NATIONAL GUIDELINES FOR NEWBORN CARE

VOLUME III

- Anaemia in neonates
- Bleeding neonate
- Neonatal shock
- Communication in newborn care
- Emergency triage assessment and treatment (ETAT)
- Neonatal transport
- Developmental care in the neonatal unit
- Procedures in newborn care
- Newborn care in the field setting

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Family Health Bureau

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STATEMENT OF INTENT

The main purpose of these guidelines is to improve the quality of clinical care provided by the health care providers at all levels. These parameters of practice should be considered recommendations only. The ultimate judgment regarding a particular clinical procedure or a treatment plan must be made by the clinician in light of the clinical data gathered from the patient and the diagnosis and treatment options available.

Designed by Ajith Kumara Jayamanne

Preface

Sri Lanka has a vision to have no preventable deaths of mothers, foetuses and newborns, where every pregnancy is planned and wanted, every birth celebrated, and women, babies and children survive, thrive and reach their full potential as per the Maternal and Newborn Health Strategic Plan 2017-2025. For the country to ensure reaching the set vision, goals and objectives evidence based updated guidelines for the use of staff caring for new-borns are essential.

This set of guidelines is updated based on the current updated global evidence in place. As per the previous National Guidelines for Newborn Care 2014, greater emphasis is on improving the quality of neonatal care services in the country with a view of further reducing neonatal morbidity and mortality in Sri Lanka. This is an attempt to improve the quality and uniformity of clinical care with efficiency, cost effectiveness and accountability.

We highly appreciate the contribution made by the Consultant Neonatologists and Consultant Paediatricians from the Sri Lanka College of Paediatricians and Consultant Community Physicians of the Family Health Bureau in updating, adopting and developing these guidelines. Further these guidelines are developed as per national policies, strategies and standards and considering the facilities and resources available in the country. As such this set of guidelines are national guidelines for the conditions described and all health care workers are requested to follow the same.

Dr Asela Gunawardena
Director General of Health Services
Ministry of Health
Sri Lanka

2020

Message from the President of Sri Lanka College of Paediatricians

Sri Lanka has set an example to many developing countries and reached a neonatal mortality rate of 6 per 1000 live births in 2015. However, this accounts for over 70% of infant mortality and regional and district disparities are observed. Reduction of mortality and morbidity remain a challenge despite continuous effort of health care staff, even with a lot of effort put into training of human resources and improving infrastructure. Focusing on the neonate specifically in these areas is a priority which remains unchanged. Simple interventions like preconception folic acid, antenatal corticosteroids for preterm delivery, preventing inadvertent oxygen administration and using a pulse oximeter for neonatal resuscitation, delayed cord clamping, delivery onto abdomen of the mother, using plastic bags for preterm babies, preventing hypothermia, simple inflation and ventilation breaths by the midwife or nurse in unexpected situations, passive head cooling for asphyxia, promotion of exclusive breast feeding on demand could be practiced in low resource settings and has a direct link to reduce neonatal mortality and morbidity. Furthermore, advanced newborn care such as treatment of infections, neonatal ventilation, extra care for premature newborns, surgical interventions, therapeutic cooling and NO therapy are performed with the aim of further reducing neonatal mortality and improving the quality of life of newborns.

A team of Consultant Neonatologists, Consultant Paediatricians and Consultant Community Physicians have been working on revising and updating these newborn care guidelines. These guidelines for newborn care will further go a long way to bring uniformity in standards of neonatal care across the country to further improve quality of care. The health care providers all over the country can utilize these guidelines and care for newborns in a uniform manner using the best standards of care.

I express my sincere gratitude towards all who worked hard to revise this document. I am certain that, these guidelines will have a great impact on improving the quality of care and reducing the mortality and morbidity among newborns in Sri Lanka.

Prof Vasantha Devasiri
President
Sri Lanka College of Paediatricians

Acