/NGT.

Stopping of enhanced calorie feeds:

- If weight gain is excessive or when the newborn approaches readiness for discharge to home, all enhanced calories should be removed, and the newborn should be fed solely breast milk (e.g., breastfeed and/or cup feeds)
- When discharge planning, consider stopping fortification three days before the anticipated discharge to ensure ongoing weight gain.

Supplementation of feeds (micronutrients)

Iron

- Premature newborns fully breast milk feeding should be given 4 mg/kg per day iron supplementation until 12 months of age.

Vitamin D

- Premature newborns should be given vitamin D supplements at a minimum dose of 400 I.U. per day until 12 months of age.
- If using a multivitamin preparation check the supplement being given to ensure that it contains sufficient Vitamin D as many multivitamin solutions contain only a very small amount of Vitamin D.

Use of breast milk substitute for newborn feeding

- Formula milk should only be used when breastfeeding or expressed breast milk is not feasible because of maternal or newborn medical condition or in case of maternal death. Formula milk is, therefore, a last resort and has significant negative implications for neonates (e.g., risk of infection).
- Preterm newborns are at greatest risk of adverse effects associated with using breast milk substitutes, including increased risk of NEC. Preterm infant formula should be used when newborn is stable to tolerate it and closely monitor for signs of intolerance and NEC.
- The risks of using breast milk substitutes:
  - The lack of the protective elements of breast milk, resulting in a higher illness rate.
  - The lack of optimal balance of nutrients, for example those needed for brain growth and intestinal development.

5.7. Intravenous (IV) fluids

Electrolytes in IV fluids

- 0-24 hours of life: G10% should be used if the newborn is not receiving full enteral feedings
- After 24 hours of life, newborns require maintenance electrolytes:
  - If a newborn is receiving any enteral feeds, this provides electrolytes; therefore, they can remain on G10% as they wean off IVF and increase their enteral volume.
  - If enteral feeding is not started by 24 hours of age, give G10% ¼ RL. If concern for hyperkalemia or alkalosis, IV fluid should be G10% ¼ NS.
- See appendix 9 for IV fluid and enteral feeding quick reference charts if able to advance enteral feeds on DOL1.

Increased losses:

Newborns require increased total fluid administration if they have increased losses (phototherapy, severe respiratory distress, radiant warmer) and you should add 20 mls/kg/day of fluids on to the total volume of daily fluid (enteral or IV).

HIE or other brain injury:

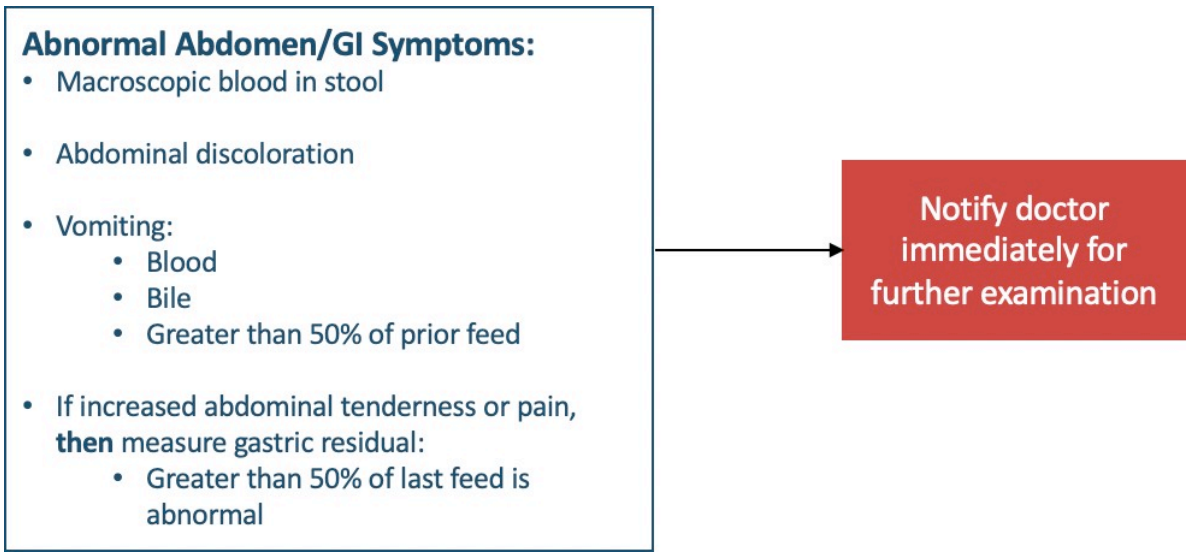
- Ensure strict monitoring of input and output of fluids and adjust fluid volumes accordingly.
- To avoid exacerbation of cerebral edema and compromised renal function, fluid volume should start at 60 mls/kg/day.

Weaning from IV fluids

- When advancing enteral volumes and weaning IV volume: Total daily fluid volume = IV fluid volume + Enteral fluid volume
- If the newborn is tolerating 100-120 ml/kg/day enterally, consider stopping IV fluids. This is to reduce the number of phlebotomy episodes, thus reducing infection risk, and newborn distress.
- In contrast to IV fluids, enteral fluids are not entirely absorbed into the vascular space. Therefore, newborns need higher fluid volume if being enterally fed than if on IV fluids.

5.8. Feeding intolerance

Figure 6: Signs of feeding intolerance



Gastric residuals

- The gastric residual volume may be dependent on the placement of the NG tube, the position of the newborn, or other non-pathologic factors.
- Gastric residuals DO NOT need to be monitored routinely, but should be checked in cases of bilious emesis or abdominal distension.
- Check the position of the NG tube routinely.

5.9. Necrotizing enterocolitis (NEC) Suspected NEC

If the newborn has bloody stool, marked abdominal distension, visible loops of bowel, discoloration of the abdominal wall, especially if accompanied by signs and symptoms of sepsis, consider the diagnosis of necrotizing enterocolitis (NEC). Air in the bowel wall (pneumatosis) on abdominal x-ray is diagnostic.

Management of NEC

- Stop all enteral feedings, leave NG tube open to decompress the stomach.
- Start IV fluids G10% ¼ RL or G12.5 ¼ LR at 150 mL/kg/day to maximize caloric intake. (see IV fluid recipes on appendix 10).
- Due to fluid losses into the bowel, newborns may need higher IV fluid volume

- Broad-spectrum antibiotics:
  - Ampicillin, gentamicin, metronidazole OR Cefotaxime + metronidazole.
- Perform serial abdominal radiograph to monitor progress of NEC.
- Bowel rest for 7 days and antibiotics for 7-14 days.
- Newborns may need medication for pain control:
  - Paracetamol: 10 mg/kg PR 6 hourly for up to three days, then only when needed
  - Morphine (0.02 to 0.05 mg/kg IV q 4 hours) can be helpful, but monitor for potential respiratory depression, hypotension and decreased bowel motility
- After the course of bowel rest and broad-spectrum antibiotics, reintroduce enteral feeds, observing for intolerance, mal-absorption, and obstruction due to scar tissue (strictures).

5.10. Feeding newborns with cleft lip and/or palate

Table 7: Feeding intervention for cleft lip and palate

FEEDING INTERVENTIONS FOR CLEFT LIP AND PALATE	
Newborns with a unilateral cleft lip (no palate involvement)	• The mother should be encouraged to orient the cleft towards the top of the breast. • The mother should try to use her breast to fill the gap in the lip, which creates a tighter seal. • She can use the underarm hold and switch to the cradle hold on the other breast. • Mother can place her finger over the cleft to occlude air entry and create a seal. • Breastfeeding outcomes for a unilateral cleft lip should be positive, the breast partly obscures the cleft
Newborns with cleft palate	• The mother should position her breast away from the cleft.
Newborns with a bilateral cleft lip or cleft palate	• The mother should feed the newborn in an upright position. • She can stimulate milk flow by using breast compressions if needed.
All newborns with any form of cleft lip/palate	• The mother should burp the newborn frequently during and after feeding and keep the newborn upright for at least 10 minutes after feeding.
Monitoring weight gain is very important. Newborns with poor growth despite these interventions may require cup, spoon and bottle with Haberman nipple or NGT feeding.	

CHAPTER 6: HYPOGLYCAEMIA AND HYPERGLYCAEMIA

6.1. Hypoglycemia Definition

Hypoglycemia is defined as a serum glucose level less than 2.5 mmol/L in the term newborn and less than 2.2 mmol/l in the pre-term newborn.

- Moderate Hypoglycemia: Glucose is 1.4-2.5 mmol/L (25-45 mg/dl)
- Severe Hypoglycemia: Glucose is < 1.4 mmol/L (25 mg/dl)

Causes and risk factors

- Prematurity/Low Birth Weight
- Large for Gestational Age Newborn/Newborn of diabetic mother/ Hyperinsulinism
- Birth asphyxia
- Feeding difficulties
- Sepsis/Respiratory distress
- Hypothermia

Clinical Presentation

- Jitteriness, tremors, irritability
- Stupor, lethargy, hypotonia, poor feeding
- Respiratory depression
- Convulsions
- Hypothermia
- Coma

Investigations

Blood tests for monitoring blood glucose (heel prick sampling):

- If feasible in your setting, confirmation of the blood sugar at admission should be undertaken immediately by sending a sample to the laboratory. However, confirmation should never delay treatment.

Management

See Moderate and Severe hypoglycemia algorithms below.

Glucose conversion: 1 mmol/L = 18mg/dl

If breast milk not available, use formula. If neither breast nor formulas available, If neither breast milk nor formula is available, G10% IV fluid may be given enterally**.**

When blood sugar monitoring is not available

- Newborns at high risk for hypoglycemia but asymptomatic, follow the moderate hypoglycemia protocol
  - High Risk: Required resuscitation, concern for sepsis, <35 weeks or birth weight < 2 kg, poor feeding, newborn of diabetic mother, macrosomic newborns
- For the newborn with symptoms of hypoglycemia and no blood sugar measurement, follow severe hypoglycemia protocol.

Figure 7: Moderate Hypoglycemia Algorithm

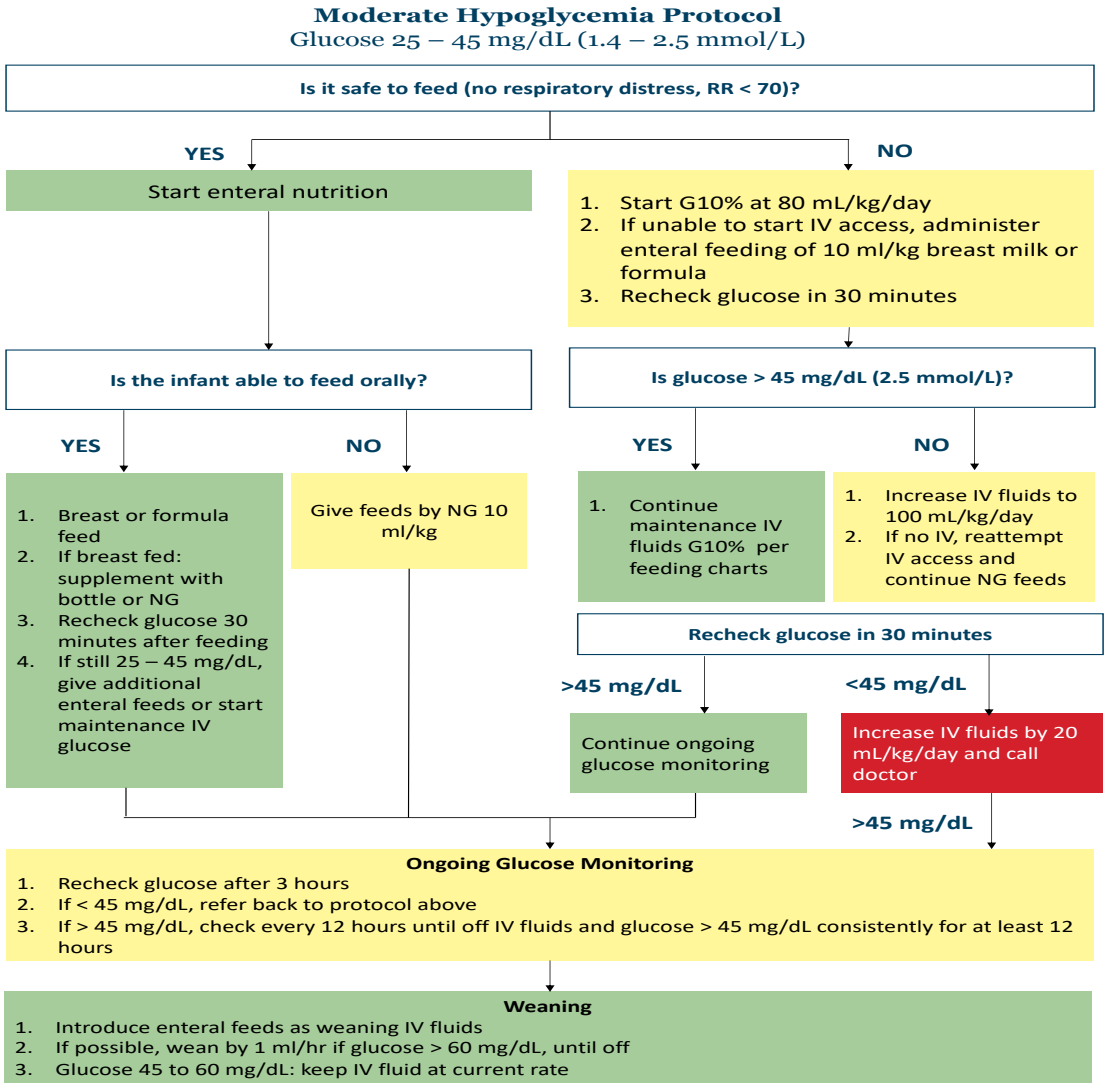
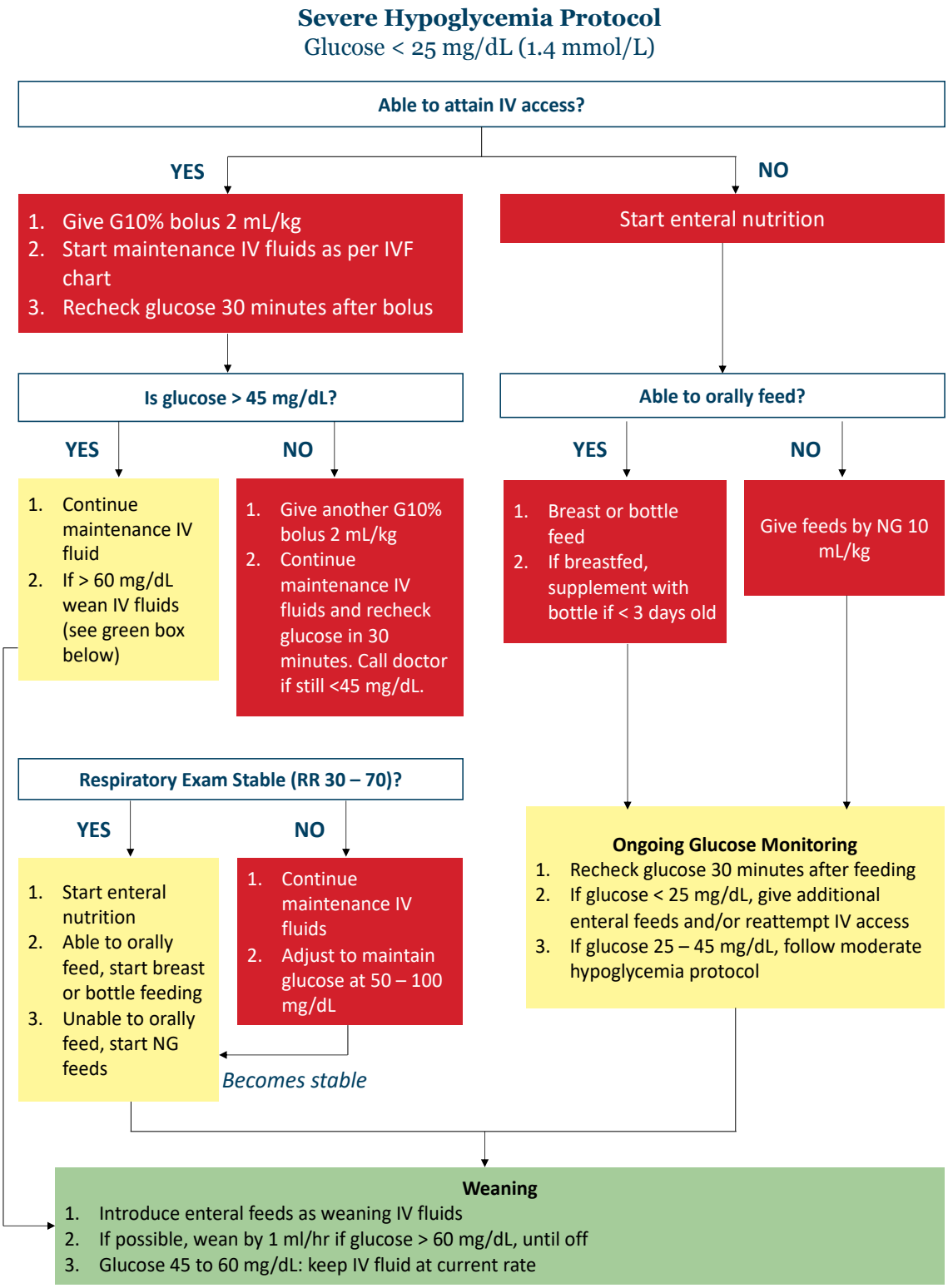


Figure 8: Severe Hypoglycemia Algorithm



6.2. Hyperglycemia

Definition

Treat elevated blood sugar detected if:

- No urine testing available - two blood sugars are ≥14 mmol/l (250mg/dl) on 2 occasions measured 2 hours apart.
- If evidence of glycosuria (++ on urine dipstick) two blood sugars ≥ 12 mmol/l (216 mg/dl) on two occasions measured 2 hours.

Risk factors

- Immaturity of pancreatic function (e.g. extremely premature newborns and IUGR)
- Insulin resistance
- Glucose overload (e.g., equipment failure, prescriber error)
- Stress (e.g., infection, pain)
- Side effects of a medication (e.g. glucocorticoid treatment)

Monitoring

- Monitor blood sugar with heel prick at admission for all newborns
- If newborn treated with corticosteroids, check blood glucose daily
- Check blood glucose 3 hourly if elevated blood sugar
- Check urine for glycosuria daily, if elevated blood sugar

Treatment

- If blood glucose ≥ 12 mmol/L:
  - Check urine for glycosuria, assess for hydration and strictly monitor fluid input/output.
  - Check for dextrose infusion administration errors
  - Do not stop fluids. Rather, reduce glucose infusion concentration progressively; E.g. reduce IV fluid rate if not dehydrated and > 100 mL/kg/day, or if on dextrose 10% reduce to 7.5 or 5%.
  - Consider early transfer to referral hospital where insulin is available and can safely be administered if no response to above measures.

CHAPTER 7: RESPIRATORY DISORDERS IN NEWBORNS

7.1. Assessment

Abnormal respiratory rate (RR):

- Tachypnea: RR > 60 breaths/minute
- Bradypnea: RR < 30 breaths/minute
- Apnea: Cessation of breathing for > 20 seconds, or less when associated with bradycardia or cyanosis.

Increased work of breathing

- Grunting on expiration
- Flaring of nostrils
- Retractions (chest indrawing)

Hypoxia

- Central cyanosis: blue tongue and lips
- Oxygen saturation < 90%

7.2. Classification of respiratory distress

Mild

- Physical Examination: minimal grunting on expiratory, flaring and retractions
- Vital Signs: RR in 60–70, Oxygen saturation > 90%.

Moderate to severe

- Physical Examination: moderate to severe grunting, flaring, retractions
- Vital Signs: RR > 70 or < 30 or saturation < 90%.

7.3. Investigations of respiratory distress in general

- FBC, CRP (at least 12-24 hours after birth), blood culture if available and infection is suspected,
- CXR,
- Blood gas if available,
- Echocardiography if congenital cardiac disease or Persistent Pulmonary Hypertension

(PPHN) are suspected.

7.4. Management/treatment of respiratory problems in general

- Immediately resuscitate the newborn (as per resuscitation protocol) if:
  - Not breathing at all, even when stimulated
  - Gasping respirations
  - Heart rate < 100 beats/minutes
- Stabilize and admit to neonatal unit
- Monitor Vital signs with focus on respiratory rate and oxygen saturation
  - Normal RR: 30–60
  - Saturation on room air 90-100% /on supplemental O_2: 90-95%
- NPO if severe respiratory distress, IVF, monitor blood glucose
  - Treat if < 45 mg (2.5 mmol/l) as per hypoglycemia protocol
- Treat for sepsis/pneumonia with antibiotics
- Newborn with tachypnea and cyanosis (despite oxygen), no or minimally increased work of breathing; consider congenital heart disease.
- Treatment options for respiratory distress are dependent on newborn's gestational age, birth weight and degree of respiratory distress:
  - For every preterm (< 33 weeks gestation) and birth weight < 2 kg
    - Start CPAP if any respiratory distress
  - For newborns ≥ 2 kg or ≥ 33 weeks gestation
    - If mild respiratory distress and O_2 sat < 90%, start nasal cannula/prong oxygen
    - If moderate to severe respiratory distress, start CPAP +/□ oxygen
- Safe use of oxygen including close monitoring of saturation is essential. Misuse or overuse of oxygen can result in retinopathy of prematurity.

7.5. Most common respiratory conditions

7.5.1. Pneumonia

Definition:

Inflammation of one or both lungs, with dense areas of lung inflammation commonly caused by bacteria or viruses but can be aspiration or fungal. Can be acquired from the mother (early-onset)

or later, including through nosocomial infections.

Aspiration pneumonia can be caused by poor sucking/swallowing coordination due to prematurity, HIE, GERD, and congenital malformation of the gastrointestinal tract and airways

Clinical presentation

- Birth History: Perinatal risk factors for sepsis
- Moderate to severe respiratory distress that lasts for > 48 hours

Investigations

- Laboratory evaluation suggestive of sepsis (FBC, CRP)
- Chest X ray; May be focal but often nonspecific in newborns, may show non-specific areas of consolidation or atelectasis

Treatment

- Follows neonatal sepsis treatment protocol (Ampicillin and Gentamycin)
- Give oxygen by nasal cannula/prongs (or face mask) if saturating at < 90%
- CPAP (see indications below)
- Transfer for mechanical ventilation if respiratory distress worsens despite the above measures, if feasible

7.5.2. Respiratory Distress Syndrome (RDS)

Risk factors

- Preterm delivery < 37 weeks gestation
- Newborn of diabetic mother

Clinical presentation

- Presents within the first hours of birth with signs of respiratory distress, such as tachypnoea, nasal flaring, expiratory grunting, chest indrawing and cyanosis.

Investigations

- Laboratory evaluation: FBC, CRP not suggestive of sepsis (unless RDS with pneumonia)
- CXR; poorly expanded (prior to positive pressure such as CPAP), diffusely hazy lung fields with overlying air bronchograms.

Prevention and management

- Use of antenatal steroids for all mothers with premature labor < 34 weeks
- Early exogenous surfactant, if available and able to safely intubate
- Continuous positive airway pressure (CPAP)
- Transfer for mechanical ventilation if respiratory distress worsens

7.5.3. Transient Tachypnea of the Newborn (TTN)

Due to delayed resorption and clearance of fetal alveolar fluid.

Risk factors

- Birth history: usually term, precipitated labor, rapid delivery, C-section, no perinatal risk factors for sepsis, maternal diabetes and asthma

Clinical presentation

- Mild respiratory distress that resolves spontaneously over hours to 1–3 days

Investigations

- Laboratory evaluation: FBC, CRP not suggestive for sepsis
- Chest X ray; May show fluid in the fissure and prominent vascular markings.

Supportive management

- Maintain a neutral thermal environment, nutrition, supplemental oxygen and CPAP if needed.

7.5.4. Pneumothorax (PTX)

Definition

Air in the space between the parietal and visceral pleura

Risk factors

- Birth History: bag mask ventilation at birth, mechanical ventilation, meconium stained amniotic fluid if associated with Meconium Aspiration Syndrome (MAS), can also occurs spontaneously.

Clinical presentation

- A small PTX may be asymptomatic and resolve spontaneously
- Mild to severe respiratory distress such as tachypnea, grunting, pallor and cyanosis depending on size of PTX

- Tension PTX interferes with cardiac function (low blood pressure, poor perfusion, and tachycardia)
- Chest asymmetry with enlargement of the affected side
- Decreased breath sounds on the affected side
- Shift of cardiac impulse away from the affected side

Investigations

- CXR: Consistent with unilateral hyperlucency representing PTX. Cardiac shadow and mediastinum shifted away from PTX if component of tension.
- Laboratory evaluation: FBC, CRP not suggestive of sepsis (unless PTX associated with pneumonia/MAS)

Management

- Oxygen supplementation
- Needle aspiration and/or chest tube insertion (size 8 Fr or 10 Fr) if provider skilled in these procedures is present and the proper equipment is available.
- If on mechanical ventilator: reduce peak inspiratory pressure (PIP), peak end expiratory pressure (PEEP) and inspiratory time.

7.5.5. Meconium aspiration syndrome (MAS)

Definition:

Respiratory distress in newborns due to mechanical obstruction and inflammation of the airways by meconium; seen in newborns born through meconium-stained amniotic fluid.

Clinical presentation

- Difficulty in breathing from mild to severe respiratory distress, cyanosis and hyperinflation with wide variations in oxygen saturation due to intra and extra-pulmonary shunting.

Investigations

- Laboratory evaluation: FBC, CRP not suggestive of sepsis (unless MAS with pneumonia)
- CXR; shows patchy opacifications with areas of atelectasis and areas of hyperinflation
- Pre- and post-ductal oxygen saturations to assess if there is a right to left shunt at the level of the PDA concerning for PPHN.
- Hyperoxia test may help to eliminate the possibility of cyanotic heart disease

- Echocardiogram, if available, to exclude cyanotic heart disease, may show the shunt at PDA and intra atrial level and establish the pulmonary pressures.

Supportive management

- Meconium stained amniotic fluid at delivery:
  - Vigorous newborn — No suctioning, clear airway; manage as any other newborn
  - Non-vigorous newborn —refer to resuscitation chapter 3.
- Maintenance of adequate oxygenation and ventilation
- Maintenance of adequate blood pressure and perfusion
- Correction of any metabolic abnormality including hypoglycemia and acidosis
- Empirical antibiotic therapy
- Minimal handling (cluster care) of the newborn to avoid agitation, which worsens PPHN (refer to management of PPHN).

7.5.6. Persistent pulmonary hypertension of the newborn (PPHN)

- This is as a result of failure of the normal circulatory transition that occurs after birth.
- The blood vessels do not open up properly so the pressure inside them remains high.
- As a result, this failure of blood vessels to relax and open up, blood flow into the lungs to pick up oxygen is restricted leading to hypoxia which affect organ function and signs of PPHN
- It occurs in term and post term infants usually within 72 hours of birth.

Risk factors

- Meconium aspiration
- Respiratory distress syndrome (RDS)
- Lack of oxygen before or during birth causing HIE
- Diaphragmatic hernia or other congenital malformation
- Severe early neonatal sepsis

Clinical presentation

- Tachypnea (> 60 breaths/ minute), flaring, grunting and chest retractions

- Cyanosis which gets worse in the first 24 hours of life
- Tachycardia
- Desaturations with poor response to giving oxygen, mimicking cyanotic heart disease.
- Symptoms which worsen when the baby is agitated.

Diagnosis

- PPHN should be suspected in all term newborns with the above risk factors who have cyanosis with respiratory distress.
- Hypoxia is labile and always present.

Investigations

- CXR: variable findings depending on underlying diagnosis (normal or minimal changes in idiopathic PPHN)
- Laboratory evaluation: FBC, CRP not suggestive of sepsis
- Pre and post-ductal oxygen saturations where right hand is better than the left foot
- Hyperoxia test may differentiate PPHN from cyanotic heart disease
- Echocardiogram if available is diagnostic.

Treatment

Therapy is directed towards:

- Decreasing pulmonary vascular resistance
- Increasing systemic oxygenation and maintain blood pressure
- Treating the underlying disease condition
- Improving oxygen levels in the blood: give oxygen via hood, CPAP or mechanical ventilation
- Babies suspected of having PPHN should be transferred early

Treatment strategies

- Keep the baby calm or sedate where possible, with minimal handling in a quiet environment
- Maintain normal temperature, normal blood sugar, electrolytes and fluid balance
- Keep Hb $\geq$ 120 g/L
- IV antibiotics if sepsis is the likely cause

- Maintain oxygenation saturation above 93% but avoid hyperventilation
- Manage as shock if BP is low with signs of poor perfusion
- If perfusion is poor, normal saline 10 mL/kg fluid bolus, may repeat total of 30 mL/kg
- Surfactant where available if PPHN is associated with RDS, MAS
- Use locally available vasodilators (e.g. sildenafil).

7.5.7. Bronchopulmonary dysplasia (BPD)

BPD is a result of lung injury in newborns requiring mechanical ventilation and supplemental oxygen.

Treatment

- Nutrition support: nutritional supplementation to provide added calories, protein, and fat is needed for growth.
- Fluid restriction (e.g. 130 mL/kg/day high caloric density enteral full feeds)
- Drug therapy:
  - Diuretics: Furosemide; PMA < 31; 0.5-2 mg/Kg/24 > 31; 0.5-2 mg/Kg/12 and spironolactone oral: 1.5 mg/kg/dose every 12 hours in case of fluid overload. (avoid long term use of diuretics)
  - Inhaled bronchodilators (e.g.: albuterol, ipratropium bromide)
  - Methylxanthines
  - Steroids (Dexamethasone) use only severe BPD who remains oxygen dependent for more than 2 weeks on ≥ 2 l/min or ventilator-dependent (IV: Initial: 0.15 mg/kg/day in divided doses every 12 hours for 3 days, followed by a taper of: 0.1 mg/kg/day for 3 days, then 0.05 mg/kg/day for 2 days, and 0.02 mg/kg/day for 2 days for a total dexamethasone dose of 0.89 mg/kg given over 10 days; tapering doses administered in divided doses every 12 hours
- Maintenance of adequate oxygenation (91 -95%)
- Prompt treatment of infection.

7.5.8. Apnea and bradycardia in premature newborns Definitions

- Apnea: cessation of breathing for more than 20 seconds, or less when associated with bradycardia or cyanosis.

- Bradycardia: Abnormally slow HR; < 100 beats/minute in the preterm newborn

Potential causes

- Central nervous system causes (intraventricular hemorrhage (IVH), drugs, seizures, hypoxic injury)
- Respiratory (prematurity, pneumonia, obstructive airway lesions, Surfactant deficiency, pneumothorax, other causes of hypoxia, phrenic nerve paralysis)
- Infectious (sepsis, meningitis)
- Metabolic abnormalities
- Cardiovascular (hypotension, heart failure, Patent ductus arteriosus, anemia,).
- Gastrointestinal: GERD (Gastroesophageal reflux)

Management

- Monitoring: all vital signs including oxygen saturations
- Consider other causes (neonatal sepsis, temperature instability)
- Supine midline head and neck position
- Maintain airway patency
- Continuous positive airway pressure (CPAP), if available
- Methylxanthines therapy
- All newborns with birth weight < 1.5 kg or GA < 33 weeks should be started on a methylxanthine stimulant (caffeine or aminophylline) on admission or after birth
  - Caffeine (preferred)
    - Loading dose: 20 mg/kg caffeine citrate NG/PO x1 on day of initiation
    - Maintenance dose (subsequent day and onward):10 mg/kg/day caffeine citrate IV/NG/PO, given as once daily dose
    - Caffeine citrate 20 mg/kg = Caffeine base 10 mg/kg
  - Aminophylline
    - Loading dose: 5-8 mg/kg IV on day of initiation
    - Maintenance dose < 7 days of age: 2.5 mg/kg/dose IV or NG/PO Q12 hours
    - ≥ 7 days of age: 4 mg/kg/dose IV or NG/PO Q12 hours.
    - If newborn develops tachycardia, vomiting, or agitation these may be signs of aminophylline toxicity. Evaluate for all potential causes of tachycardia and vomiting such as sepsis, necrotizing enterocolitis and dehydration.

- If cannot find another cause of the patient's symptoms, consider holding one dose of caffeine or aminophylline and then reassess.
- If the patient has improvement of the tachycardia/vomiting within 12 hours, resume caffeine or aminophylline but decrease the dose by10%.
- Discontinue caffeine or aminophylline at ≥ 34 weeks post-menstrual age; observe for 3 days prior to discharge if there are no signs or symptoms of apnea or bradycardia.

7.5.9. Continuous positive airway pressure (CPAP)

CPAP is a form of positive airway pressure useful for respiratory support in any newborn with moderate to severe respiratory distress, but it is especially useful for preterm and low birth weight newborns with any grade of respiratory distress. CPAP offers the following benefits:

- Maintains lung volume during expiration
- Decreases lung atelectasis
- Improves ventilation-perfusion matching and pulmonary compliance,
- Improves oxygenation
- Decreases work of breathing.

Indications for CPAP

- Preterm (< 33 weeks gestation) or low birth weight (< 2000 grams) with ANY respiratory distress
- Any newborn with moderate to severe respiratory distress.

Contraindications for CPAP

- Congenital diaphragmatic hernia
- Severe birth asphyxia with reduced consciousness
- Inability to protect their airway
- Air leak syndrome (pneumothorax with bronchopleural fistula)
- Cleft lip and cleft palate

Monitoring of the newborn on CPAP

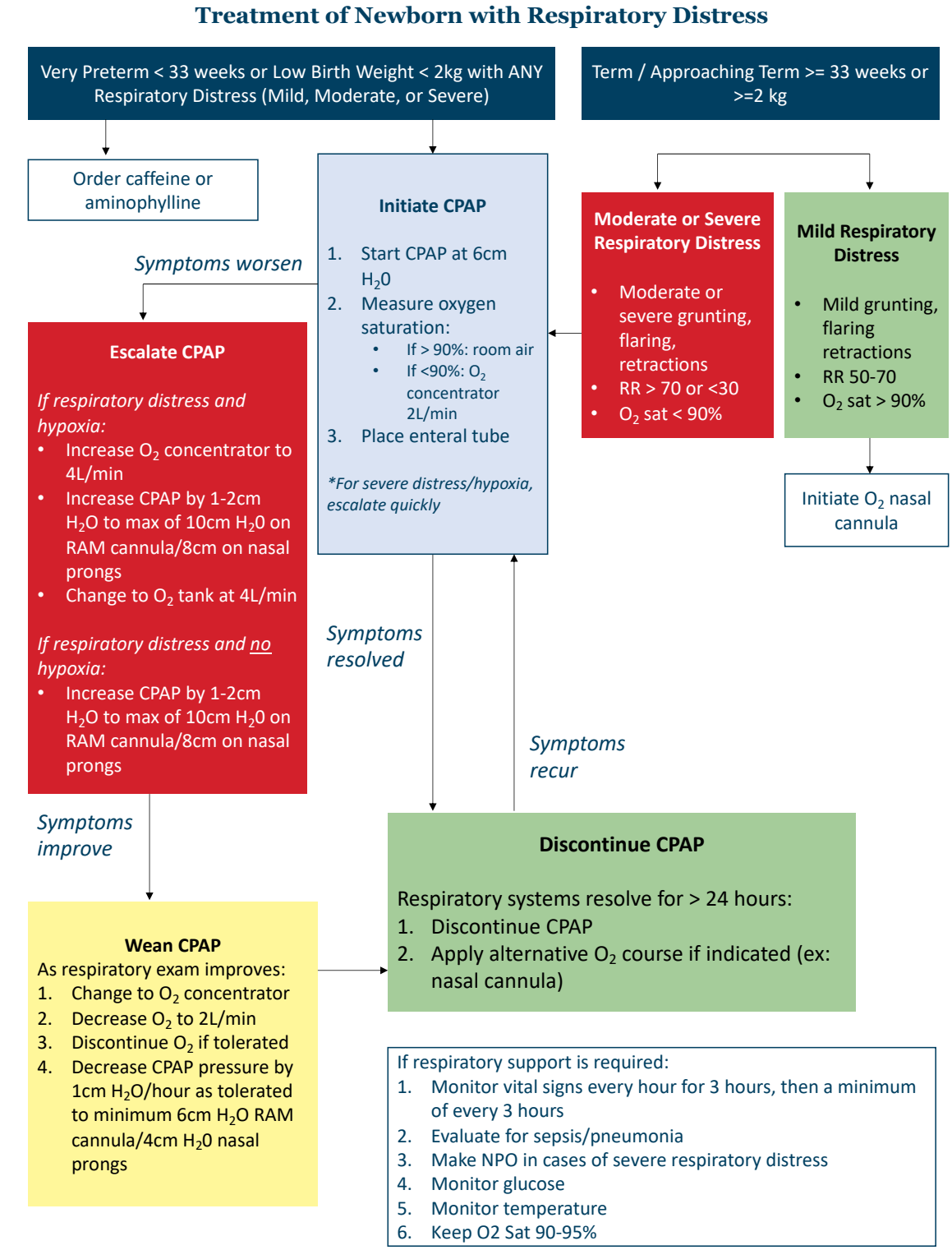
- Monitor newborn's vital signs:
  - Heart rate
  - Respiratory rate

  - Oxygen saturation
- Check CPAP systems (CPAP prongs position keeping CPAP cannula/prongs away from nasal septum at all times, air bubbling in the canister, ensure condensed water is present in the circuit)
- Airway management: Suction nasal cavities and mouth, keep NGT open.
- Positioning and handling: The newborn should be positioned to facilitate comfort and optimize respiratory effort.
- Change and clean CPAP circuit once a week if on the same newborn; always ensure sterilized CPAP circuit for new baby.

Complications of CPAP

- Skin injuries related to pressure of interface
- Gastric distension
- Pneumothorax
- Infection

Figure 9: Respiratory distress treatment algorithm



CHAPTER 8: CARDIOLOGY

8.1. Bedside approach to congenital heart disease (CHD)

Clinical presentation

- Respiratory Distress (RR > 60, indrawing): mainly L-R Shunts
- Cyanosis: All cyanotic CHD.
- Tachycardia + low cardiac output: left ventricular outflow tract obstruction and, Coarctation of the aorta, neonatal and fetal tachyarrhythmias
- Bradycardia: complete heart block
- Differential pulses and blood pressures: Aortic arch obstruction
- Systolic/continuous murmur: Shunts, outflow obstruction, collateral vessels.

Investigations

- CXR:
  - Cardiomegaly-shunts, aortic stenosis, pulmonary Stenosis (PS), prolonged arrhythmias and cardiomyopathy.
  - Plethora-Shunts – Transposition of Great Arteries (TGA), Total anomalous pulmonary venous drainage, truncus arteriosus, univentricular heart with no PS, tetralogy of fallot (TOF) with collaterals, coarctation, cardiomyopathy, hypoplastic left heart syndrome (HLHS).
  - Oligemia - tetralogy of fallot physiology, pulmonary stenosis, transposition of great arteries with pulmonary stenosis, PPHN, Epstein's anomaly.
- For additional investigations, consult a pediatric cardiologist.

Management of newborn with heart murmur on postnatal ward

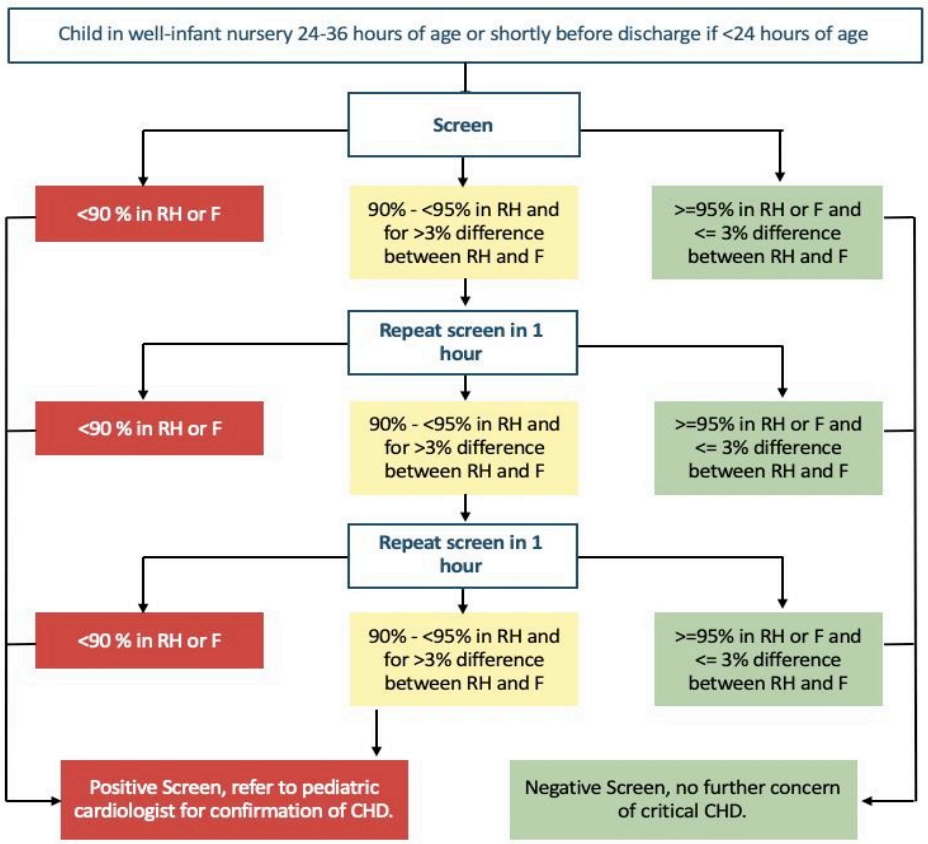
Heart murmur is very common in the first 48 hours of life. This is mostly due to physiological circulatory changes at birth i.e. closing PDA, transient tricuspid regurgitation. A small proportion of newborns will have significant CHD who may or may not have a heart murmur. Therefore, it is the associated symptoms and signs that dictate the course of management in these newborns and they should be referred to a pediatric cardiologist.

8.2. Pulse oximetry screening for congenital heart diseases

Pulse oximetry screening is safe, noninvasive, easy to perform and proven to enhance detection of critical congenital heart disease in newborns. Screening should be performed between 24 hours and 36 hours post birth, using the newborn's right hand and either foot to minimize false-positive results.

- The screening is positive when any of the following:
  - The pre- or post-ductal saturation is less than 90%
  - Both pre- and post-ductal saturations are less than 95%, 3 times at 1 hour interval between 2 measurements.
  - Pre-ductal and post ductal saturation of more than 3% difference at 1 hour interval between 2 measurements.
- A positive screening should be followed by a referral to a pediatric cardiology after educating parents and ensure they understand a reason for referral.

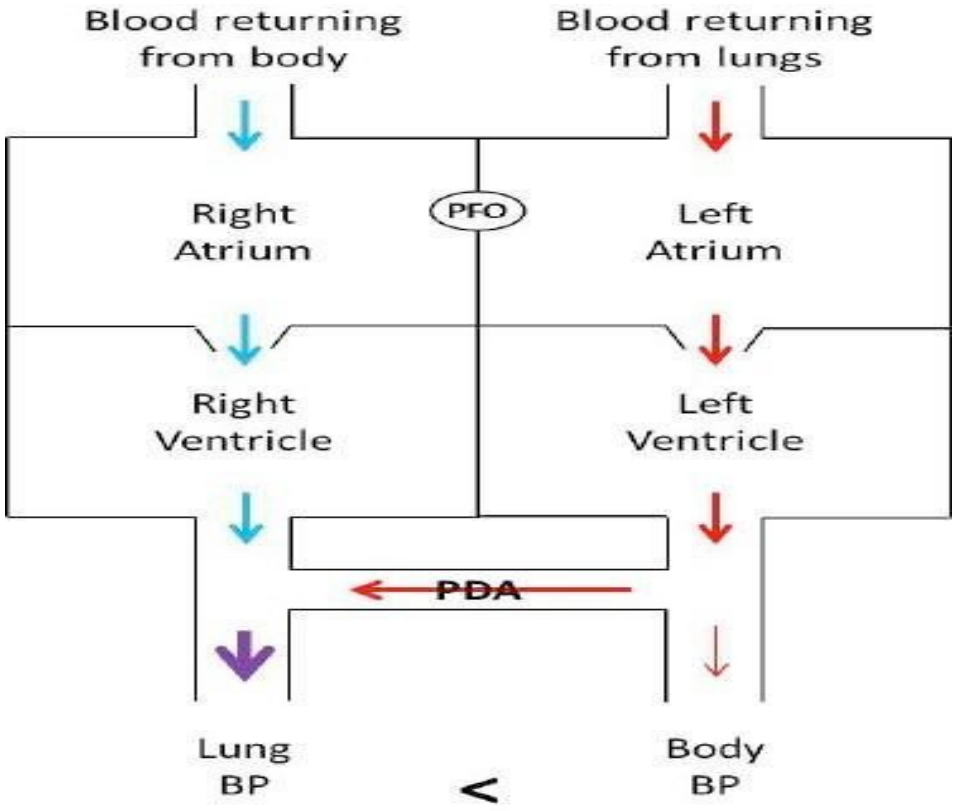
Figure 10: Algorithm for screening for critical CHD using pulse oximetry



8.3. Patent ductus arteriosus (PDA)

During fetal circulation, oxygenated blood is shunted from the pulmonary artery into the descending aorta through ductus arteriosus which functionally closes after birth. When it fails to close, it becomes as is referred to as patent ductus arteriosus (PDA).

Complications of untreated moderate to large PDA include: Bronchopulmonary dysplasia, prolonged ventilation, pulmonary hemorrhage, necrotizing enterocolitis, renal impairment, and intraventricular hemorrhage.



Clinical presentation

The clinical signs depend on the size of the shunt. Newborns especially preterm newborns with significant shunt may develop signs during the first three days of life:

- Respiratory distress
- Bounding pulses and a widened pulse pressure
- Murmur: typically, continuous but may be systolic initially when the pulmonary pressures are high. The murmur is best heard on the left upper sternal border.
- Hepatomegaly if heart failure

Diagnosis

- Usually, the diagnosis can be made clinically. A CXR can be useful, may show pulmonary edema and cardiomegaly.
- Echocardiography required for confirming diagnosis.

Management

Supportive management:

- Avoid large fluid volumes; if poor weight gain considers fortifying the feed to increase calories
- If require respiratory support: use oxygen, CPAP or mechanical ventilation to meet newborn ventilation and oxygenation needs.
- Keep the hematocrit level at 40-45%

Pharmacologic management:

- Ibuprofen, IV dosage: 10 mg/kg/dose x1dose, then 24 hours later 5 mg/kg/dose every 24 hours for 2 doses.
  - Repeat same dose if murmur persists or if control echocardiography shows the flow is still significant.
  - If murmur persists after 2 courses of Ibuprofen, refer to a pediatric cardiologist
  - Contraindications include low platelets, kidney injury, gastrointestinal bleeding
- Alternatively, indomethacin IV 0.1-0.2 mg/kg per day at 12 hourly intervals for 2 doses
  - Contraindications include low platelets, kidney injury, gastrointestinal bleeding
- Alternatively, Paracetamol IV 10-15 mg/kg/dose 6 hourly for 3-7 days
  - Monitor for signs liver toxicity
  - Stop Paracetamol on day 3 if no murmur or echocardiography demonstrates closed PDA.
  - If PDA present despite 7 days of Paracetamol, refer to a pediatric cardiologist
- Combination of both Ibuprofen and Paracetamol is another alternative for newborns who do not respond to a single drug. Doses are the same as those used above.

Surgical management:

- Surgical ligation is indicated for large PDA if medical therapy failed.

CHAPTER 9: HYPERBILIRUBINEMIA

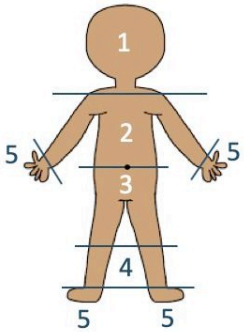
9.1. Risk factors for pathological neonatal jaundice

- Prematurity
- Low birth weight
- Jaundice that appears in the first 24 hours of life
- Rapid rise of total serum bilirubin (> 8 mmol/L/hr)
- Sepsis
- Cephalohematoma or bruises
- Lactation failure in exclusively breastfeeding newborn
- Newborn of diabetic mothers
- G6PD deficiency
- Siblings with history of severe neonatal jaundice

9.2. Assessment

- Physical examination starting with eye sclera, face, and downward.
- Jaundice may be hard to see especially in newborns with dark skin.
- Kramer rule helps to estimate the degree of neonatal jaundice depending on the body parts presenting with jaundice.

Figure 11: Kramer rule for neonatal jaundice (Bilirubin ranges are in mg/dL)



Dermal Zone	Bilirubin Range (mg%)
1	4.5 - 8
2	5.5 - 12
3	8 – 16.5
4	11 - 18
5	> 15

9.3. Investigations

- Use transcutaneous bilirubin (TcB) where available for screening:
  - 24-48 hours of life in all neonates and/or prior to discharge
  - Anytime jaundice is detected or suspected
  - Consider frequent assessment if TcB is close to phototherapy threshold or rapidly rising

- Serum bilirubin levels of total, direct and indirect are the basis for treatment (phototherapy or exchange transfusion)
  - A positive TcB screen must be confirmed with serum bilirubin as it is more accurate.
  - Serum bilirubin should be used for monitoring while on treatment.
- Other potential investigation:
  - Concern for hemolysis: FBC, blood type of mother and newborn, Coombs test
  - Concern for sepsis could prompt WBC, CRP, blood culture
  - TORCH screen (HIV, HSV, syphilis, etc.) if not known

9.4. Treatment

Medical management

- Encourage and support for frequent lactation and breastfeeding
- Ensure good hydration, use IVF if signs of dehydration or moderate to severe hyperbilirubinemia, correct deficit and increase maintenance IVF by 10-20 ml/kg
- Treat underlying causes, for example if signs of sepsis start broad spectrum antibiotics according to sepsis protocol

Phototherapy

- Phototherapy is the gold standard of treating pathological indirect hyperbilirubinemia.
- The following curve guides on when to start, considering gestational age and risk factors to develop pathological jaundice.
- Start phototherapy immediately if:
  - Anytime jaundice is detected or suspected clinically and no TcB test available
  - TcB is elevated or close to phototherapy threshold
  - Any jaundice appearing within 24 hours of life, and conduct investigations

Table 8: Thresholds for starting phototherapy treatment

Day	< 35 weeks gestation, sepsis, hemolysis, poor feeding, < 2 kg	≥ 35 weeks gestation, no risk factors, ≥ 2 kg
DOL0	Any visible jaundice*	
DOL1	170 µmol/L = 10 mg/dL	260 µmol/L = 15 mg/dL
DOL2+	250 µmol/L = 15 mg/dL	310 µmol/L = 18 mg/dL

Bilirubin conversion: 1 mg/DL = 17.1 µmol/L
**Or excessive bruising or anticipated prolonged NPO course in the VLBW. (Source: WHO, 2013)*

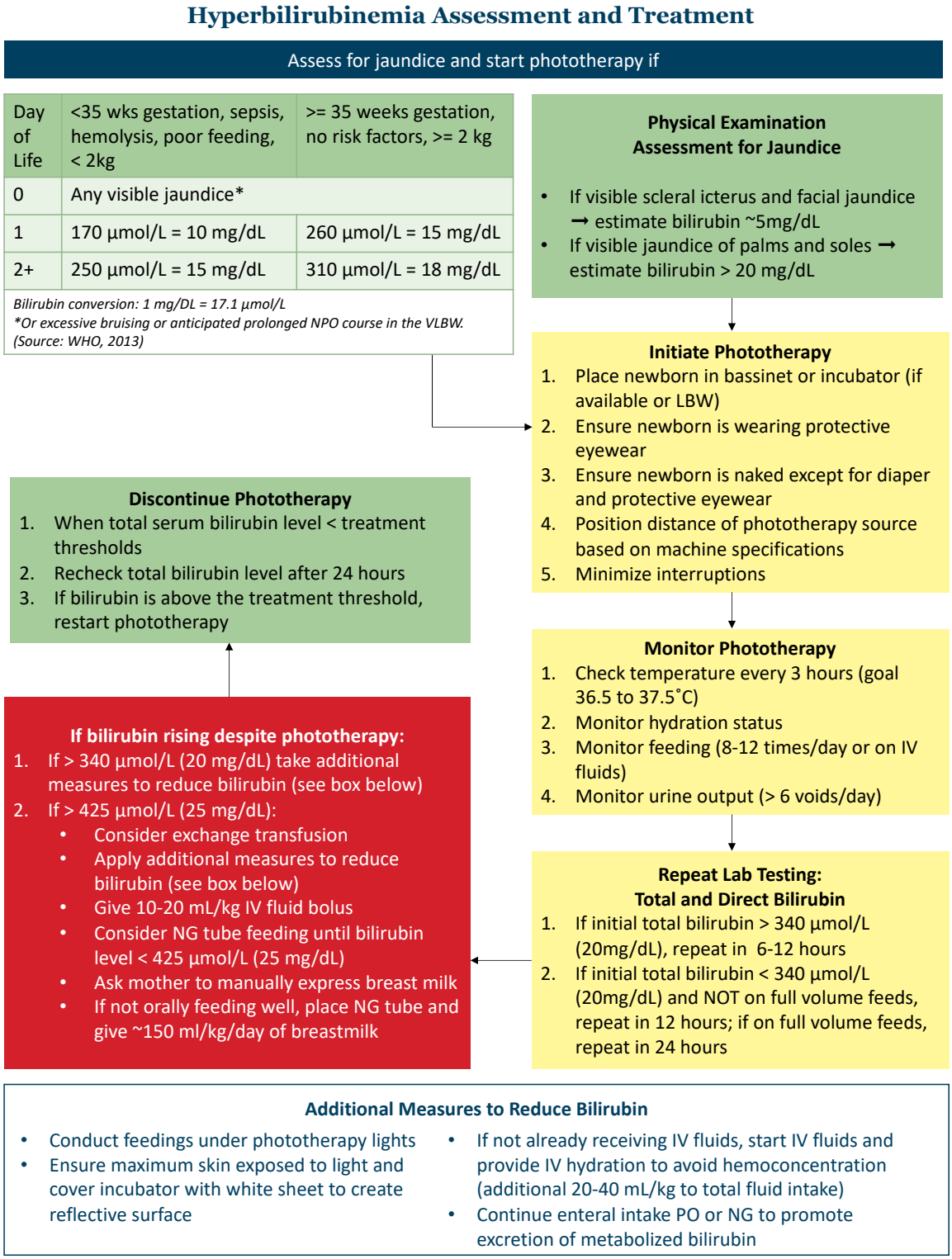
Exchange transfusion

- Exchange transfusion is a treatment for extreme hyperbilirubinemia or if phototherapy fails to control the rising bilirubin levels.
- For newborns who initially present with serum bilirubin concentrations at or above the exchange transfusion levels, intensive phototherapy and hydration should produce a sharp decline bilirubin within 4 to 6 hours potentially avoiding the need. However, if there is not a good response or the response is slow, consider likelihood of requiring exchange and start preparation.
- If bilirubin levels exceed the thresholds below, consider referral in anticipation for possible exchange transfusion. Never discontinue phototherapy when planning or conducting an exchange transfusion.

Table 9: Transfusion Treatment (Based on WHO 2013 recommendations).

Day	< 35 weeks gestation, < 2 kg, sepsis hemolysis, poor feeding	≥ 35 weeks gestation, ≥ 2 kg Healthy (no risk factors)
DOL 0	220 µmol/L (10 mg/dL)	260 µmol/L (15 mg/dL)
DOL 1	260 µmol/L = 15 mg/dL	425 µmol/L = 25 mg/dL
DOL ≥2	340 µmol/L = 20 mg/d	425 µmol/L = 25 mg/dL

Figure 12: Flow chart of assessment and treatment of hyperbilirubinemia



CHAPTER 10: INFECTIOUS DISEASES

Symptoms of early onset bacterial sepsis are often non-specific, and therefore a high index of suspicion is warranted. There should be a lower threshold for intervention in neonates, especially those born preterm.

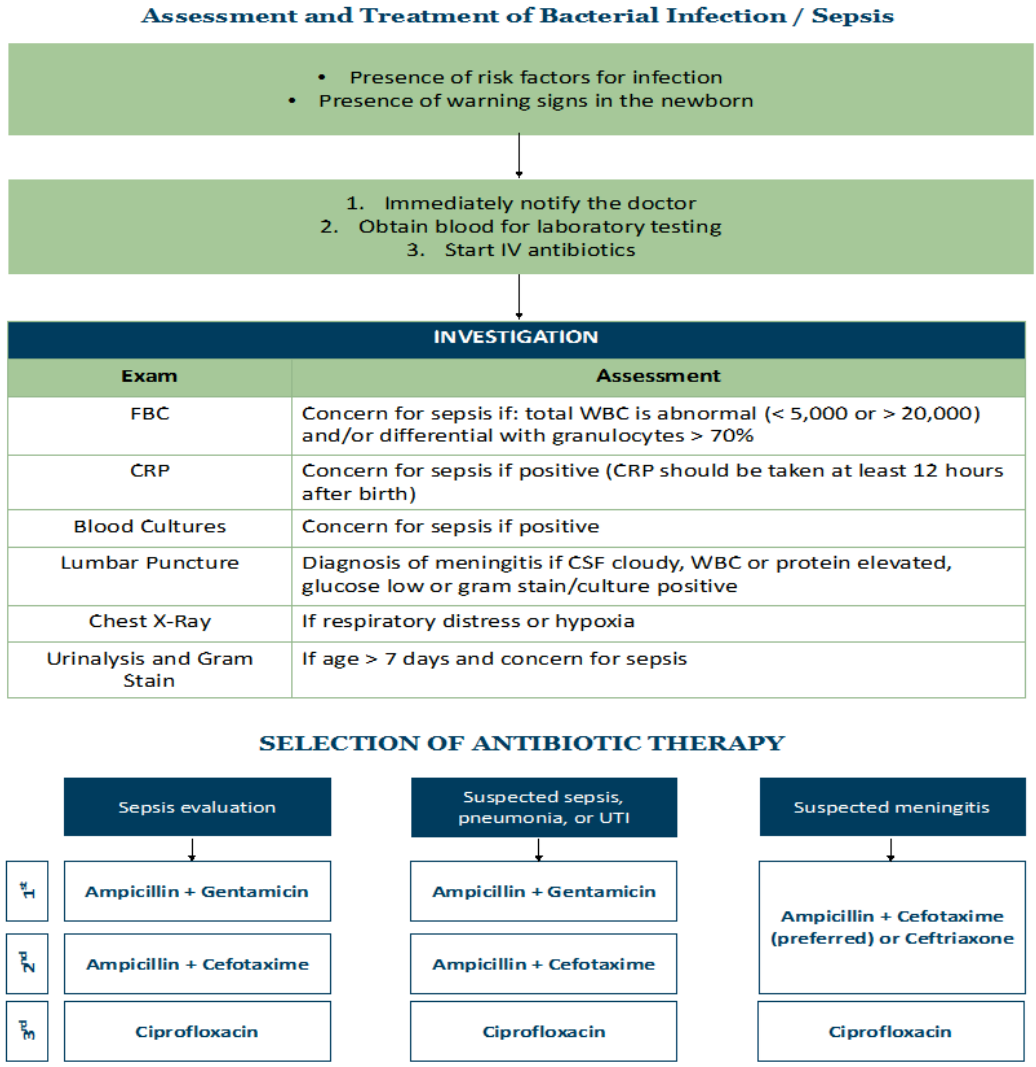
Table 10: Risk factors and warning signs for sepsis

Risk Factors	Warning Signs in the Newborn
Early Onset Sepsis, EOS (within the first 72 hours of life) • Maternal fever (temp > 38°C during labor or within 24 hours after delivery) • Maternal urinary tract infection during current pregnancy • Duration of membrane rupture > 18 hours before delivery • Uterine tenderness or foul-smelling amniotic fluid • Obstetric diagnosis of chorioamnionitis • Maternal group B streptococcal (GBS) colonization or infection in the current pregnancy • Preterm labor (< 37 weeks) without a known cause • Resuscitation at birth • Meconium stained amniotic fluid • Home delivery or delivery en route to facility **Late Onset Sepsis, LOS (after the first 72 hours of life)** • Prolonged hospitalization • Presence of foreign bodies (e.g. Intravenous catheter) • Invasive procedures • Malformations (e.g. Urinary tract anomalies) • GBS positive mother in current pregnancy • Home delivery or delivery en route to facility	Signs and symptoms are usually non-specific and other conditions present similarly. They may include: • Fever (temp > 38°C), hypothermia (temp < 36.5°C) or temperature instability • Tachycardia (HR > 180) or bradycardia (HR < 80) • Tachypnea (RR > 60) or bradypnea (RR < 30) including apnea • Poor perfusion: capillary refill time > 3 seconds, hypotension • Abnormal breathing: gasping, grunting, severe chest indrawing, nasal flaring or apnea • Abnormal color: cyanotic, pale, grey, mottled, jaundiced, erythematous skin including umbilical flare • Sclerema • Abnormal activity: tremors, irritability, seizures, stiffness, hypotonia or lethargy • Abnormal feeding: poor feeding, abdominal distention, vomiting • Unexplained hypo- or hyperglycemia • Bulging fontanel

10.1. Indications for starting antibiotics

- Presence of risk factors or signs in the newborn of sepsis, strong clinical suspicion, and/or positive septic screen (see next page)

Figure 13: Assessment and treatment of bacterial infection/sepsis



10.2. Other considerations

- Infection prevention is the cornerstone for infection control: hand washing, isolation of newborns with suspected or confirmed infection, disinfect any medical equipment that is shared from one patient to another (e.g., stethoscope, thermometer)
- Antibiotics that cover gram positive and negative organisms must both be given for the same duration to ensure adequate treatment, unless specific organism identified.
- If the newborn does not have adequate urine output (> 1 ml/kg/hr), use a third-generation cephalosporin (Cefotaxime or Ceftriaxone) instead of Gentamicin.

Table 11: Neonatal doses of common antimicrobials

Drug	Dose	Interval[1]			Infusion Time	Comments
		< 35 weeks or < 2 kg	Term ≤ 7 days	Term > 7 days		
Acyclovir	20 mg/kg/dose IV or PO	12 hourly	8 hourly	8 hourly	60 minutes IV	Ensure adequate hydration due to risk of nephrotoxicity. Treatment of herpes Simplex infection: 14 days if localized, 21 days if disseminated.
Ampicillin or Cloxacillin	50 mg/kg/dose IV[2] Meningitis: Preterm or < 2.5 kg and Term ≤ 7 days: 100 mg/kg/dose IV Term > 7 days: 100 mg/kg/dose IV	12 hourly	12 hourly	8 hourly	IV slow push 3-5 min	Ampicillin should be followed by a saline flush BEFORE administering gentamicin. Never combine medications in the same syringe.
Cefotaxime[3]	50 mg/kg/dose	12 hourly	8 hourly	6 hourly	IV slow push 3-5 min	Preferred over ceftriaxone due to improved safety profile.
Ceftriaxone[4]	50 mg/kg/dose IM or IV or eye pus	Once	Once	Once		For IM injection, dilute to 350 mg/mL. Max does ½ mL = 175 mg.
	Meningitis: 50 mg/kg/dose IV	12 hourly	12 hourly	12 hourly	IV slow push 3-5 min	Avoid unless Cefotaxime unavailable.
Gentamicin	Preterm or < 2.5kg: 3 mg/kg/dose IV Term: 5 mg/kg/dose IV	24 hourly	24 hourly	24 hourly	30 minutes IV	If inadequate urine output, use third generation cephalosporin (Cefotaxime or ceftriaxone) instead.
Metronidazole	7.5 mg/kg/dose IV	12 hourly	12 hourly	12 hourly	30 minutes IV	Anaerobic coverage including treatment of NEC
Ciprofloxacin	10 mg/kg/dose IV	12 hourly	12 hourly	12 hourly	IV slow push 3-5 min	Use with caution due to risk of side effects: GI upset, rash, renal failure, seizures.

[1] Preterm means GA < 35 weeks or weight < 2 kg if GA unknown. Term means GA ≥ 35 weeks or weight ≥ 2 kg if GA unknown.
[2] If continuing antibiotics beyond 48 hours, must rule out meningitis by lumbar puncture or clinically to determine done and duration of antibiotic therapy.
[3] Cefotaxime: to replace gentamicin in the setting of renal dysfunction or to treat presumed meningitis due to poor CNS penetrating of gentamicin.
[4] Ceftriaxone: Do not use in setting of hyperbilirubinemia because displaces bilirubin from albumin; do not administer within 48 hours of IV calcium in newborns due to risk of lethal precipitation.

Table 12: Antibiotic Coverage Summary by Condition for newborns < 1 month of age

Antibiotic Coverage Summary by Condition for newborns < 1 month of age					
Condition	**Clinical Condition**	**Laboratory Results**	**Treatment recommends**	**Therapy Duration**	**Comments**
Sepsis Evaluation: Negative	Normal vital signs, well appearing	Normal WBC, differential, CXR, CRP less than 10 mg	Ampicillin Gentamicin	48 hours	
Sepsis/ Pneumonia	Abnormal vital signs, ill appearing	Abnormal WBC, differential, CRP, CXR	Ampicillin Gentamicin	7 days	
Sepsis/ Pneumonia: Not improving	Abnormal vital signs, ill appearing, poor response to antibiotics after 48 hours	Abnormal WBC, differential, CRP, CXR	Ampicillin Cephalosporin	7–14 days	Cefotaxime preferred over Ceftriaxone Ciprofloxacin depending on culture sensitivity
Meningitis	Abnormal vital signs, ill appearing, abnormal neurological exam	Abnormal WBC, differential, CRP, CXR, CSF	Ampicillin Cephalosporin	14 days if gram + 21 days if gram	Cefotaxime preferred over Ceftriaxone
Urinary Tract Infection	Abnormal vital signs, ill appearing	Urinalysis concerning for urinary tract infection	Ampicillin Gentamicin	7 days	Generally considered in newborns 7 days
Fungal infections	Abnormal vital signs, ill appearing	Blood culture or CSF or urine culture positive for candida species,	Fluconazole	14 days	

10.3. Congenital infections

Newborn of HIV positive mother

- For HIV exposed newborns, refer to national document on Elimination of Mother to Child Transmission (EMTCT).

Newborn of mother with syphilis

- All pregnant mothers must be serologically screened for syphilis
- If mother has a positive syphilis serology during pregnancy and;
  - Has received treatment (2.4 million IU of Benzathine-Penicillin per week for 3 weeks and the treatment began 30 days or more before delivery)
    - Treatment: No additional measures are required.
  - Not treated for syphilis or insufficiently treated, or if the treatment is not clear and the newborn does not present any clinical signs of syphilis

    - Treatment: Give the newborn one dose of 50,000 IU/kg of IM Benzathine-Penicillin
- Mother not treated and newborn with signs/symptoms of syphilis:
  - Early signs include: Bullous rash (especially of palms and soles), anemia, hepatosplenomegaly, osteitis (presenting as pseudo-paralysis of limb), coryza, jaundice
  - Treatment:
    - Hospitalize newborn for treatment
    - Aqueous penicillin G 50,000 IU/kg/per dose IV 12 hourly if ≤ 1 week old, or 8 hourly if > 1 week old, for 10 days
    - Procaine penicillin G 50,000 IU/kg IM once a day for 10 days or give benzyl penicillin 50,000 IU/kg IM single dose
- Discharge newborn when RPR titre has dropped at least fourfold or becomes negative.
- Treat the mother and partner if already not done
- Follow-up:
  - Month 1 and 3: Request syphilis screen + RPR + Treponema IgM
  - Month 6 and 12: Request RPR only

Newborn of mother with hepatitis B

- Confirm mother was tested for hepatitis B in antenatal care. If not tested, or status unknown order a test.
- If the mother is HBsAg positive, there is a risk of transmission during pregnancy and delivery
  - Administer the first dose of anti□hepatitis B vaccine preferably with in the first 12 hours following delivery: 0.5 ml IM in the quadriceps muscle
  - If anti-□hepatitis B Immunoglobulin are available, administer 200 IU IM in the first 12 hours of life
  - Vaccine and immunoglobulin should be given at two different sites.

Newborn of mother with tuberculosis (TB)

- If signs of TB in the newborn, provide treatment according to national protocol

Newborn of mother with herpes simplex virus (HSV)

- Clinical presentation:
    - Localized disease: SEM (skin, eyes and mucosa rash)
    - Disseminated disease: liver, lungs, brain
    - CNS disease
- Diagnosed by HSV PCR or culture of samples from skin swabs, serum or CSF
- HSV exposed and symptomatic neonate:
    - Take samples from skin swabs, serum and CSF
    - Start IV acyclovir 20 mg/kg every 8 hours for 14 days. Stop if PCR comes back negative.
- If CNS involvement, treat for at least 21 days or until CSF negative
- Asymptomatic but exposed neonate:
    - Take samples and start IV acyclovir 20 mg/kg every 8 hours for 14 days, except if born by elective C-section
- Breastfeeding is only contraindicated in the event of a herpetic lesion on the breast.
- Oral acyclovir 20 mg/kg 8 hourly for six months should be considered after acute IV treatment in disseminated and CNS cases.
- Ensure that newborns receiving acyclovir are well hydrated to minimize risks of renal toxicity

Congenital malaria

- Newborns are usually asymptomatic at birth, but clinical manifestations frequently appear within 10-30 days after birth
- Signs and symptoms: fever, irritability or drowsiness, hepatosplenomegaly, anorexia, progressive hemolytic anemia and thrombocytopenia, hepatomegaly, jaundice, and poor feeding.
- Treat with IV Artesunate 3 mg/kg at 0, 12 and 24 hours and then once a day to complete a 7-days course.

Newborns with cutaneous infections (pustules and vesicles):

- Clean lesion with antiseptic
  – If closed, keep clean and monitor. If open, apply topical antibiotic ointment.
  – If the pustules are numerous and there are no signs of generalized infection (no danger

signs), start Cloxacillin syrup 25 mg/kg/dose 2 times a day orally for 5 days

– If there are danger signs or if the pustules are very large and/or numerous, hospitalize the newborn and treat with antibiotics (IV Cloxacillin) against Staphylococcal Aureus.

10.4. Infection prevention and control (IPC)

Hand hygiene is the simplest and most cost-effective way to prevent the transmission of infection and maintaining a clean environment including supplies and equipment is also essential. For more details on IPC, see chapter 1.

CHAPTER 11: HEMATOLOGY

11.1. Anemia

Anemia may be defined as a reduction in red blood cell (RBC) mass or blood hemoglobin concentration below the normal range for the age. Hemoglobin and hematocrit values begin to drop until they reach the physiologic nadir termed "physiologic anemia of infancy".

Table 13: Mean hemoglobin levels for newborns

Age	Hb (g/dl)		HCT (%)	
	Mean	-2SD	Mean	-2SD
26-30 weeks	13.4	11	41.5	34.9
28 weeks	14.5		45	
32 weeks	15.0		47	
Term (cord)	16.5	13.5	51	42
1-3 days	18.5	14.5	56	45
2 weeks	16.6	13.4	53	41
1 month	13.9	10.7	44	33

Physiologic anemia

Term newborns typically reach a physiologic nadir with hemoglobin of 9–11 g/dl at 6–12 weeks of age while in premature newborn the level falls lower and earlier, typically to 8-10 g/dl at 4-10 weeks.

Pathologic anemia

Pathologic anemia is defined Hb below age-appropriate physiologic nadir or anemia that is associated with clinical symptoms.

Clinical presentation

- History consistent with blood loss
- Pallor, apnea, bradycardia, tachycardia, decreased vigor, poor weight gain, respiratory distress, increased oxygen requirement

Investigations

- Laboratory testing may include: Blood group, FBC, reticulocyte count, peripheral blood smear, Coombs test.

Treatment

- Asymptomatic newborn requires only observation
- Treatment of the underlying cause.
- The main treatment for symptomatic neonate is transfusion of packed RBCs
- Anemia of preterm newborns (AOP) or term newborns who have iron deficiency anemia should be treated with oral iron therapy

Table 14: Indications for Transfusion of RBC

Postnatal age	Hemoglobin/dl	Hematocrit, %	Hemoglobin/dl	Hematocrit, %
	On significant respiratory support*		No respiratory support	
0 to 7 days (week 1)	11.5	35	10.0	30
8-14 days (week 2)	10.0	30	8.5	25
> 14 days (week 3)	8.5	25	7.5	23
*Significant respiratory support or escalating respiratory support				
Transfusion may be considered: • After fluid resuscitation with persistent acidosis, or ongoing bleeding. • Acute blood loss of > 20% of newborn's blood volume. • Hemoglobin less than 8 g/dl in a stable newborn with symptoms of anemia: – bradycardia, tachycardia (HR ≥180 bpm) for ≥ 24 hours, decreased vigor, – poor weight gain < 10 g/kg per day over 4 days while receiving ≥120 kcal/kg/day, – Apnea, tachypnea (RR ≥ 60 breaths per minute) for ≥ 24 hours) – Hemoglobin less than 12g/dl in newborn with severe lung disease, cyanotic congenital heart disease, heart failure, or for surgery.				

Prevention of anemia

- Minimize iatrogenic causes especially from phlebotomy losses
- Implement delayed cord clamping especially for preterm newborns.
- Erythropoietin (EPO): not recommended for routine use in preterm newborns, but it may be requested in some circumstances of sick preterm newborn requiring mechanical ventilation whose parents refuse blood transfusion for example for religious believe. Dose is 250 IU/kg given 2 times per week subcutaneously or IV.

11.2. Bleeding in neonates

Causes

- Platelet Disorders: Thrombocytopenia, Impaired platelet function
- Coagulation Protein Disorders: Congenital factor deficiencies, Acquired deficiencies

- Combined Platelet and Coagulation Factor Disorders: Disseminated Intravascular Coagulation (DIC), Hepatic Dysfunction
- Disorders of Vascular Integrity: Hemangiomas or Vascular malformations

Risk factors

- Neonatal: History of asphyxia, birth trauma, administration of Vitamin K, gender
- Perinatal: Toxemia of pregnancy, IUGR, infections, antepartum bleeding.
- Maternal and family history of bleeding disorders, thrombocytopenia, medication intake.

Clinical presentation

- Signs of bleeding (petechial rash, ecchymosis) and hypovolemia
- Signs of infection (sepsis, hepatosplenomegaly)
- Hemangiomas, vascular malformations

Investigations

- FBC and differential, Platelet count, blood smear
- Prothrombin time (PT), Activated Partial Thromboplastin Time (aPTT), Fibrinogen and D-dimers and increased international normalized ratio (INR) where possible

Management

- Depends on etiology, see below
- If suspected Vit K deficiency, give Vit K 0.5 to 1 mg (slowly over 1 min) of subcutaneous (preferred) or intravenous.

11.3. Disseminated Intravascular Coagulation (DIC)

- DIC is an acquired syndrome characterized by a massive inflammatory response with endothelial damage and systemic activation of the coagulation system. It causes both hemorrhage and microvascular thrombosis,
- Laboratory findings: prolonged PT/aPTT, low fibrinogen, elevated D-dimers, and hemolytic anemia.
- Treatment:
  - Fresh frozen plasma: 10-20 mL/kg over 5-10 min
  - Aggressive sepsis treatment

11.4. Platelet Disorders

Definition: Neonatal (Term and preterm) thrombocytopenia is defined as a platelet count less than 150×10^3/ml (150×10□/L).

Classification

- Mild thrombocytopenia: 100 -150 × 10^9/L
- Moderate thrombocytopenia: 50 to 100 ×10^9/L
- Severe thrombocytopenia: ≤ 50 ×10^9/L

Causes

- Increased destruction: Neonatal Alloimmune thrombocytopenia (NAIT), Idiopathic thrombocytopenia (ITP), DIC, Giant hemangiomas.
- Decreased production: thrombocytopenia absent radius syndrome, congenital megakaryocytic hypoplasia.
- Decreased production and increased destruction: congenital or acquired infection.

Risk factors

- Maternal and family history of bleeding: nose bleeds (ITP), previous siblings with bleeding (NAIT), maternal rash (infection), and drugs.
- Maternal blood results: Platelets level, RPR and HIV
- Physical examination: well or ill appearing newborn, bleeding, petechial rash, congenital abnormalities, absent radii, hepatosplenomegaly.

Investigations

- Blood test: FBC and blood smear, platelet; blood culture, CRP, aPTT, Prothrombin time (PT), thrombin time, and fibrinogen level RPR, HIV PCR if mother HIV positive.
- Isolated thrombocytopenia: NAIT, autoimmune thrombocytopenia, an inherited platelet disorder
- Prolonged aPTT and PT:
  - Severe Vitamin K deficiency bleeding (VKDB) and liver disease
  - If associated with Thrombocytopenia: Consider DIC.
- On FBC isolated prolongation of PT: Consider VKDB and congenital factor VII deficiency.
- All coagulation screening test results are normal, but the neonate is still bleeding: Factor XIII deficiency (bleeding from umbilical stump), Von Willbrand Factor (vWF) deficiency, platelet function defect, and defect in fibrinolytic pathway.

Management

- Transfuse with platelets over 1 hour: 10 ml/kg of concentrate platelet and increase platelet count by about 50×10^3/microliter if:
  - Platelet count less than 30×10□/L
  - Platelet less than 31-50×10□/L if ≤ 28 weeks gestation and ≥ 10 days of age or needing invasive procedure.
  - Platelet count < 100×10□/L with active bleeding or going for surgery.

11.5. Polycythemia

Polycythemia is defined as venous hemoglobin > 22 g/dL or hematocrit > 65% confirmed on two consecutive samples.

Risk factors

- Placental transfusion, e.g. delayed cord clamping, maternal-fetal transfusion, twin-twin transfusion
- Intrauterine hypoxia, e.g. IUGR, Maternal diabetes, Maternal smoking

Clinical presentation

- Skin: Plethora
- Central Nervous System (CNS): Irritability, jitteriness, poor feeding, lethargy, seizures
- Cardiorespiratory: cyanosis, tachypnea/respiratory distress, pulmonary hypertension.
- Other: jaundice, thrombosis, hematuria, proteinuria, hypoglycemia.

Management

- Manage hypoglycemia if present and other complications
- Increase IVF by 10-20% to ensure adequate hydration and reduce severity of viscosity.
- Consider referral for partial exchange transfusion (PET) if hematocrit > 70% or apparent clinical symptoms, if feasible.

CHAPTER 12: NEUROLOGY

12.1. Asphyxia

Asphyxia is defined as inadequate delivery of oxygen to meet metabolic demand. This can occur perinatally due to fetal, maternal and/or placental etiology.

Table 15: Risk factors and conditions associated with neonatal asphyxia

Fetal	Maternal	Placental
• Preterm and post-dates • Multiple births • Forceps or vacuum assisted delivery • Abnormal presentation • Emergency caesarean section • Intrauterine growth restriction (IUGR) • Meconium stained amniotic fluid • Abnormal fetal heart rate trace • Anemia • Infection • Congenital malformations	• General anesthetic • Maternal drug therapy • Pregnancy-induced Hypertension • Chronic hypertension • Maternal infection • Maternal diabetes mellitus • Hemorrhage • Uterine rupture	• Chorioamnionitis • Placenta praevia • Placental abruption • Cord prolapses • Polyhydramnios • Oligohydramnios

12.2. Hypoxic ischemic encephalopathy (HIE) Diagnosis

- Neonatal signs consistent with an acute peripartum or intrapartum hypoxic ischemic event:
  - Persistence of an Apgar score of less than 5 at 5 and 10 minutes
  - Neonatal neurologic abnormalities in immediate neonatal period (e.g. abnormal tone, abnormal oculomotor or pupillary movements, weak or absent suck, apnea or clinical seizures)
  - Evidence of multiple organ involvement (kidney, lungs, liver, intestine, etc.)
- Additional factors consistent with an acute peripartum or intrapartum hypoxic ischemic event (ruptured uterus; severe abruption placentae; umbilical cord prolapsed, prolonged maternal hypotension and hypoxemia; maternal cardiovascular collapse; abnormal fetal heart rate monitoring)

Differential diagnosis

- Infections
- Several inborn errors of metabolism
- Neuromuscular disorders including neonatal myopathies
- Brain tumors

- Developmental defects
- Drug withdrawal

Table 16: Classification of HIE with Sarnat Staging

SARNAT STAGES	STAGE 1	STAGE 2	STAGE 3
Level of consciousness	Hyper alert	Lethargic or obtunded	Stupor or coma
Activity	Normal	Decreased	Absent
Neuromuscular Control			
Muscle tone	Normal	Mild hypotonia	Flaccid
Posture	Mild and distal flexion	Strong distal flexion	Intermittent decerebration (extension)
Stretch reflexes	Overactive	Overactive	Decreased or absent
Complex / Primitive Reflexes			
Suck	Weak	Weak or absent	Absent
Moro (startle)	Strong, low threshold	Weak, incomplete, high threshold	Absent
Tonic neck	Slight	Strong	Absent
Autonomic function			
Pupils	Mydriasis	Miosis	Variable, often unequal, poor light reflex, fixed, dilated
Heart rate	Tachycardia	Bradycardia	Variable
Seizures	None	Common, focal or multifocal	Uncommon (excluding decerebration)

Investigations

- Evaluation should be initiated quickly to determine possible etiology and treatment of neonatal encephalopathy, depending upon therapies available.
- FBC, serum glucose, electrolytes including calcium and magnesium, renal and liver function test

Supportive treatment

- Close monitoring of core body temperature to avoid hyperthermia: keep the newborn normothermic.
- Maintenance of adequate ventilation (avoidance of hypoxemia or hyperoxia). Those who have severe respiratory distress may need advanced respiratory support (CPAP, Mechanical ventilation)
- Maintenance of adequate brain and organ perfusion (avoidance of systemic hypotension or hypertension)

- Maintenance of normal metabolic status (normoglycemia, nutritional status, pH)
- Control of seizures
- Control of brain edema (avoidance of fluid overload) start at 60 mls/kg/day until good urine output.

Prognosis and follow up counselling are important for families of newborns with HIE

- Most newborns with mild encephalopathy develop normally
- Newborns with moderate to severe encephalopathy are more likely to have poor outcomes including death:
  - Permanent neurologic sequelae can be mild, such as specific learning difficulties or attention deficit disorder,
  - May be severe and disabling, such as cerebral palsy, epilepsy, visual impairment, and severe cognitive and developmental disorders.

Normally, all newborn who have suffered from HIE need to be followed up until the age of 2 years and the aim is to monitor nutrition due to high risk of malnutrition and feeding problems and also evaluate developmental milestones and detect disabilities. Physiotherapy and occupational therapy should be considered as early as possible.

12.3. Seizures

Common etiologies of neonatal seizures

- Hypoxic ischemic encephalopathy
- Ischemic stroke
- Intracranial hemorrhage
- Central nervous system infections
- Intrauterine (prenatal) infection
- Metabolic and electrolytes disturbance (Hypoglycemia, Hypocalcemia, Hypomagnesemia, Hypo/ hypernatremia)
- Neonatal onset epilepsy
- Inborn error of metabolism

Clinical presentation

- Neonatal seizures can be subtle compared to older patients:
  - Non-extinguishable twitching, rhythmic lip or jaw movements, staring or eye

twitching, extension of extremities, clenching of fists, and changes in vital signs including apnea.

Differential diagnosis

- Neonatal seizures must be differentiated from non-epileptic paroxysmal events and non-seizure behaviors of the newborn, and EEG is often required to distinguish them.

Diagnosis

- Observation and clinical description, but EEG is the gold standard for diagnosis.
- Diagnosis should specific to the likely underlying cause of the seizure.

Treatment

- Acute: Ideally seizures should be controlled within 30 minutes of initial presentation
- Phenobarbital:
  - Loading dose: 20 mg/kg IV slow push
  - Subsequent doses: May repeat 10 mg/kg after 20–30 minutes if seizures continue, and repeat again after 20–30 minutes (max dose 40 mg/kg/day)
- Phenytoin (fosphenytoin preferable) as second agent if seizures persist after second dose of phenobarbital:
  - Loading dose: 15 mg/kg/dose IV
  - If administering phenytoin, IV tubing containing glucose must be flushed with normal saline before and after to prevent precipitation and loss of IV access
  - Subsequent doses: May repeat 5 mg/kg after 20–30 minutes if seizures continue
- Diazepam: to be used only as a last resort if phenytoin is not available (Be aware of associated risk of cardiorespiratory arrest and myoclonic seizures in preterm newborns).
  - 0.1 mg/kg given over 3–5 minutes. May repeat same dose after > 15 minutes if seizures continue or recur.
- Maintenance: If seizures recur after acute treatment, start maintenance therapy 24hours after first loading dose of Phenobarbital.
  - Phenobarbital: 5 mg/kg/day IV/PO every 24 hours.
  - In unlikely event that second agent maintenance therapy may be needed, give Phenytoin: 5 mg/kg/dose IV every 24 hours or 2.5 mg every 12 hours.

Ongoing monitoring

Anticonvulsants can cause apnea, especially at high doses and in combination; monitor respiratory system closely.

- Be prepared to provide bag mask ventilation while awaiting return of respiratory drive.

Discontinuation of anticonvulsants

- After 3 days without seizures on maintenance dose of anticonvulsants, trial discontinuation of therapy to determine whether or not newborn will require longer term, outpatient anticonvulsant therapy.
- If on second agent (phenytoin or diazepam), discontinue that first. Monitor for 48 hours and if seizures recur, bolus with loading dose and restart maintenance.
- If seizures do not recur, discontinue Phenobarbital. Monitor for 48 hours
  - If seizures do not recur, newborn may be discharged home off anticonvulsant therapy.
  - If seizures do recur, then re-bolus with loading dose and restart maintenance.

Discharging a newborn who has required anticonvulsant therapy

- If newborn requires longer term, outpatient anticonvulsant therapy, the Phenobarbital should be changed to PO route. The same IV dose can be given orally
- Phenytoin cannot be orally dosed with adequate serum levels. Therefore, it is a poor choice as an oral maintenance anticonvulsant.
- Any newborn who has required an anticonvulsant should be observed for at least 48 hours after the last dose to ensure that seizures do not recur.
- If newborn has HIE, especially if seizures occur during the hospitalization, arrange follow□up appointment after 1 week of discharge to home. Frequency and duration of follow up depends on severity of HIE and seizures.

CHAPTER 13: PAIN CONTROL

13.1. How newborns express pain

- Sedation does not provide pain relief and may mask the neonate's response to pain.
- The following Neonatal/Infant Pain Scale (NIPS), also contained in the Rwanda National Neonatal Medical File, shows some of the ways a newborn may express pain and can be used to help assess severity of pain:

Table 17: Neonatal/Infant Pain Scale

Behavior	0	1	2
Face	Relaxed	Contracted	
Cry	None	Moaning	Vigorous
Breathing	Relaxed	Change in breathing	
Arms	Relaxed	Tense	
Legs	Relaxed	Tense	
Arousal	Calm	Uncomfortable	
If ≥ 4, need pain intervention			

- Symptoms of pain may be harder to observe in some newborns, such as those with HIE and severe prematurity. Provider should anticipate the pain they may experience and follow the table for pain management based on the procedures (see table on next page).

13.2. Appropriate environment to support newborn development and pain management

- All newborns should be comforted, including breastfeeding, skin to skin contact, and swaddling, holding, and gentle touch throughout their stay and during procedures whenever possible.
- Minimizing painful or stressful procedures (use non-invasive procedures whenever possible, placement of peripheral lines to reduce repeated IV punctures).

Table 18: Pain management guidance for procedures in newborns

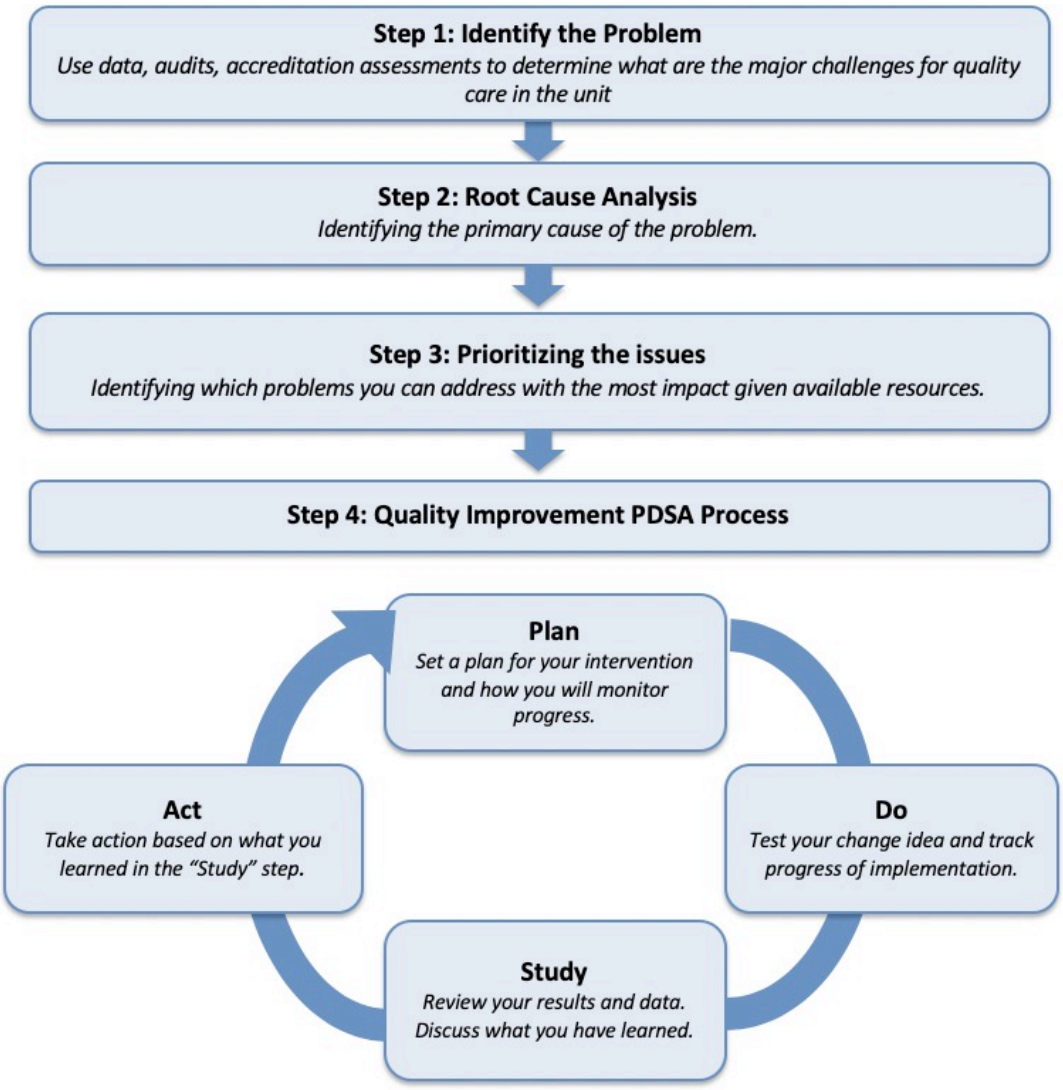
Procedure	Pain Management
Blood draw, IV catheter placement, injections (IM or subcutaneous), or umbilical catheters	• Breastfeeding, comfort measures (such as holding and swaddling) • D10 (20 ml) two minutes prior to procedure on a gauze or via small syringe or Sugar Water (1 teaspoon in 20 ml of clean water)
Surgical procedures (draining abscess, extensive dressing or wound care)	• D10 (20ml) two minutes prior to procedure on a gauze or via small syringe or Sugar Water (1 teaspoon in 20 ml of clean water) • Use syrup morphine 0.02-0.05 mg/kg or IV morphine 0.01-0.1 mg/kg 20 minutes prior to the procedure.
NG Tube Insertion	• Use holding, swaddling or containment by flexing and holding the newborn • D10 (20 ml) two minutes prior to procedure on a gauze or via small syringe or Sugar Water (1 teaspoon in 20 ml of clean water) • Lubrication (e.g., Normal saline or KY Gel)
CPAP	• Every 3 hours: Saline drops on the nose • Proper nasal prong sizing to avoid pain and trauma (refer chapter 7)
Lumbar Puncture	• D10 (20 ml) two minutes prior to procedure on a gauze or via small syringe or Sugar Water (1 teaspoon in 20 ml of clean water) • Paracetamol 10-15mg/kg/dose PO 1 hour prior to procedure • Use topical lidocaine
Urinary catheters /Suprapubic bladder tap	• D10 (20 ml) two minutes prior to procedure on a gauze or via small syringe or Sugar Water (1 teaspoon in 20 ml of clean water)
Intubation	• Morphine 0.05mg/kg 20 minutes prior or fentanyl 1mcg/kg 5 minutes prior to intubation (the administration must be slow to avoid related respiratory depression or chest rigidity)
Palliative pain management	• Morphine 0.05 mg/kg as needed

CHAPTER 14: QUALITY OF CARE GUIDELINES

Quality of care in healthcare facilities is essential during the care of newborns. In order to provide the best quality of care to newborns we must understand how care is provided to newborns, such as how well protocols are followed, how patients and their families experience care, and outcomes of newborns. The role of healthcare providers is to work as a team to analyze our strengths and weaknesses and develop quality improvement projects to continuously improve the care we provide to newborns and their families for better health outcomes.

14.1. Steps for developing a quality improvement project

Figure 14: Steps for developing a quality improvement project



14.2. Recommendations for improving the quality of care in neonatal units

- Monthly unit meetings should be held to discuss quality improvement
- Existing tools – including neonatal death audits or asphyxia audits – should be used to understand gaps in care and inform quality improvement projects.
- Neonatology teams should meet with maternity teams to discuss cross-cutting challenges
- Quality of care requires stability of staffing in neonatal units, including to the greatest extent possible to eliminate rotation of nurses and doctors and ensure continuity of care for patients.
- Quality improvement teams may refer to the Rwanda Accreditation Standards for Hospitals and Primary Health Care.
- Clinicians need to communicate efficiently during handover between shifts. The ″Situation Background Assessment Recommendation (SBAR)□ tool should be used for clear communication of cases.

SBAR Example
Situation: briefly state the problem

- *This is a 1-day old male term newborn with severe respiratory distress*

Background: brief important background information on the patient

- *He was born last night with 4000grams by a gravida 1, para 1, diabetic mother by an elective caesarean section. The APGAR was 6, 8, and 9 at birth.*

Assessment: your analysis of the case and anything you have done so far ("what you found")

- *He presented nasal flaring, grunting, intercostal and subcostal retraction. His oxygen saturation is varying between 88-92% on 6 liters of oxygen.*

Recommendation: actions you request or recommend ("what you want")

- *We plan to start CPAP with pressure 6 and 6 liters of oxygen, plan CXR when stable,*

CHAPTER 15: FAMILY CENTERED CARE GUIDELINES

Family-centered care is an approach that provides an expanded view of how to work with children and their families. It involves parents in partnership with a clinical team; thus, allowing a shift from the provider-oriented approach to the patient oriented one. However, the clinical team maintains primary responsibility of care.

15.1. The benefits of family centered care

Table 19: Benefits of family centered care

Neonatal Unit Staff	Newborns	Families
• Better quality of care • Increased satisfaction • Better performance • Decreased stress • Better use of resources	• Decreased length of hospital stay • Improved breastfeeding and weight gain • Decreased hospital-acquired infections • Better continuity of care • Improved outcomes	• More confident and comfortable to care for their newborn in the unit and after discharge • More informed and better able to manage stress, fear, and anxiety • Greater satisfaction

15.2. Key principles of family centered care for neonatal units

1. Mothers and fathers, or other designated primary caregivers, should receive explanations for why their newborn is being admitted to neonatology.
2. All aspects of care should be explained to the mother and father, such as treatment plans, procedures, and prognosis.
3. Upon admission, informed consent should be obtained for the course of care for the newborn.
4. Mothers and fathers, or other designated primary caregiver, should have access to the newborn at all times day and night.
5. All family members who enter the unit must be educated on the infection control and prevention, especially hand washing, processes on the unit and how to follow them.
6. Mothers and fathers, or other designated primary caregivers, are the ultimate

caregivers for the newborn and should be empowered to be able to care and monitor their newborn which includes feeding, recognizing danger signs, and other essential topics for the care of the newborns (see appendix 11 for counselling checklist).

7. The viewpoint and values of the patient's family should be respected.

15.3. Appropriate environment for family centered care

- Mothers, fathers or other caregivers should have a place to sleep and sit with their newborns
- Noisy stimuli should be avoided; a quiet environment is recommended
- Lights should be turned down during the night to allow and promote newborn sleeping and protect the sleep schedules

15.4. Psychological and social support for families

- Hospital mental health care provider should be available to help parents in need.
- Hospital social service should be available to advocate for any eventual issue.
- "Champion parents" can be nominated to provide peer support to other parents, especially new admissions, in the unit.
- Washable curtains can be used to create space for a single newborn room. This allows privacy, can encourage fathers to participate in care, and ensures good sleep.

CHAPTER 16: NEONATAL REFERRAL AND TRANSPORT

For neonatology, in-utero transfer is the safest and easiest form of transfer because transport increases the neonatal mortality and morbidities. Collaboration between Obstetric and Neonatal teams is mandatory to identify all high-risk pregnancies and refer the mother to the appropriate level of care before delivery. At any time, when a health care staff is worried about the status/classification of the baby, they should refer the baby to the appropriate level of care.

Here is the process of neonatal transfer/transport:

- **Stabilize the neonate** to the best of your facility ability prior and during transport:
  - Thermoregulation: provide KMC by parent or other family member during transport or a transport incubator whenever available.
  - Respiratory support: provide oxygen or ventilation support as capable during transport if respiratory distress or hypoxia
  - Fluids, Electrolytes and Nutrition: Have a nutrition plan for the transported neonate (IV line preferably by qualified practitioner). Check glycaemia and treat hypoglycemia (Chapter 6: Hypoglycemia) prior and during transport.
  - Infectious Disease: If infant has suspected or confirmed infection, give first dose of antibiotics per protocol prior to transport
  - Seizures: Assess and treat seizures as per protocol (see Neurology chapter)
- **Communication**
  - Communicate and get the transfer consent from the family
  - Discuss the neonate's clinical course and reasons for transfer with the receiving facility prior to transport and address any recommendations provided
  - Record relevant antepartum, delivery, postnatal medical history and pre-transfer treatment on the Neonatal Referral Form (see Appendix)
  - Record neonate's clinical events and how addressed during transport on the Transport Monitoring Form (see Appendix)
  - The transporting qualified provider (e.g. neonatology unit personnel) should keep communication with the referring Clinician.

- **Equipment and Personnel**
    - A nurse/midwife or any qualified provider (e.g. neonatology unit personnel) should accompany the neonate and continue close monitoring during transport
    - A parent or caregiver should also accompany the neonate during transport and don't separate the baby from the mother whenever possible
    - The ambulance should have the emergency equipment per standards at all times including ambubag with correct size mask, oxygen, nasal cannula, pulse oximeter, IV fluids and catheter, and emergency drugs such as D10, and adrenaline (see Appendix).

CHAPTER 17: COMMON CONGENITAL ANOMALIES

17.1. Causes

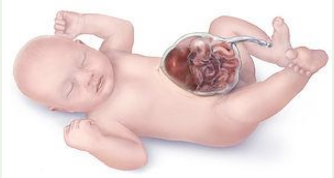
- Genetic disorders
- Chromosomal disorders
- Teratogenic insults to the developing fetus.
- Congenital infections (TORCH)

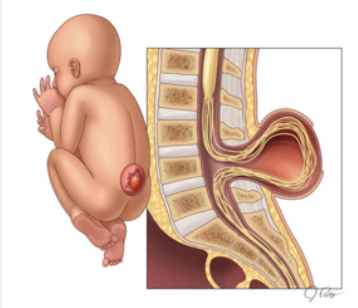
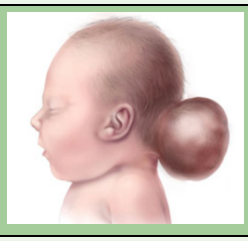
Any congenital anomaly noted should alert the physician to the possibility of other developmental abnormalities, whether physical, neurological, or mental. The presence of multiple, congenital anomalies may be indicative of a syndrome and requires further testing and/or genetic studies for verification and counseling of the parents.

17.2. Identification, Management and Referral of Common Congenital Anomalies

Table 20: Identification, Management and Referral of Common Congenital Anomalies

Condition	Presentation	Immediate Management	Referral
Cleft lip and/or palate	Openings in the lip and/or roof of moth (palate). Not all are visible, so a physical exam is essential.	Ensure adequate feeding, refer to feeding chapter.	Refer for surgical repair (Cleft lip at 3 months, if healthy; Cleft palate before 12 months).
Choanal atresia	Blockage of the posterior nares caused by the persistence of a bony septum in 90% of the cases and a soft tissue membrane in the other 10% of the cases	Immediate insertion of an oral airway/Guedel (Bilateral choanal atresia) Feeding through gavage until breathing and eating without any assisted airway is possible.	Refer for potential surgical repair by ENT surgeon as urgently as possible,
Congenital diaphragmatic hernia	Commonly presents with polyhydramnios. Large defects (Bochdalek) usually present at birth with cyanosis, respiratory distress, scaphoid abdomen, decreased or absent breath sounds on the side of the hernia, and heart sounds displaced to the side opposite	Intubate, if able to do so safely and then refer. Insert large NG tube and leave open below level of newborn for drainage, or suction frequently Monitor saturation	Refer for surgical repair.

Condition	Presentation	Immediate Management	Referral
	the hernia. Intestinal sounds may be heard on chest auscultation. Small hernias, right sided hernias and substernal hernias of Morgagni may have a subtler presentation, manifested as feeding problems and mild respiratory distress.	closely and avoid hypoxia. Sedate and provide analgesia as necessary. Bag and mask ventilation, and CPAP are contraindicated.	
Esophageal atresia (EA) with or without tracheoesophageal fistula (TEF)	Maternal polyhydramnios may alert the physician to EA. The newborn often presents with: excessive salivation, choking/coughing on feeds, episodes of coughing, cyanosis, and respiratory distress	Maintain NPO, suction intermittently the proximal pouch to avoid aspiration, elevate bed to 45 degrees to diminish reflux of gastric contents	Refer for urgent surgical repair.
Small and large bowel atresia	Bilious vomiting main indication. Others include: scaphoid or distended abdomen, initially pass small meconium.	NG tube for abdominal decompression, IV fluids, and antibiotics if indicated for possible infection.	Refer for likely surgical repair.
Malrotation and midgut volvulus	Sudden onset of vomiting that quickly becomes bilious. Progressive abdominal distention. Abdominal tenderness and bloody stools indicative of advanced bowel ischemia and gangrene.	NG tube for abdominal decompression, fluids, and pain management.	Refer for urgent surgical repair.
Distal bowel obstructions (anorectal malformation, Hirschsprung's disease, meconium plug most common)	Absence or abnormal location of the anus (anorectal malformation), delayed meconium passage after 24 hours, progressive distension of abdomen, poor tolerance of breastfeeding, vomiting that becomes progressively bilious. An abdominal x-ray should show features of intestinal obstruction.	Hydrate and keep warm, NG tube for decompression.	Refer for surgical repair.
Omphalocele		Saline-soaked sterile dressings applied immediately. Maintain normal temperature, NG suction, antibiotics, IV fluids.	Refer for urgent management and potential surgical repair.
Gastroschisis		At delivery, leave umbilical stump of 6-8 cm. Maintain	Refer for urgent surgical repair (within 6-12 hours

Condition	Presentation	Immediate Management	Referral
		normal temperature, IVF increased by 20-25%, antibiotics, NG decompression. Saline-soaked sterile dressings over intestines and dry sterile dressing.	of delivery).
Myelomeningocele		Keep in prone position with sterile saline gauze sponge and IV antibiotics.	Refer immediately for neurosurgery.
Encephalocele			Refer for surgical repair.
Spina bifida occulta	Local signs such as a patch of hair, lipoma, discoloration of the skin, or a dermal sinus in the midline of the lower back which may be overlying a spinal cord defect (dimples in the coccygeal region are not significant).		If it causes tethered cord, refer as it may require surgical repair.
Hypospadias	Curved penis (chorda), deficient ventral prepuce, and abnormal meatal opening. May be associated with undescended testes and hernias.	Avoid circumcision.	Refer for further assessment by urologist, may require surgical repair around 6-12 months.
Bladder exstrophy	Clinical exam that reveals a low abdominal wall defect with an exposed bladder mucosa with urine continuously dribbling from the ureteric openings.	Plastic material to protect the mucosa should be used to avoid repeated trauma by cloth, gauze or diapers that induce bleeding/granulation and polyps' formation that degrade mucosal function	Refer for further management by urologist.

Condition	Presentation	Immediate Management	Referral
Trisomy 21	Down slanting eyes, large protuberant tongue, single palmar crease, flat nasal bridge, hypotonia. Can be associated with duodenal atresia at birth ("double bubble sign on x-ray), cardiac abnormalities, hypothyroidism		If they have double sign, refer for surgery. All will need an ECHO given high risk of congenital cardiomyopathy.

CHAPTER 18: DISCHARGE PLANNING AND FOLLOW-UP

18.1. Discharge criteria

The newborn must meet the following criteria before being discharged:

Feeding

- Newborn does not require intravenous fluids
- The newborn should demonstrate mature feeding skills (breastfeeding or/and drinking by bottle/ cup) to sustain appropriate growth on full feeds.
- Newborn has gained at least 20 g/kg/day for at least 3 consecutive days.
- The mother/caregiver is confident to feed and look after the newborn.

NB: In some exceptional cases (Severe HIE), newborns maybe discharged with NGT for feeding if agreed between the parents and the medical team. For those cases, parents/ caregivers should receive and be checked on NGT feeding skills prior to discharge

Respiratory

- There are no signs of respiratory distress
- The newborn should maintain O_2 saturation of > 90% on room air
- For preterm or LBW newborns, no apnea for 5-7 days without caffeine or aminophylline

Temperature

- Newborn can maintain normal body temperature (Axillary temperature 36.5–37.5^{o}C) without the use of incubator or radiant heater sources for at least 3 days.

Neurologic

- For those with HIE and treated with anticonvulsants, no convulsions for 48 hours off anticonvulsant therapy unless patient being discharged on maintenance treatment.

18.2. General considerations for discharge

- Has no danger signs including fever, jaundice, vomiting, abdominal distension
- Newborn is passing urine and stool normally
- Identify available community resources like Early Childhood Development Centers (ECDs) and /or any community support system for, adolescent mothers, or single caregivers.
- Parents/mother has mastered effective breastfeeding skills
- A follow up plan for immunization has been established.
- Preterm and LBW newborns have undergone ophthalmologic screening (or booked) for

ROP where available and a follow up plan has been established.

- Routine cranial ultrasound screening for all newborns born at ≤ 32 weeks gestation where possible
- Drugs or supplements have been prescribed or given to the mother/caregiver with demonstration of correct administration at correct dose of all prescribed medications.
  - For HIV- -exposed newborns, prophylaxis has been provided and follow up arranged including review of drugs and PCR/ serology testing
  - Preterm/LBW newborns: Newborns born at < 35 weeks or with birth weight < 2 kg should be prescribed iron (Fe) from two weeks until 1 year of age (see discharge medications section below).
- Any question from the family regarding discharge and ongoing management has been answered.

18.3. Discharge processes

Parent education prior to discharge

The primary caregiver (e.g. mother or father) should be educated on the following:

- Warning signs of illness
- Follow up (OPD) planning
- How to administer medications upon discharge
- Vaccination
- Continuation of KMC
- Nutrition after discharge
- 3 hourly Breastfeeding interval, or on demand
- Specific information related to newborn's condition
- Iron and micronutrient supplementation
- Hygiene at home
- Monitoring feeding tolerance and weight gain
- Keeping the newborn warm
- Infection control at home
- Sleeping position
  - Flat on back (not side or stomach) and not covering newborn's face with blankets or clothes, without pillows, toys and alternating the position of the neonate's head

between left to right side each time they sleep to prevent deformational plagiocephaly

- Recognizing and interpreting newborn's behavioral cues

Discharge medications

- Iron: VLBW (< 1500 g) newborns should be given 2-4 mg/kg per day iron supplementation starting at 2 weeks until 12 months of age (WHO guidance). If NOT anemic, give preventive dose: 2 mg/kg/day of elemental Fe: (weight the newborn every 4 weeks to adjust the dose).
- Vitamin D: Premature newborns (and any newborn) that are exclusively breastfed should receive 400 IU of Vit D per day for six months up to 12 months of age.
- Multivitamin syrup in doses appropriate for newborns and young infants

Discharge examination

- All newborns discharged from neonatal unit should have complete physical examination prior to discharge
- Newborns' weight, length and head circumference should be plotted on appropriate growth chart from the day of birth and be continued throughout the follow up. This growth chart should be part of follow up cards and brought at every follow up appointment.
- Complete discharge form in the neonatal file completely.

18.4. Follow-up

Recommended in 1 week at the hospital or health centre for the follow up of newborns with any of the below conditions:

- LBW < 2 Kg
- Preterm newborns (especially those born < 35 weeks GA)
- Newborns with concern for feeding difficulty (suspected genetic syndrome, congenital anomalies)
- HIV exposed newborn to be weighed and to adjust doses (respect EMTCT protocol appointment)
- Severe birth asphyxia/HIE
- Confirmed meningitis
- Bronchopulmonary Dysplasia
- Congenital Heart Diseases
- Other concerns for vulnerability

CHAPTER 19: PALLIATIVE CARE ON NEONATAL UNIT

19.1. Indications for palliative care

- Newborns with conditions that are not compatible with life.
- Newborns whose prognosis is uncertain, such as prematurity under 24 weeks and birth weight under 600 grams, whose parents choose compassionate care.
- Newborns with conditions with poor long-term survival, including multiple malformations, severe bilateral hydronephrosis and impaired renal function, and some congenital heart conditions.
- Newborns with conditions where the newborn is experiencing unbearable suffering in the course of their illness or treatment, including severe necrotizing enterocolitis with likelihood of short bowel syndrome post-surgery, where palliative care is in the newborn's best interest.

19.2. Counselling on palliative care

- Counselling on palliative care is essential. Have a face-to-face discussion with both parents; this should be in a quiet and private space away from the neonatal unit, where families are able to ask all questions they have. Give them the option of inviting other family members or a close friend to be with them.

19.3. Supporting treatment

- Provide pain relief and comfort care according to chapter 13.
- Monitoring: Invasive monitoring techniques and lab investigations should be discontinued, and any cardiac and saturation monitors should also be turned off.
- Nutrition provision is for comfort:
  - If able and desires to breastfeed, the newborn should continue to be fed as part of comfort care.
  - Oral nutrition, including NG tube feeds, should only be withheld if it is felt that providing it will cause pain or discomfort.
  - For newborns unable to feed orally, minimal IV fluids should be provided for comfort so long as they are not causing distress.
  - When a newborn is discharged to continue palliative care at home, arrangements about stopping medically provided fluids need to be made in advance and

discussed with parents. If there is gastrostomy or nasogastric feeding, parents need to be trained adequately while still into the unit.

- Withdrawal of respiratory support or reduction of oxygen is appropriate if the newborn is dying and continuing respiratory support only serves to delay death.
- Once life-sustaining support has been withdrawn, intermittent physical exams with auscultation of the heart rate should be continued.
- Parents, or family members, may require additional support for themselves during the grieving process. A referral to the hospital psychologist or other counsellor would be appropriate for their ongoing support after death.

Tips on delivering bad news to families

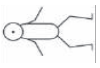
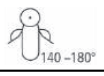
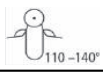
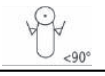
Phrases such as the following may help:

- "Our aim is to help your baby have pain-free, peaceful death. We cannot cure your baby but we will always care for him/her.''
- "We want to support you through this difficult time.''

Staff should be aware that families might show their distress in different ways they may be tearful, withdrawn, short-tempered or angry. Be patient, give them time to speak and process.

APPENDICES

Appendix 1: Ballard's score

Neuromuscular Maturity Sign	Score							Record Score Here
	-1	0	1	2	3	4	5	
Posture								
Square Window (Wrist)								
Arm Recoil								
Popliteal Angle								
Scarf Sign								
Heel to Ear								
							Total Neuromuscular Maturity Score	

Physical Maturity Sign	Score							Record Score Here
	-1	0	1	2	3	4	5	
Skin	sticky friable transparent	gelatinous red translucent	smooth pink Visible veins	superficial peeling &/or rash, few veins	cracking pale areas rare veins	Parchment deep cracking No vessels	leathery cracked wrinkled	
Lanugo	none	sparse	abundant	thinning	bald areas	mostly bald		
Plantar Surface	heel-toe 40-50mm: -1 <40mm: -2	>50mm no crease	faint red marks	anterior transverse crease only	creases ant. 2/3	creases over entire sole		
Breast	imperceptible	barely perceptible	flat areola no bud	stippled areola 1-2mm bud	raised areola 3-4mm bud	full areola 5-10mm bud		
Eye / Ear	lids fused loosely: -1 tightly: -2	lids open pinna flat stays folded	sl. curved pinna; soft; slow recoil	well-curved pinna; soft but steady recoil	formed & firm instant recoil	thick cartilage Ear stiff		
Genitals (Male)	scrotum flat, smooth	scrotum empty Faint rugae	testes in upper canal rare rugae	testes descending, few rugea	testes down good rugae	testes pendulous Deep rugae		
Genital (Female)	clitoris prominent & labia flat	prominent clitoris & small labia minora	prominent clitoris & enlarging minora	majora & minora equally prominent	majora large Minora small	majora cover clitoris & minora		
						Total Physical Maturity Score		
						Total Score (Neuromuscular Maturity + Physical Maturity)		

Score	-10	-5	0	5	10	15	20	25	30	35	40	45	50
Weeks	20	22	24	26	28	30	32	34	36	38	40	42	44

GESTATIONAL AGE

By date: _____

By ultrasound:_____

By exam:_____

Reference: Ballard JL et al. (1991). New Ballard Score, expanded to include extremely premature infants. J Pediatrics, 119-417.

Appendix 2: Dilution of adrenaline

Adrenaline (1mg/ml → 0.1mg/ml)			
Adrenaline (1mg/ml or 1:1,000) is a high--☐dose solution This must be diluted to standard--☐dose (0.1mg/ml or 1:10,000) before using it			
IV/IO: bradycardia, asystole			
☐ Prepare ☐ Calculate ☐ Give			
YOU MUST DILUTE adrenaline 1 mg/ml solution to 0.1 mg/ml BEFORE using it: Mix 0.1 ml of adrenaline with 0.9 ml of sterile water/saline. Then give the written volume.	Weight (kg)	Dose (mg) (0.1 mg/ml)	Volume (ml)
		0.01 mg/kg	0.1 ml/kg of the diluted solution
	1 kg	0.01 mg	0.1 ml of the diluted solution
	2 kg	0.02 mg	0.2 ml of the diluted solution
	3 kg	0.03 mg	0.3 ml of the diluted solution
	4 kg	0.04 mg	0.4 ml of the diluted solution
	5 kg	0.05 mg	0.5 ml of the diluted solution
	6 kg	0.06 mg	0.6 ml of the diluted solution
	7 kg	0.07 mg	0.7 ml of the diluted solution
	8 kg	0.08 mg	0.8 ml of the diluted solution
	9 kg	0.09 mg	0.9 ml of the diluted solution
	10 kg	0.10 mg	1.0 ml of the diluted solution
	11 kg	0.11 mg	1.1 ml of the diluted solution
	12 kg	0.12 mg	1.2 ml of the diluted solution
	13 kg	0.13 mg	1.3 ml of the diluted solution
	14 kg	0.14 mg	1.4 ml of the diluted solution
	15 kg	0.15 mg	1.5 ml of the diluted solution

Appendix 3: Algorithm for initiating breastfeeding

ALGORITHM FOR INITIATING BREASTFEEDING for newborns >1.5kg and clinically stable

[a]CONTRAINDICATIONS to enteral feeding
- Respiratory rate: >80 rpm (preterm) >70 rpm (term)
- Shock
- Unresponsive
- Bilious emesis (evidence of bowel obstruction)
- Confirmed or strong suspicion of NEC
- Severe (grade 3) HIE in initial stages

[b]SIGNS for CAUTION feeding:
- Newborn's body is stiff
- Chomping, coughing, eyes tearing, or multiple sneezing
- Noisy/congested breathing or wet breath sounds during/after feeding

On first day of admission:
Start breastfeeding

Assess quality of breastfeeding
In collaboration with the mother and nurse

Breastfeeds well:
- Good latch: mouth is wide open and lips are turned out. Newborn maintains latch for total feed.
- Newborn feeds for >5 minutes per breast
- Mother confident, relaxed
- Newborn calm and alert at breast
- Initial rapid sucks change to slow deep sucks with jaw lowering
- Each suck burst ≥5 sucks and each suck burst is similar in length
- Swallowing seen or heard

Continue exclusive breastfeeding
monitor weight gain daily

Breastfeeds fairly:
- Newborn comes on and off breast frequently
- No sucking or few rapid sucks
- Each suck burst <5 sucks
- Milk seen coming out of mouth
- Mother pulls breast towards newborn
- Mother unsure, shaking newborn/breast
- Feeds <5 minutes or >30 minutes per breast

Top up (supplement) with cup feeding
Give 50% volume as per handbook/protocol

Breastfeeds poorly
- Newborn does not wake for feeding or displays no interest in feeding
- There is no latch
- Newborn shows signs for caution[b]

Provide maternal education, e.g.:
- Mother requires significant assistance with positioning
- Mother feels pain when feeding

Top up (supplement) with cup feeding
Give full (100%) volume in protocol

Did newborn take all of cup volume offered AND *without* signs for caution[b]?

YES

Continue breastfeeding +/- cup feeds
Reassess breastfeeding daily and monitor weight gain

NO

Insert NG tube
give full volume of feed by NG and follow algorithm for newborns unable to PO feed

If weight loss of >10% of birthweight, or newborn remains less than birthweight at >=DOL 14, go to Algorithm to "ADD CALORIES"

If at any point the infant is not reaching goal weights, other causes of growth failure should be investigated.

ALGORITHM FOR INITIATING BREASTFEEDING for newborns <1.5kg and clinically stable but unable to PO feed

[a]CONTRAINDICATIONS to enteral feeding
- Respiratory rate: >80 rpm (preterm) >70 rpm (term)
- Shock
- Unresponsive
- Bilious emesis (evidence of bowel obstruction)
- Confirmed or strong suspicion of NEC
- Severe (grade 3) HIE in initial stages

Place Nasogastric tube (NGT)
1. Prior and during each feed, give newborn oral stimulation (e.g. place newborn near breast)
2. Give milk via NGT (volume per protocol)
3. Adjust IV fluid (per protocol)

[b]SIGNS for CAUTION feeding:
- Newborn's body is stiff
- Chomping, coughing, eyes tearing, or multiple sneezing
- Noisy/congested breathing or wet breath sounds during/after feeding

Once at goal NG feeds
Assess quality of breastfeeding
In collaboration with the mother and nurse

Breastfeeds well:
- Good latch: mouth is wide open and lips are turned out. Newborn maintains latch for total feed.
- Newborn feeds for >5 minutes per breast
- Mother confident, relaxed
- Newborn calm and alert at breast
- Initial rapid sucks change to slow deep sucks with jaw lowering
- Each suck burst ≥5 sucks and each suck burst is similar in length
- Swallowing seen or heard

Stop NG feeds
Start exclusive breastfeeding and monitor weight gain daily

Breastfeeds fairly:
- Newborn comes on and off breast frequently
- No sucking or few rapid sucks
- Each suck burst <5 sucks
- Milk seen coming out of mouth
- Mother pulls breast towards newborn
- Mother unsure, shaking newborn/breast
- Feeds <5 minutes or >30 minutes per breast

Top up (supplement) with NG feeds
Give 50% volume in protocol

Breastfeeds poorly
- Newborn does not wake for feeding or displays no interest in feeding
- There is no latch
- Newborn shows signs for caution[b]

Provide maternal education, e.g.:
- Mother requires significant assistance with positioning
- Mother feels pain when feeding

Top up (supplement) with NGT
Give full (100%) volume in protocol

Continue offering the breast prior to NG feeds
Reassess breastfeeding daily and top up with NG feeds if needed
Monitor weight gain

If weight loss of >10% of birthweight, or newborn remains less than birthweight at >=14 days of life, *go to Algorithm to "ADD CALORIES"

If at any point the infant is not reaching goal weights, other causes of growth failure should be investigated.

Appendix 4: Calculations for the introduction of enteral feeds

Introduction of enteral feeds in newborns
Feeding newborns always requires clinical judgement

Guidance for introducing enteral feeds

- Only Expressed Breast Milk (EBM) should be used (formula should be discouraged, but can be used/considered when: deceased mother or term newborn where no EBM is available).
- If clinical concern regarding giving enteral feeds then still give trophic feeds as a minimum (15ms/kg/day).
- Stop IV Fluids once newborn is well tolerating 100-120mls/kg/day of enteral feeds
- For newborns with HIE (birth asphyxia); monitor input and output of fluid and adjust fluid volumes accordingly

STEP 1. Give ALL newborns colostrum (unless ABSOLUTE contraindication)
STEP 2. Calculate the TOTAL daily fluid volume required Table 1.
STEP 3. Identify feeding group

Group 1: No contraindication to feeding. The following are NOT contraindications to enteral feeding:
- Mild-mod (grade 1-2) HIE
- Mild to moderate respiratory distress
- CPAP

Group 2: Potential contraindications**
- Tachypnea. Respiratory rate: Preterm>70rpm; term>60rpm
- Cardiorespiratory instability
- Feeding intolerance
- Convulsions in the last 3 hours
- Severe Hypothermia (<35.0ºC)

Group 3: Absolute contraindications
- Severe respiratory distress: preterm >80 rpm, term >70 rpm
- Shock
- Unresponsive
- Bilious emesis (evidence of bowel obstruction)*
- Confirmed or strong suspicion of NEC*
- Severe sepsis
- Severe (grade 3) HIE in initial stages

STEP 4. Start trophic or full feeds
Choose feeding group

>1kg **AND** milk available **AND** feeds tolerated

<1kg **OR** the required EBM volume is not available **OR** the full feed is not tolerated

STEP 5. Give full enteral feeds Table 1 (i.e. no IV fluids) in 3 hourly volumes.

STEP 5. Calculate IV and enteral volumes
IV VOLUME (IVF) =
Total Daily Fluid Volume (TDF) Table 1 – Enteral Fluid Volume (EF) Table 2

STEP 4. Give Total Daily Fluid Volume (TDF) as IV fluids Table 1 as IV fluids until contraindication resolved.

STEP 6: Daily review of feeds. Increase enteral and IV fluids accordingly

Table 1
TOTAL DAILY FLUID VOLUME (TDF)
(mls/kg/day)

Day of life	Weight <1.5kg	Weight ≥1.5kg)	HIE (any weight)
0	80	60-80	60
1	100	90	60
2	120	120	90
3	150	150	120
4	180	150	150
5+	180	150	150

Table 2
ENTERAL FLUID VOLUME (EF)
(mls/kg/day)

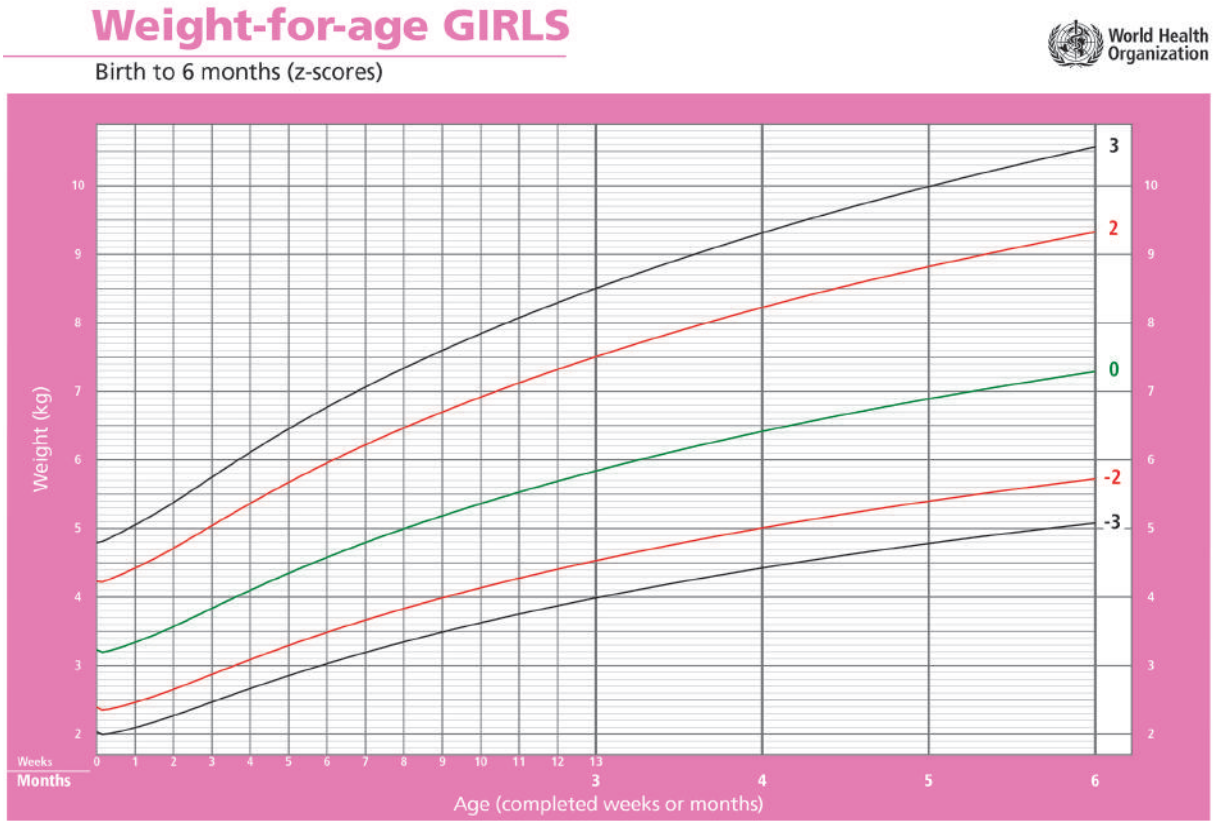
Day of feed	Weight <1.5kg	Weight ≥1.5kg	HIE (any weight)
0 (trophic)	15	15	15
1	40	40	40
2	70	70	70
3	100	100	100
4	130	130	150
5+	160	150	150

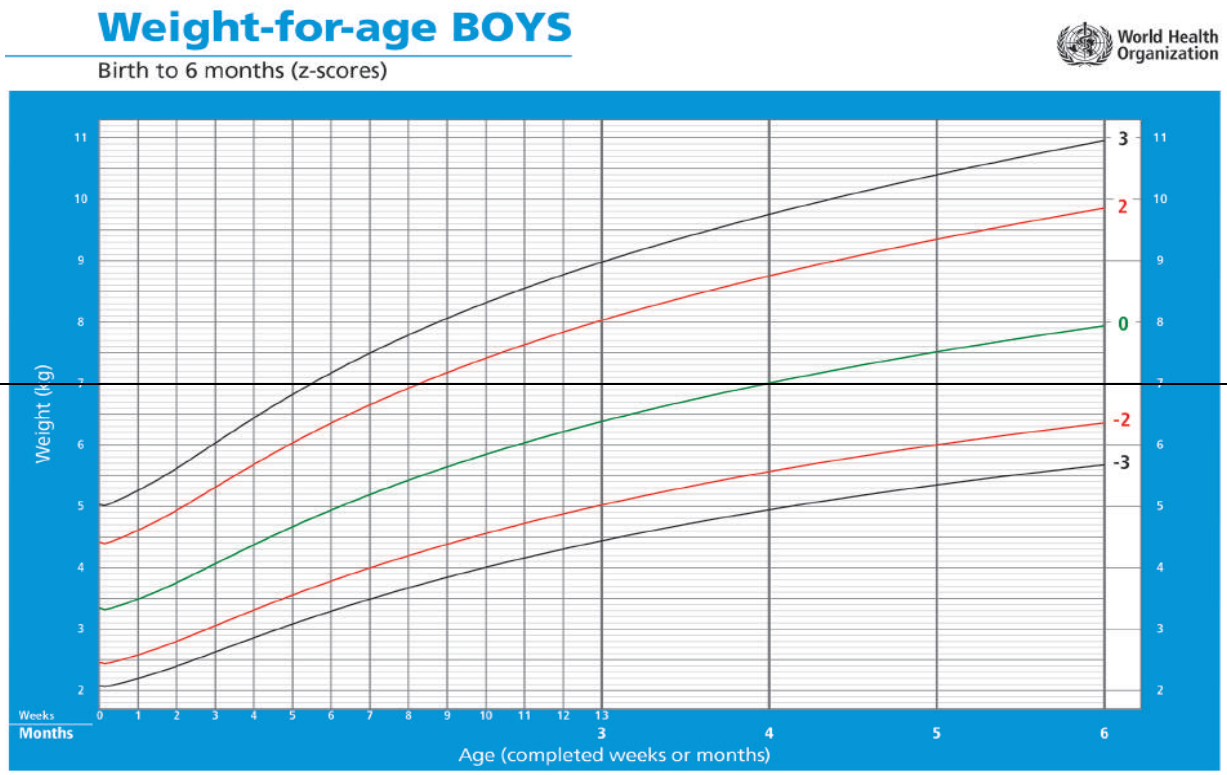
Example: 1.8kg newborn on day-3 of life, has been on IV fluids and trophic feeds (15mls/kg/day) and received colostrum (**STEP 1**). Initially not tolerating feeds. Now tolerating and You now want to increase the enteral feeds:

- **STEP 2**: Total Daily Fluid Volume (TDF) on Day-3 = 150ml/kg/day = 270ml/day
- **STEP 3**: Feeding group 1
- **STEP 4**: Newborn already on trophic feeds
- **STEP 5**: Newborn to progress from Day-0 (trophic) to Day-1 of Enteral feeds.
  - Enteral Fluid Volume (EF) = 40ml/kg/day = 72ml/day = 9mls three hourly
  - Intravenous Fluid Volume (IVF) = 270 (TDF) – 72 (EF) = 198ml = 8.25ml/hr

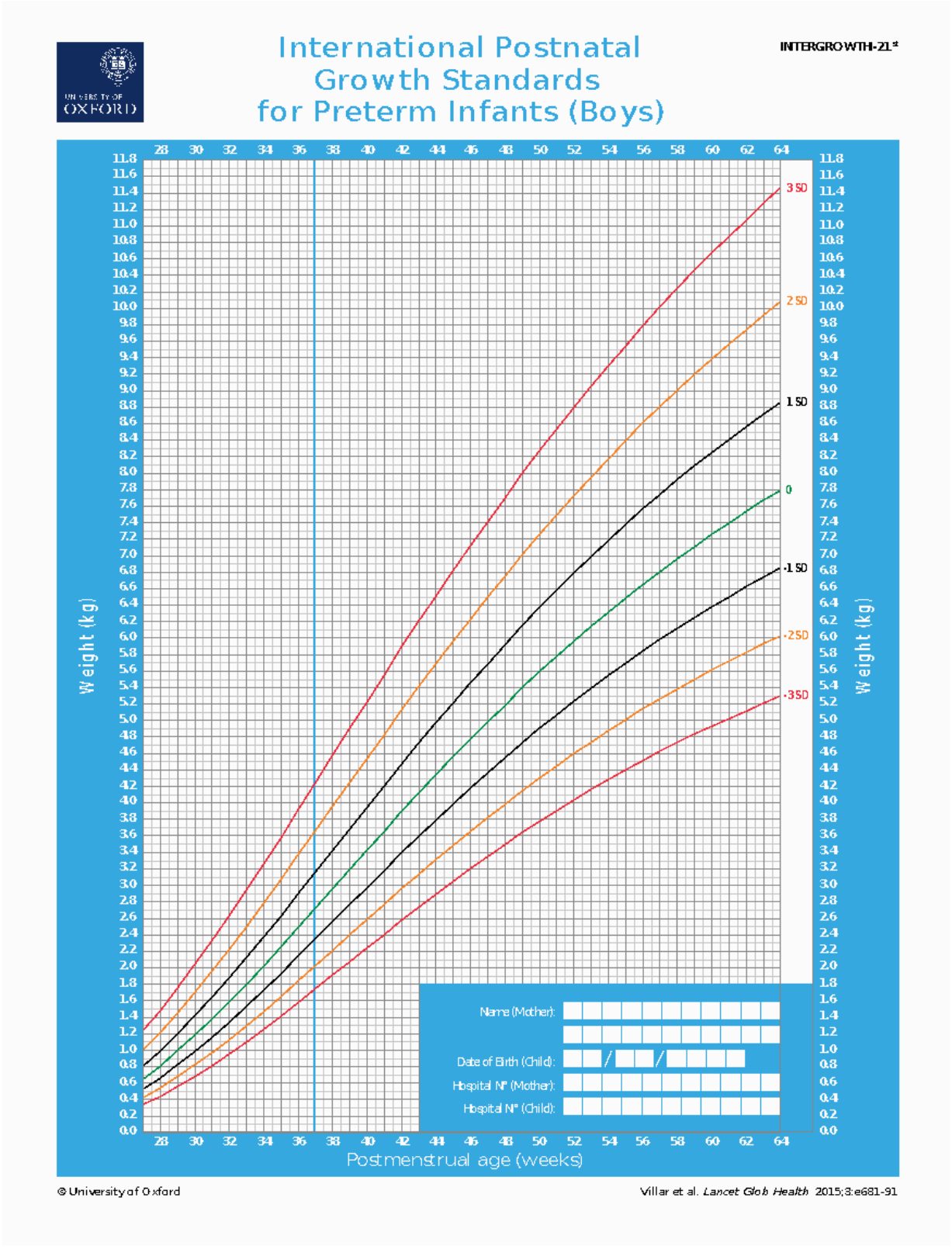
*NEC=Necrotizing enterocolitis; HIE=Hypoxic-Ischemic Encephalopathy (birth asphyxia)
** Potential contraindications. These are **NOT** absolute contraindications to enteral feeding but require consideration and judgement from the clinical team with monitoring during feeds

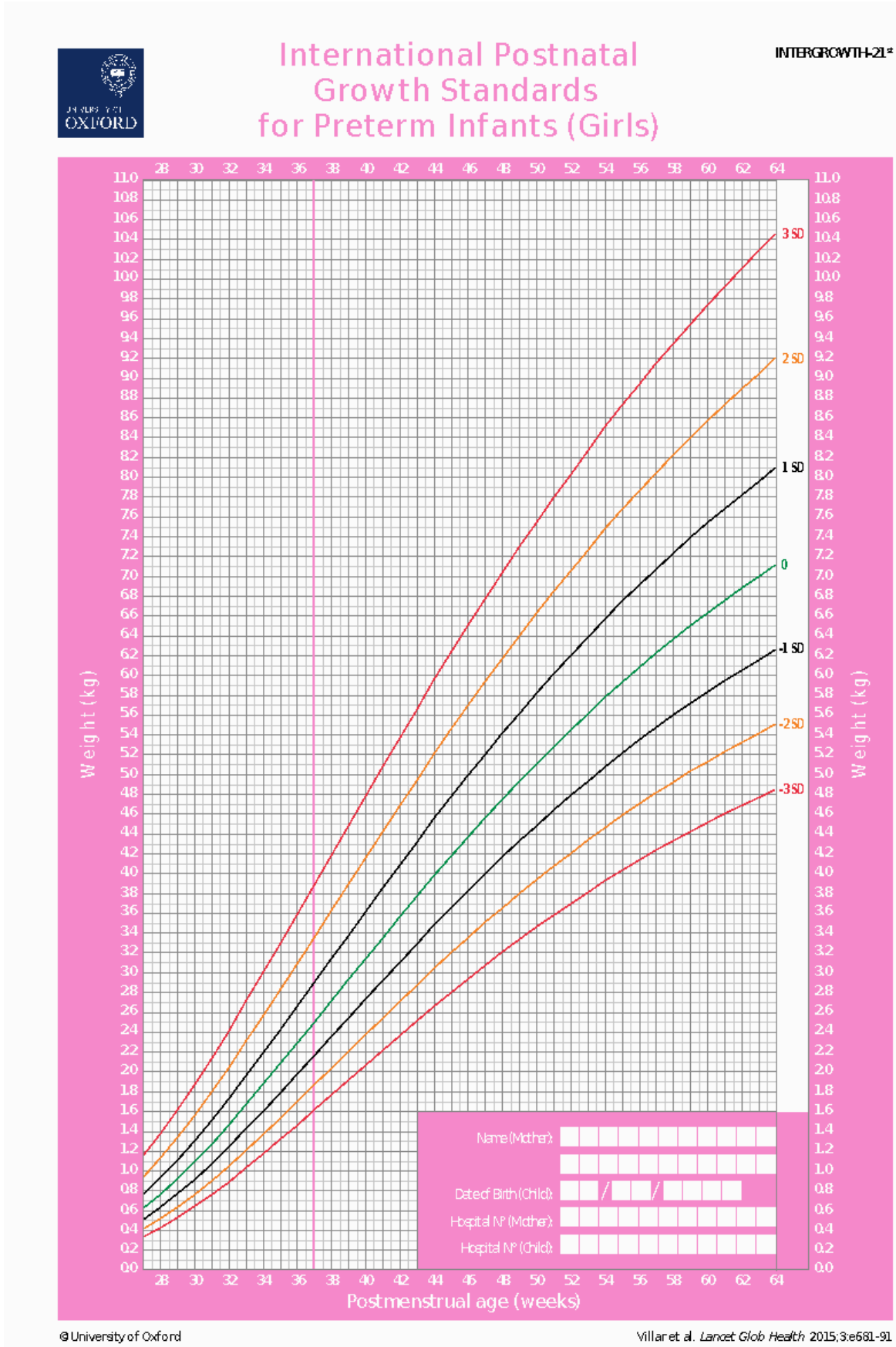
Appendix 5: Term growth charts



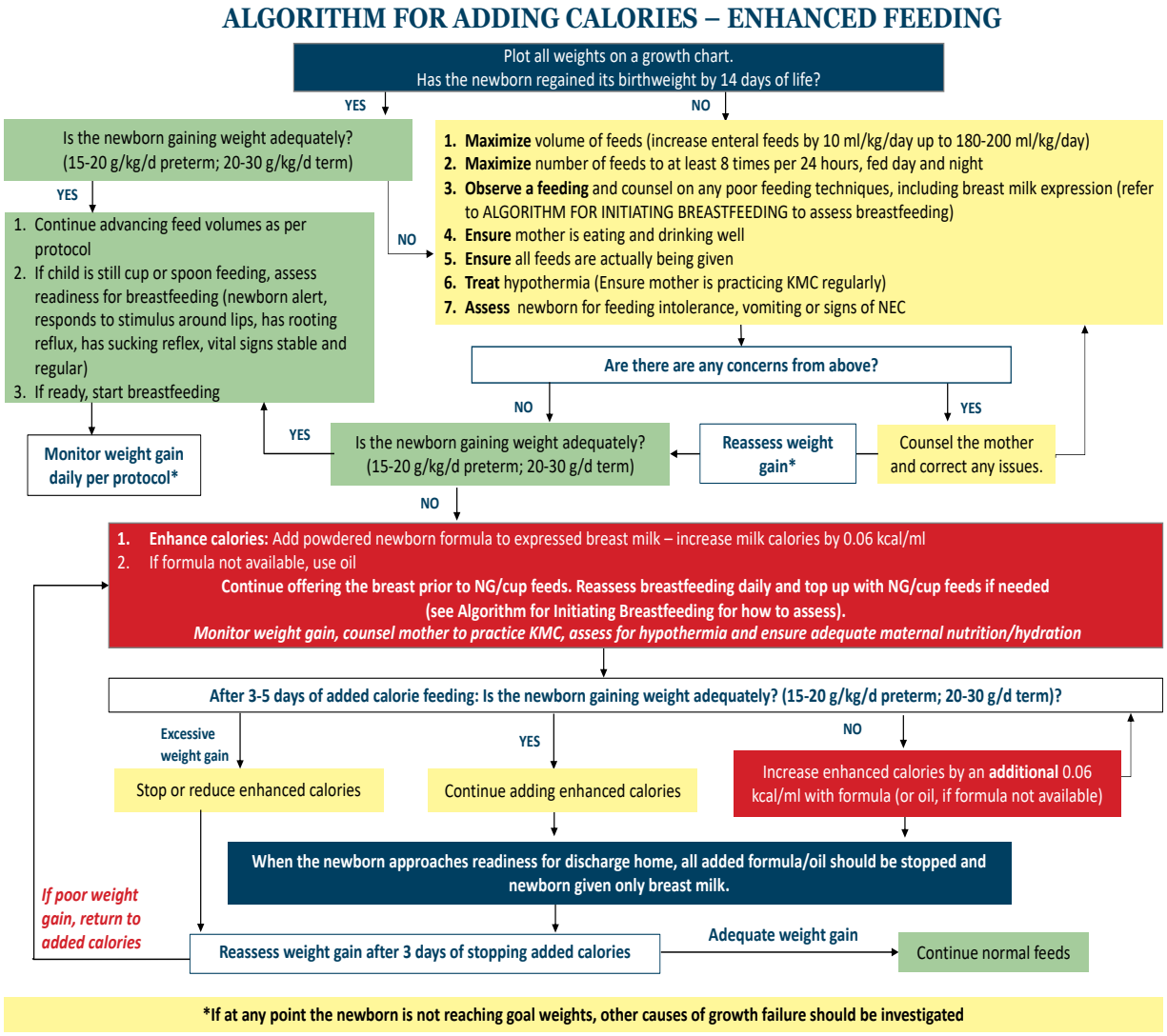


Appendix 6: Preterm growth charts




International Postnatal Growth Standards for Preterm Infants (Girls)
INTERGROWTH-21st
OXFORD
Weight (kg)
Postmenstrual age (weeks)
3 SD
2 SD
1 SD
0
-1 SD
-2 SD
-3 SD
Name (Mother):
Date of Birth (Child):
Hospital N° (Mother):
Hospital N° (Child):
© University of Oxford
Villar et al. Lancet Glob Health 2015;3:e681-91

Appendix 7: Algorithm for adding calories-enhanced feeding



Appendix 8: Calculations for breast milk fortification

Fortification should not be undertaken routinely.
Optimize nutrition with Expressed Breast Milk (EBM) before fortifying

To fortify EBM:

- The mother should express breast milk, as educated and supported by healthcare professionals
- Where possible use the "hind-milk" (i.e. milk at the end of the expressing) as this is calorie rich
- Use a standard infant formula for fortification. Alternatively, Safflower, sunflower or olive oil can be used
- Wash hands with water and soap and wash the top of the box containing the artificial milk before opening.
- Use clean tools. Bottles etc should be washed with water and soap and then ideally boiled for at least one minute
- Use an appropriately sized syringe (plunger removed) to measure/scoop out the formula/oil to be added. The volumes below to increase the calories in maternal milk (EBM)
- The fortification volume of oil does not always need to be mixed. For example, it can be syringed directly into the newborn's mouth/NGT.

	Breast (EBM) milk quantity	Powder Formula Volume to add to EBM	Mls of Oil to add to EBM (if formula not available)
0.67kcal/ml 20 calories per 30 ml	EBM	None	None
0.73 kcal /ml (i.e. adding extra 0.06kcal/ml) 22kcal/30 ml	1mls	0.024mls/ml	0.007mls/ml
	15mls	0.4mls	0.1mls
	30mls	0.7mls	0.2mls
	60mls	1.4mls	0.4mls
	90mls	2.2mls	0.6mls
	120mls	2.9mls	0.9mls
	150mls	3.6mls	1.1mls
0.8 kcal/ml (i.e. adding extra 0.13kcal/ml) 24kcal/30 ml	1mls	0.052mls/ml	0.016mls/ml
	15mls	0.8mls	0.2mls
	30mls	1.6mls	0.5mls
	60mls	3.1mls	0.9mls
	90mls	4.7mls	1.4mls
	120mls	6.2mls	1.9mls
	150mls	7.8mls	2.3mls
0.87 kcal / ml (i.e. adding extra 0.20kcal/ml) 26kcal/ml (note: exceptional use)	1mls	0.08mls/ml	0.024mls/ml
	15mls	1.2mls	0.4mls
	30mls	2.4mls	0.7mls
	60mls	4.8mls	1.4mls
	90mls	7.2mls	2.1mls
	120mls	9.6mls	2.9mls
	150mls	12.0mls	3.6mls
0.94 kcal / ml (i.e. adding extra 0.27kcal/ml) 28kcal/ml (note: exceptional use)	1mls	0.11mls/ml	0.032mls/ml
	15mls	1.6mls	0.5mls
	30mls	3.2mls	1.0mls
	60mls	6.5mls	1.9mls
	90mls	9.7mls	2.9mls
	120mls	13.0mls	3.9mls
	150mls	16.2mls	4.8mls

Oil Calorie content**:** Safflower, sunflower or olive oil: 1 mL oil = 8.4 kcal
Dispersed Infant 1 Formula dispersed POWDER: 2.5kcal/ml (1ml of powder gives 0.4kcal)

Appendix 9: IV/enteral fluid rates if advancing enteral volume on DOL 1

Birth Weight < 1 kg (ELBW) (Estimated as **0.9 kg** for calculation)						
DOL	IV Fluid	Total Fluid: IV+PO ml/kg/day	IV		Enteral	
			ml/kg/24hrs	ml/hr	ml/kg/24hrs	ml/3hrs
0	G10%	80	65	3	15	2
1	G10%*	100	60	2	40	5
2	G10%*	120	50	2	70	8
3	G10%*	150	50 (or stop)	2	100	10
4	G10%*	180	50 (or stop)	2	130	15
5	G10%*	180	stop	0	165	20
6	G10%*	180	stop	0	180	20
*If newborn is NPO after DOL0, refer to IVF recipes to make G10 1/4 LR.						

Birth Weight 1 – 1.5 kg (VLBW) (Estimated as **1.25 kg** for calculation)						
DOL	IV Fluid	Total Fluid: IV+PO ml/kg/day	IV		Enteral	
			ml/kg/24hrs	ml/hr	ml/kg/24hrs	ml/3hrs
0	G10%	80	65	3	15	3
1	G10%*	100	60	3	40	6
2	G10%*	120	50	3	70	11
3	G10%*	150	50 (or stop)	3	100	16
4	G10%*	180	50 (or stop)	0	130	20
5	G10%*	180	stop	0	165	26
6	G10%*	180	stop	0	180	28
*If newborn is NPO after DOL0, refer to IVF recipes to make G10 1/4 LR.						

Birth Weight 1.5 – 2 kg (LBW) (Estimated as **1.75 kg** for calculation)						
DOL	IV Fluid	Total Fluid: IV+PO ml/kg/day	IV		Enteral	
			ml/kg/24hrs	ml/hr	ml/kg/24hrs	ml/3hrs
0	G10%	60-80	45	3	15	3
1	G10%*	90	50	4	40	10
2	G10%*	120	50	4	70	15
3	G10%*	150	50 (or stop)	4	100	20
4	G10%*	165	35 (or stop)	3	130	30
5	n/a	165	0	0	165	35
6	n/a	165-180	0	0	165-180	40
*If newborn is NPO after DOL0, refer to IVF recipes to make G10 1/4 LR.						

Birth Weight 2– 2 .5kg (LBW) (Estimated as **2.25 kg** for calculation)						
DOL	IV Fluid	Total Fluid: IV+PO ml/kg/day	IV		Enteral	
			ml/kg/24hrs	ml/hr	ml/kg/24hrs	ml/3hrs
0	G10%	60	45	4	15	4
1	G10%*	90	50	5	40	10
2	G10%*	120	50	5	70	20
3	G10%*	150	50 (or stop)	5	100	30
4	G10%*	165	35 (or stop)	3	130	40
5	n/a	165	0	0	165	45
6	n/a	165-180	0	0	165-180	50
*If newborn is NPO after DOL0, refer to IVF recipes to make G10 1/4 LR.						

Birth Weight 2.5 – 3 kg unable to breastfeed). (Estimated as **2.75 kg** for calculation)						
DOL	IV Fluid	Total Fluid: IV+PO ml/kg/day	IV		Enteral	
			ml/kg/24hrs	ml/hr	ml/kg/24hrs	ml/3hrs
0	G10%	60	45	5	15	5
1	G10%*	90	50	6	40	15
2	G10%*	120	50	6	70	25
3	G10%*	150	50 (or stop)	6	100	30
4	G10%*	165	35 (or stop)	4	130	45
5	n/a	165	0	0	165	55
6	n/a	165-180	0	0	165-180	60
*If newborn is NPO after DOL0, refer to IVF recipes to make G10 1/4 LR.						

Birth Weight > 3 kg unable to breastfeed (Estimated as **3.5 kg** for calculation)						
DOL	IV Fluid	Total Fluid: IV+PO ml/kg/day	IV		Enteral	
			ml/kg/24hrs	ml/hr	ml/kg/24hrs	ml/3hrs
0	G10%	60	45	7	15	7
1	G10%*	90	50	7	40	20
2	G10%*	120	50	7	70	30
3	G10%*	150	50 (or stop)	7	100	45
4	G10%*	165	35 (or stop)	5	130	60
5	n/a	165	0	0	165	70
6	n/a	165-180	0	0	165-180	80
*If newborn is NPO after DOL0, refer to IVF recipes to make G10 1/4 LR.						

Appendix 10: IV fluid recipes

G10% IV fluid from G5% and G50%, *Use premixed G10% if available*

1. Remove 28 ml from 250 ml bag of G5%
2. Add 28 ml G50% to bag in step1
3. Mix bag to make G10%

G10% ¼ Ringers Lactate (RL) from G5%, G50% and RL

1. Remove 95 ml from 250 ml bag of G5%
2. Add 35 ml G50% to bag in step1
3. Add 60 ml RL to bag in step 2
4. Mix bag to make G10% ¼ Ringers lactate

G10% ¼ Ringers Lactate (RL) from G10%, G50% and RL

1. Remove 75 ml from 250ml bag of G10%
2. Add 15 ml G50% to bag in step1
3. Add 60 ml RL to bag in step 2
4. Mix bag to make G10% ¼ Ringers lactate

G10% ¼ Normal Saline (NS) from G5%, G50% and NS

1. Remove 95 ml from 250ml bag of G5%
2. Add 35 ml G50% to bag in step1
3. Add 60 ml NS to bag in step 2
4. Mix bag to make G10% ¼ Normal saline

G10% ¼ Normal Saline (NS) from G10%, G50% and NS

1. Remove 75 ml from 250ml bag of G10%
2. Add 15 ml G50% to bag in step1
3. Add 60 ml NS to bag in step 2
4. Mix bag to make G10% ¼ Normal saline

G12.5% ¼ Ringers Lactate (RL) from G5%, G50% and RL

1. Remove 108 ml from 250ml bag of G5%
2. Add 48 ml G50% to bag in step1
3. Add 60 ml NS to bag in step 2
4. Mix bag to make G12.5% ¼ Ringers Lactate

G12.5% ¼ Ringers Lactate (RL) from G10%, G50% and RL

1. Remove 90 ml from 250 ml bag of G10%
2. Add 30 ml G50% to bag in step1
3. Add 60 ml NS to bag in step 2
4. Mix bag to make G12.5% ¼ Ringers Lactate

Appendix 11: Newborn family centered care parent education checklist

INTRODUCTION	Date	HCP name
1. Explaining the reason for admission of the newborn		
2. General rules of the neonatal unit		
3. Explaining the treatment process		
4. Rights of the patient		
5. Show the environment/unit		
6. Consent for care		
7. Payment process		
8. How to use the incubator		
9. Introduction to the staff		
GENERAL CARE		
1. Kangaroo mother care (including by fathers, other caregivers)		
2. Recognition of warning signs of illness		
3. How to hold the neonate		
4. How to report any warning signs to a HCP		
5. Importance of affection/bonding of the newborn		
6. Maternal hydration and nutrition		
7. Psychology and emotional support		
8. How to communicate with HCPs if the neonate removes materials (e.g. NGT/O^2)		
9. Family planning importance, expectations and complications		
FEEDING THE NEWBORN		
1. Feeding quantity		
2. Feeding through a nasogastric Tube		
3. Breastfeeding and hygiene before breastfeeding		
4. Post-breastfeeding positioning		
5. Proper storage of feeding materials		
6. Expressing breast milk		
7. Feeding timing		
8. Hygiene/cleaning of materials used in feeding (e.g. cup)		
9. How to assess feeding tolerance		
10. Special lesson on feeding for HIV+ mothers		
11. Side effect of NGT and ways of preventing them		
12. Toilet/cleaning of the nasogastric tube		
13. Fortification of milk		
CLEANLINESS AND HYGIENE		
1. Hand washing		
2. Using Disinfectant		
3. How to clean the baby and delayed bathing for at least 24 hours		
4. Mother's body hygiene and self-care		
DISCHARGE AND FOLLOW UP		
1. Follow up (OPD) planning		
2. Teach the mothers how to administer the drugs upon discharge		
3. Vaccination		
4. Continuation of KMC		
5. Nutrition at discharge		
6. Breastfeeding period		
7. Specific information related to disease state		
8. Iron and micronutrient supplementation		
9. Hygiene at home		
10. Monitoring feeding tolerance and weight gain		
11. Thermoregulation		
12. Infection control at home		
13. Sleeping position		

Appendix 12: Essential equipment and drugs for neonatal transport

Required Material	Health Centre	District Hospital	Referral Hospital
Source of newborn warming during transport. An incubator is ideal. If not available, KMC, plastic bag, infant warmers, etc.	X	X	X
Gloves	X	X	X
Source of oxygen and compressed air, mainly oxygen cylinder	X	X	X
Equipment for Resuscitation (Ambu bag, face masks 0/1, O_2 tubing)	X	X	X
Airway equipment (Laryngoscopes with no. 00, 0, and 1 blade, Magill forceps, CO2 detectors)	X	X	X
Oxygen saturation, heart rate monitor and respiratory rate	X	X	X
Thermometer	X	X	X
Stethoscope	X	X	X
Glucometer		X	X
IV fluid infusion pump		X	X
Suction device (if not available, use a penguin suctioning device)	X	X	X
Oxygen nasal cannulas	X	X	X
Vascular catheters, IV fluids, IV tubing, tape, pen torch, arm board	X	X	X
Syringes, needles		X	X
Umbilical clamps or ties	X	X	X
Gauze	X	X	X
Nasogastric tubes size 5F and 8F.	X	X	X
Transport Medications			
IV fluids (D10%, NS, RL)	X	X	X
Ampicillin	X	X	X
Gentamycin	X	X	X
Paracetamol	X	X	X
Phenobarbital		X	X
Caffeine or Aminophylline		X	X
Vitamin K	X	X	
Eye ointments	X	X	
Any other prescribed medications			X

Appendix 13: Neonatal medical file

The National Neonatal Medical File from the Ministry of Health should be used for all inpatient newborn care, as well as the neonatal referral form for the transfer of any newborn.

REPUBLIC OF RWANDA

NAME OF HOSPITAL

MINISTRY OF HEALTH

P.O BOX 84 KIGALI

www.moh.gov.rw

NEONATOLOGY SERVICE
PATIENT FILE

PATIENT NAME:…….

Date of birth(dd/mm/yyyy):……/……/……/Sex (M:Male/F:Female):

PATIENT/FILE NUMBER

<table>
<tr><td colspan="7">HOME ADDRESS</td></tr>
<tr><td colspan="3">Province</td><td colspan="4">Sector</td></tr>
<tr><td colspan="3">District</td><td colspan="4">Cell</td></tr>
<tr><td colspan="3"></td><td colspan="4">Village</td></tr>
<tr><td colspan="7">INFORMATION ON PARENTS</td></tr>
<tr><td colspan="3">Mother’s Name</td><td colspan="3"></td><td>Age</td></tr>
<tr><td colspan="3">Father’s Name</td><td colspan="4"></td></tr>
<tr><td colspan="3">Other Caregiver</td><td colspan="4"></td></tr>
<tr><td colspan="3">Mother’s Occupation</td><td colspan="4"></td></tr>
<tr><td colspan="3">Father’s occupation</td><td colspan="4"></td></tr>
<tr><td colspan="3">Father’s occupation</td><td colspan="4"></td></tr>
<tr><td colspan="3">Religion</td><td colspan="4"></td></tr>
<tr><td colspan="3" rowspan="4">Education level of mother</td><td colspan="4">□ Primary</td></tr>
<tr><td colspan="4">□ Secondary</td></tr>
<tr><td colspan="4">□ University</td></tr>
<tr><td colspan="4">□ Other:</td></tr>
<tr><td colspan="3" rowspan="4">Mother’s marital status</td><td colspan="4">□ Single</td></tr>
<tr><td colspan="4">□ Married</td></tr>
<tr><td colspan="4">□ Divorced</td></tr>
<tr><td colspan="4">□ Widowed</td></tr>
<tr><td colspan="7">Mother’s blood group___ HIV Status □ positive □ negative Father’s HIV status □ positive □ negative</td></tr>
<tr><td colspan="3">Contact phone number</td><td colspan="4"></td></tr>
<tr><td colspan="3"></td><td colspan="4"></td></tr>
<tr><td colspan="3">National ID of Mother</td><td colspan="4"></td></tr>
<tr><td colspan="7">ADMISSION AND OUTCOME</td></tr>
<tr><td colspan="2" rowspan="3">Date of admission (dd/mm/yyyy)
……/……/……</td><td rowspan="3">Mode of admission</td><td colspan="4">□ Internal transfer</td></tr>
<tr><td colspan="4">□ External transfer</td></tr>
<tr><td colspan="4">□ With transfer form</td></tr>
<tr><td colspan="2" rowspan="3">Exit date (dd/mm/yyyy)
……/……/……</td><td rowspan="3">Disposition</td><td colspan="4">□ Recovered</td></tr>
<tr><td colspan="4">□ Unimproved</td></tr>
<tr><td colspan="4">□ Left Against Medical Advice</td></tr>
<tr><td colspan="2"></td><td colspan="2">□ Died</td><td>□ Before 48 hours</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>□ After 48 hours</td></tr>
<tr><td colspan="7">CLINICAL SUMMARY</td></tr>
<tr><td colspan="7">……
……
……
……</td></tr>
<tr><td colspan="7">DIAGNOSIS</td></tr>
<tr><td colspan="3">Primary Diagnosis</td><td colspan="4"></td></tr>
<tr><td colspan="3">Secondary diagnosis</td><td colspan="4"></td></tr>
<tr><td colspan="3"></td><td colspan="4"></td></tr>
<tr><td colspan="7">HEALTH INSURANCE</td></tr>
<tr><td>□ MUSA</td><td>□ RSSB</td><td>□ MMI</td><td>□ MEDIPLAN</td><td>□ CORAR</td><td>□ PRIVATE</td><td>□ OTHER</td></tr>
</table>

INTERDISCIPLINARY PROGRESS NOTE

(Document the date, time, department, name and signature for each visit)

Date and Time	Name & Signature

NEONATAL CARE UNIT – MEDICAL CHART | ADMISSION FORM– INFANTS < 1 MONTH OF AGE

Date of admission ____/____/____ Time of admission ____h____

Vital Signs on Admission: T _____ RR_____ HR _____ O2 Sat _____ BP _____

Patient Name _____ ☐ M ☐ F
Date of Birth _____/_____/_____ Time of Birth _____
Day of Life on Admission _____ *NB : Day of Birth = Day of Life 0*

HISTORY
Maternal History: Age _____ Gravida ____ Para ____ Abortions____ Stillbirths____ Living Children____ ☐ Unknow
Problems during previous pregnancies _____ ☐ History of preterm delivery ☐ Unknown
Problems during this pregnancy _____ ☐ Unknown
Number of ANC visits _____ ☐ Unknown
Use of traditional médicine during this pregnancy ☐ No ☐ Yes
LMP/DDR____/____/____ ☐ Unknown
HIV Status : ☐ Negative ☐ Positive ☐ Status Unknown
If Positive, treatment: ☐ Triple ART ☐ NVP x 1 ☐ Other_____ ☐ None
Syphillis : ☐ Negative ☐ Positive ☐ Status Unknown
Hepatitis : ❒ Negative ❒ Positive ❒ Status Unknown
Malaria during this pregnancy? ☐ No ☐ Yes: ☐ Treated ☐ Treating currently ☐Not treated ☐ Unknown
Mother Blood Group and Rhesus Status: _____ ☐ Unknown
Mother's Medications : _____

Birth History:
Place ☐ Hospital ☐ Health Center ☐ Home ☐ Other _____ ☐ Unknown
☐Normal Vaginal Delivery ☐ Vacuum assisted delivery ❒ Caesarian section, indication _____
C-section by : ☐ General anesthesia
Risk Factors for Infection:
☐ Prolonged rupture of membranes (>18 hrs) ☐ Fever during labor: Temperature if known _____
☐ Foul-smelling amniotic fluid ☐ Antibiotic given during labor ☐ Preterm Labor ☐ Unknown
Risk Factors for Birth Asphyxia:
☐ Oxytocin during labor ☐ Prolonged labor ☐ Labor dystocia
☐ Multiple gestation ☐ Signs of fetal distress (abnormal FHR) ☐ Meconium staining
APGAR Score : 1 minute_____ 5 minutes _____ 10 minutes_____ ☐ Unknown
Resuscitation ☐ None ☐ O_2 ☐ Positive pressure ventilation ☐ Chest compressions ☐ Adrenaline ☐ Unknown
Birthweight: _____kg ☐ Unknown HC : _____ Length: _____
Gestational Age:
☐ Term
☐ Preterm (<37 weeks)
Gestational Age _____ Weeks (**use LMP/DDR if ≥ 2 weeks different from Ballard)*
By: ☐LMP/DDR ☐Ballard
☐ Gestational Age Unknown
☐ Vitamin K given ☐ Yes ☐ No ☐ Unknown
☐ Ophtalmic ointment given ☐ Yes ☐ No ☐ Unknown
☐ Corticosteroids given to mother if GA < 34 weeks ☐ Yes, # doses received: _____ ☐ No ☐ Unknown

Reason for Admission: _____
_____
_____

MD Name: _____ Signature: _____

***Continue to Daily Progress Note and Orders**

NEONATAL CARE UNIT – MEDICAL CHART | DAILY EVALUATION AND ORDERS

Patient Name _____ **Date** _____/_____/_____ **Day of Life (DOL)**_____
☐ **Term** ❒ **Preterm: Gestational age at birth (GA)**_____ **Post Menstrual Age**_____**(GA+ DOL)**
RECENT EVENTS (Refer to previous day's assessment and plan): _____

_____

_____

EXAM ☐ Room Air ☐ O_2 ____ L/min ☐ CPAP ____ cm H20 Vital Signs ☐ Normal ☐ Abnormal _____
Weight _____ kg Change in weight from yesterday _____ g Weight for calculations _____ kg

	Normal	Abnormal	Comments if abnormal
General appearance			
Head: fontanelles, other			
Ears, eyes, nose, mouth			
Chest, lung auscultation			
Heart: rate, rhythm, murmur			
Abdomen, umbilicus, genitals			
Musculoskeletal			
Skin: capillary refill, jaundice			
Neuro: tone, reflexes			
Problem :			
Impression :			
Plan: 1. _____ 2. _____ 3. _____			

ORDERS: ☑ = **Ordered** ☐ **= Not ordered**
Temperature: If < 36°C, see **THERMOREGULATION PROTOCOL** ☐ Kangaroo Mother Care (KMC) ☐ Radiant warmer/ Incubator

Respiratory System: Goal: O2 sat: 90-95% with O2, 90 – 100% room air, **See RESPIRATORY PROTOCOL**
O2 sat <90%: ☐Oxygen _____ L/min ☐ Concentrator ☐ Tank
☐ Nasal cannula ☐ CPAP _____ cm H20, **See RESPIRATORY PROTOCOL**
Apnea of Prematurity : See APNEA OF PREMATURITY PROTOCOL
Stimulant **:** ☐ Caffeine ☐ Aminophylline dose: _____
☐ Stop stimulant if post menstrual age ≥34 weeks; observe for no apnea for at least 3 days after stopping stimulant prior to discharge

Infectious Disease: see INFECTIOUS DISEASE PROTOCOL
☐ FBC with differential ☐ CRP ☐ chest x-ray ☐ urinalysis with gram stain
☐ Negative sepsis evaluation: 48 hours ☐ Pneumonia/Sepsis: 1 week
☐ Gram Positive meningitis: 2 weeks ☐ Gram-negative meningitis: 3 weeks
☐ Ampicillin Dose _____ ☐ Stop ampicillin
☐ Gentamicin Dose _____ ☐ Stop gentamicin
☐ Other (cefotaxime, ceftriaxone, NVP)_____ ☐ Stop:_____

Feeding and Nutrition: See NUTRITION AND HYDRATION PROTOCOL
Total Fluids (☐IV +☐ Enteral) _____ ml/kg/day, IV _____ml/day
Maintenance IV Fluids _____ ml/hour ☐ Stop IV Fluids ☐Remove IV catheter
☐ D10% ☐ D10%¼ LR ☐ D10%¼NS ☐D12.5% ¼ LR
Enteral Nutrition ☐ NPO ☐ ad lib PO ☐ _____ ml every: ☐ 3 h ☐ ____ h
Milk: ☐Breast milk ☐ Artificial milk (**only** if breast milk not available) ☐ oral ☐ Nasogastric tube
Calories ☐ Standard (20 kcal/30 mL) ☐ 24 kcal/30 mL ☐ 26 kcal/30 mL (reduce to 20 kcal/ 30 ml pre-discharge)

Glucose: If blood glucose <45 mg/dL (2.5 mmol/L) **See HYPOGLYCEMIA PROTOCOL**
☐ D10% bolus, 2 mL/kg = _____ml and check blood glucose after 30min. ☐ repeat D10% bolus _____ mL (if needed)
☐ Repeat blood glucose after _____ h (Refer to protocol)

Hyperbilirubinemia/Jaundice: See HYPERBILIRUBINEMIA PROTOCOL
☐ Bilirubin, total and direct ☐ Blood type and Rh status ☐ Start phototherapy ☐ Stop phototherapy

Additional Orders ☐ _____
☐ _____
☐ _____

MD Name: _____ Signature: _____
Nurse Name: _____ Signature: _____

LABORATORY RESULTS

DATE	FBC	CRP	LUMBAR PUNCTURE	BILIRUBIN (Total & Direct)	OTHER

Today's date _____ MR #_____	Day of life _____	Post Menstrual Age (DOL +GA) _____	Current weight _____G	24hr change
Name _____	Gender M / F	Gestational age (GA) _____	Birth weight _____G	↑ / ↓ _____G

Documentation symbols	time	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	**Comments**	**Initials**
BP (mmHg) -- prn	220																										
Systolic: V Diastolic: Λ	210																										
	200																										
Pulse (beats/m): ◯	190																										
	180																										
Resp (breaths / m): ☐	170																										
	160																										
Temperature (˚C): △	150																										
Normal vital signs	Temp 140																										
Pulse	40 - 130																										
Term 80-160/min	120																									**Family education topics discussed**	**Initials**
Preterm 100-160/ min	39 - 110																										
	100																										
Respirations	38 - 90																										
Breaths x 30-60/min	80																										
	37 - 70																										
Temperature	60																										
Axillary 36.5-37.5˚C	36 - 50																									**Social assessment**	
	40																									Social worker referral needed?	
O2 saturation	35 - 30																									Y / N	
Room Air 90-100%	20																									Social needs assessment done?	
Oxygen 90-95%	34 - 10																									Y / N	
Respiratory	SPO2 (%)																									**O2 source:** T=tank W=wall	
	O2 flow rate (L/m)																									RA=room air C=concentrator	
	O2 source																									**O2 delivery:** NC=nasal cannula	
	O2 delivery device																									M=mask C=CPAP N=nebulizer	
	CPAP pressure (cmH20)																									**Thermoregulation:** K=KMC B=Bed	
Temp	Thermoregulation																									H=held I=incubator W=warmer	
	Set temp/ Air or Skin mode																									A=Air mode S=Skin mode	
	Phototherapy																									**Phototherapy:** Y=yes N=no	
	Glucose (mmol/dl) or (g/dl)																									**IV Fluid Type:** G5W G10W Blood	
Intake	IV Fluid type																									G10 1/4RL NS Other_____	
	IV rate (ml/hr)																									**Nutrition Method:** √=breastfed	
	Nutrition method																									NG C=cup S=syringe NPO	
	Nutrition type																									**Type:** B=breastmilk A=Artificial	
	PO/NGintake(√or ml)																									24=24kcal/oz 26=26kcal/oz	
	Intake Totals																									**24 hr total intake =**	
Output	Urine																									Urine: √ = normal C=concentrated	
	Stool																									Stool: √ = normal L=loose B=blood	
	Vomitus																									Vomitus: √ = yes	
	Output Totals																									**24 hr total output =**	
Nurse initials																										* = abnormal, see note	

Nrs name_____	Nrs name_____	Nrs name_____
Shift D / N	Shift D / N	Shift D / N

Neonatal Nursing Flowseet Version 19.3.15

	Time	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Neonatal/Infant Pain Scale (NIPS)	Face																								
	Cry																								
	Breathing																								
	Arms																								
	Legs																								
	State of Arousal																								
	Total																								
	Intervention																								
Neuro	Fontanelle																								
	Suck																								
	Muscle Tone																								
	Level of consc.																								
Cardiac	Color																								
	Skin temp																								
	Cap. Refill																								
Resp	Signs																								
	Breath sounds																								
	Interventions																								
GI	Bowel Sounds																								
	Abdomen																								
	NGT																								
Skin	Color																								
	Turgor																								
	Integrity																								
IV	IV location																								
	Appearance																								
	Device/Patency																								
Nurse Initials																									

Neonatal/Infant Pain Scale (NIPS)			
Behavior	0	1	2
Face	relaxed	contracted	
Cry	none	moaning	vigorous
Breathing	relaxed	change in breathing	
Arms	relaxed	tense	
Legs	relaxed	tense	
Arousal	calm	uncomfortable	

If ≥4, need pain intervention

Intervention

F=feed W=wrap G-glucose water

M=meds H=hold * = see note

Neuro	Cardiac	Resp	GI	Skin	IV
Fontanelle	Color	Signs A=apnea	Bowel sounds	Color	Location
S=sunken F=full	P=pale	NF=flaring R=retracting	↑=hyper ↓=hypo	A=acrocyanosis J=jaundiced	R=right L=left
B=bulging	C=cyanotic	C=coughing S=secretions	Θ = absent	Turgor	A=arm H=hand
Suck/ tone	Skin temp	G=grunting P=gasping	Abdomen	↓-poor	S=scalp F=foot
↓= poor Θ = absent	C=cool	Breath sounds	D=distended R=rigid	Integrity	Appearance
Level of consciousness	Capillary refill	W=wet ↓=decreased	NGT	W-wound R-rash	R=red S=swollen
I=irritable S=sleep	number of seconds	Interventions O=oxygen	I=inserted DC=discontinued	Δ=drsg changed	IV device/patency
U=unresponsive		BS= bulb suction C=CPAP	C=check placement	Location	O = occluded IV
C=convulsions		NP= nasopharyngeal suction	Nares	L=left R=right	I-infiltrated
		BVM = bagged	R=right L-left	A=all	DC=discontinued

√ = normal *=see note

Standardized Nursing Care Plan for Neonates

Patient name_____ DOB ___/___/____

Instructions: Review and update each shift. Initial and date at bottom of page 2. Complete new care plan weekly.

Date	Nursing diagnosis (√)	Assessment	Desired Objective (√) **refer to National Neonatal Care Protocol for details*	Plan and implementation (√) **refer to National Neonatal Care Protocol for details*	Evaluation (√)
	☐ **1.** Ineffective thermoregulation related to: ☐ Prematurity ☐ Sepsis ☐ Hypothermia ☐ Hyperthermia ☐ Other_____	☐ *See daily nurse flowsheet	☐ Temperature maintained 36.5 – 37.5C ☐ Maintain stable temperature by KMC ☐ Other_____	☐ Monitor temperature per protocol ☐ Encourage and support KMC ☐ External heat sources (incubator/ radiant warmer) utilized as indicated ☐ Other_____	☐ Ongoing ☐ Resolved
	☐ **2.**Alteration in respiratory status related to: ☐ Respiratory distress syndrome (RDS) ☐ Pneumonia ☐ Sepsis ☐ Apnea of prematurity ☐ Other_____	☐ *See daily nurse flowsheet	☐ Oxygen saturation within goal parameters in room air ☐ Symptoms of respiratory distress resolved ☐ Apnea of prematurity resolved ☐ Other_____	☐ Monitor respiratory status ☐ Administer oxygen via prescribed oxygen delivery device ☐ Administer aminophylline/caffeine as prescribed ☐ Other_____	☐ Ongoing ☐ Resolved
	☐ **3.**Alteration in cardiovascular status related to: ☐ Patent ductus arteriosus (PDA) ☐ Poor perfusion ☐ Anemia ☐ Other_____	☐ *See daily nurse flowsheet	☐ Adequate perfusion ☐ No evidence PDA ☐ Stable hemoglobin ☐ Other_____	☐ Monitor vital signs and physical exam ☐ Administer volume or blood transfusion for poor perfusion or anemia as prescribed ☐ Administer ibuprofen for PDA as prescribed ☐ Monitor laboratory studies as prescribed ☐ Other_____	☐ Ongoing ☐ Resolved
	☐ **4.** Alteration in nutritional status related to: ☐ Premature infant ☐ IUGR/ malnutrition ☐ Unable to feed due to clinical status ☐ Other_____	☐ *See daily nurse flowsheet	☐ Full nutrition by breast feeding ☐ Adequate weight gain o Return to birth weight by 2 weeks o Sustained weight gain of 15 g/kg/day ☐ Other_____	☐ Monitor input & output on flow sheet ☐ Daily weights ☐ Encourage and support mothers with breast feeding ☐ Follow feeding algorithms as prescribed ☐ Administer IV Fluids as prescribed ☐ Monitor electrolytes as prescribed ☐ Enhance calories as prescribed ☐ Other_____	☐ Ongoing ☐ Resolved
	☐ **5.** Alteration in glucose related to: ☐ Prematurity ☐ Seisures ☐ Sepsis ☐ Others _____	☐ *See daily nurse flowsheet	☐ Normal glucose values ☐ Other_____	☐ Monitor glucose values as per protocol ☐ Administer glucose bolus and IV fluids as prescribed ☐ Other_____	☐ Ongoing ☐ Resolved
	☐ **6.** Jaundice	☐ *See daily nurse flowsheet	☐ Bilirubin levels in acceptable range	☐ Monitor bilirubin levels as prescribed ☐ Maximize phototherapy per protocol ☐ Other_____	☐ Ongoing ☐ Resolved

This nursing care plan is to be used in conjunction with the National Neonatal Care Protocol. Please refer to this protocol for specific instructions on conditions, assessment, and recommended plan of care. Feeding algorithms and medication references are located in the protocol.

Date	Nursing assessment and diagnosis	Assessment	Desired outcome	Plan and implementation (√)	Evaluation
	☐ **7**. Alteration in infectious status (including potential for infection) related to: o Evaluation for risk factors o Sepsis o Pneumonia o Meningitis o Other_____	☐ *See daily nurse flowsheet	☐ No evidence of infection ☐ Other_____	☐ Monitor vital signs and physical exam ☐ Administer antibiotics as prescribed ☐ Obtain prescribed lab work ☐ Adhere to infection control standards ☐ Other_____	☐ Ongoing ☐ Resolved
	☐ **8.** Alteration Neurologic Status related to: o Asphyxia/HIE o Seizures o Meningitis o Other_____	☐ *See daily nurse flowsheet	☐ Stable neurologic exam ☐ No evidence seizure activity ☐ Other_____	☐ Monitor neurological exam ☐ Monitor for seizure activity ☐ Administer anticonvulsant as prescribed ☐ Optimize supportive care as per protocol ☐ Administer antibiotics as prescribed ☐ Obtain laboratory studies as prescribed ☐ Other_____	☐ Ongoing ☐ Resolved
	☐ **9.** Impaired Comfort related to: o Pain related to disease process o Procedural pain	☐ *See daily nurse flowsheet	☐ No evidence of discomfort ☐ Other_____	☐ Pain assessments completed using developmentally appropriate tool (NIPS) ☐ Interventions to promote comfort initiated for evidence of pain ☐ Reassess for effectiveness of interventions ☐ Other_____	☐ Ongoing ☐ Resolved
	☐ **10.** Alteration in parent/ infant attachment	☐ *See daily nurse flowsheet	☐ Parent/ infant bonding achieved: o KMC and breast feeding achieved o Providing cares o Appropriate engaging with infant ☐ Other_____	☐ Educate family on infants condition and plan of care daily and with any changes ☐ Promote breast feeding and KMC ☐ Support parents in providing cares ☐ Other_____	☐ Ongoing ☐ Resolved
	☐ **11.** Discharge Preparation	☐ *See daily nurse flowsheet	☐ Parent prepared for discharge ☐ Appropriate follow up arranged ☐ Other_____	☐ Educate family on discharge instructions including thermoregulation, feeding, when to return for follow-up, danger signs and any medications ☐ Other_____	☐ Ongoing ☐ Completed

	Shift / **Date**							
	Day							
	Night							

Nurse should review care plan each shift and update. Initial for each shift once completed.

This nursing care plan is to be used in conjunction with the National Neonatal Care Protocol. Please refer to this protocol for specific instructions on conditions, assessment, and recommended plan of care. Feeding algorithms and medication references are located in the protocol.

Neonatal Medication sheet

Patient's name												Weight for calculations = BW until current weight > BW							
Diagnosis						Gestational age						After current weight>BW, weight for calculations = current weight							
Dosing weight / PMA		Kg		wks		Kg		wks		Kg		wks		Kg		wks		Kg		wks	
Medication name and dose																					
Route	Frequency																				
Start date	Stop date																				
Times																					
Dates		Administered by(initials)				Administered by (initials)				Administered by (initials)				Administered by (initials)				Administered by(initials)			

Printed name	initials	Printed name	initials	Printed name	initals

NEONATAL CARE UNIT – MEDICAL CHART | HOSPITAL DISCHARGE FORM

Patient Name _____ **Date :** ____ /____ /____

Medical Record Number_____

DISCHARGE CRITERIA : All requirements must be fulfilled and recorded

- ☐ Complete enteral nutrition : Breastfeed ≥ 8 times a day or feeding well on demand per protocol
- ☐ No antibiotics and no concerns for infection
- ☐ Frequent urine and stool per day
- ☐ No contraindications to discharge (Danger signs : hypothermia, fever, respiratory distress, RR>70, inadequate oral feeding, jaundice, vomiting, diarhea, or seizures)
- ☐ Teaching materials offered to the family

If < 2 kg :

- ☐ No apnea for 3 days after stopping caffeine or aminophylline treatment
- ☐ Weight gain for past 3 days of ≥ 15g/ day
- ☐ Able to maintain temperature with KMC
- ☐ Prescribe Vitamin D/multivitamin if available
- ☐ Prescribe iron
  No anemia: 2 mg elemental Fe/kg/day
  Anemia : 4 mg elemental Fe/kg/day

If mother is HIV+:

- ☐ Enroll in Combined Clinic/EMTCT
- ☐ Date of appointment in EMTCT ___/___/___
- ☐ NVP _____ mL oral once a day
- ☐ AZT _____ mL oral twice a day
- ☐ Community Health Workers informed at time of discharge

Documentation

☐ Hospital Discharge Form ☐ Note recorded in patient book

DISCHARGE ORDER: ☑ **= ordered** ☐ **= not ordered**

☐ **Discharge home** ☐ **Transferred to maternity**

☐ **Follow-up Appointment** (within 1 weeks) : ____/_____/____ Location:_____
Reason:: _____

☐ **Transfer the infant to referral hospital** Hospital: _____
Reason: _____

☐ **Died:** Reason _____

MD Name: _____ Signature: _____

Nurse Name: _____ Signature: _____

Appendix 14. Neonatal transfer form

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Neonatal Transfer Form

Patient Identification	**Facility details**
Name of baby: ……..……..	Place of birth: Home Private facility on the way Public facility Other (specify)……
Sex: M F UnK; DOB: ____/___/____ GA: ____ weeks	Reason for transfer: ……
BWt: ___ gr Current Weight: ____gr; Current age (DoL):___days;	……
Name of mother: ……	Mode of transport: Ambulance Other: ……..
Mother's age:---------(years) Mother/Caregiver Phone:……	Type of transfer: Emergency Not-emergency

Maternal History	
Mother is alive: Yes No UnK	Blood Group:…… Rh:……..... UnK
Grav-Parity: G____ P____	HIV status: Eligible Non-eligible……. UnK
Type of pregnancy: Singleton Twin Other UnK	**If Eligible**
ANC Screening: Toxo Rubella Syphilis Hep B & C U/S Other:……	Regimen…….. UnK
	Recent VL:…….. UnK
Pathologies during pregnancy:	CD4 count:…….. UnK
Anemia Pre/eclampsia TB Diabetes Asthma	Opportunistic Infections:…… UnK
Infections; Others:……	Tetanus Vaccines: number of doses ……
Treatment during pregnancy:……	Maternal illicit drug history: ……

Labor Details		**Risk factors for Sepsis**
ROM date/time:__/___/___, __: ___am/pm UnK	Mode of delivery: SVD Vacuum Elective CS Emergency CS	PROM
AF quality: Clear Meconium stained UnK	Labor complications: PPH Praevia Abruption Fetal distress	Maternal fever
AF quantity: Adequate Oligo Polyhydramnios UnK	Other……..	Prematurity
Fever: Prior During After delivery NA	Maternal Anesthesia: Sedation Other..……	Maternal infection
Steroid doses: 1 2 3 4 UnK NA	Maternal antibiotics: Yes No UnK	Born on the way/home
Last dose steroid (date and time): __/__/__, __: ___am/pm UnK	Other drugs: : Yes No UnK	Others:……
MgSO4 (date and time): __/____/_____, ___: ____am/pm UnK		……

Neonatal History	**Drugs**
Resuscitation at birth Yes No UnK	Allergies: *Yes* No UnK
if Yes: Stimulation Suctioning BMV Oxygen Intubation Chest compressions	Immunization: *Yes* No UnK
	if yes, cite them: ……....
APGAR: 1 min…… UnK; 5 min…… UnK; 10 min…… UnK	……
	Vitamin K: *Yes* No UnK
HIE: Yes No UnK;	Tetracycline eye ointment: *Yes* No UnK
HIE GRADE: Mild Moderate Severe	Surfactant: *Yes* No UnK

Chief Complaint

Details:…… …….. …….. Clinical adverse events during the last 24 hrs: Yes No *Unk*	Clinical condition of neonate prior to transfer: SpO2: Preductal (right arm): …% Postductal (foot): ….% Temp: ……^{o}C HR: …… RR: …… BP: …… Neurological status: Active Lethargic Unresponsive Seizures	**List of diagnoses/Problems** 1)…… 2)…… 3)…… 4)……

Neonatal management at the Referring Facility

Airway & Breathing	***Circulation***	***Lines Inserted***	***Infectious***
Respiratory support: None Low flow O2 HFT CPAP Mechanical Ventilation Ventilation Settings:…… UnK Blood Gas Analysis:	IV Fluid vol: ……ml/kg/day Passed urine Yes No UnK Inotropes: No UnK Yes: Specify:…… …… ……	Peripheral IV: Yes No UnK Central IV: Yes No UnK Intraosseous line: Yes No UnK	Antibiotics given: Name: ……. Doses: …… Durations: …… Name: ……. Doses: …… Durations: ……. ARVs: Yes No NA
	Feeding/GIT	***Latest Laboratory Results***	***Imaging results***
Neurology	NPO Yes No If No: Last feed: __: __am/pm UnK; Feed vol …… ml/…hrs Type: Breastmilk Other…… Passed stool Yes No UnK Nasogastric tube Yes No	Glucose: …… FBC: WBC ……Neutr……(%) HB……Plts …… CRP: …… Bili:Total…… Direct …… U&E: …….. …… Cultures:…… Urine : …… LP……	No Yes *if yes, results:*----- --------- …… …… …… …… ***Patient records attached*** Imaging report Yes No Lab reports Yes No
Pain/Sedation drugs:			

Summary of clinical management at the referring facility:……..
……
……

Names of referring health care provider: ---------- **Qualification:----------**

Date:…./…../……. Time:---------- Phone: ---------- Signature and stamp:

REFERRAL FEEDBACK

Patient name: ……..Sex: ……. Age (DOB): ……..
Date of Admission or patient seen at receiving facility: …./…./… Date of Discharge: ……./…../……
Final Diagnosis: ……
Treatment at the receiving facility: ……
Outcome: stabilized/Cured ◯ Died ◯ Escaped ◯ To be followed up ◯ Referred to high level ◯

COUNTER-REFERRAL

Recommendations (follow up care): ……
……
Refer back to: Name of facility: …… Contact person: ……

Names of health care provider: …… Qualification: ……
Date:…../..../….. Time:……(am/pm) Phone:…….. Signature and stamp:

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PATIENT MONITORING TRANSFER FORM

Patient Name: ……...……Age (DOB): ……/..…/…… Sex: ……..
Name of caregiver: …….. Telephone: ……. Date of transfer: ……/…../……..
District: ……Sector……. Cell: ……Village: ……
Name of referring facility:…… …….. Time of departure from referring facility: ……(am/pm)

Monitoring of patient during transportation (if applicable):
Vital Signs:

Time (am/pm)	BP	T°	SpO2	RR	Pulse	*If women in labor*	
						FHR	Membranes ruptured (yes/no)

Problems during transportation

#	**Problem**	**Management**
1		
2		

Name of receiving facility:……Time of arrival at receiving facility:..……..(am/pm)
Name of health care provider in ambulance: ……Qualification: ……
Date:…../…../….Time:…… …(am/pm) Phone: ……..... Signature ……
Name of health care provider receiving the patient:
……..
Qualification:……Date:…../……/…….Time:…… ……(am/pm)
Phone:
……..Signature……
…….

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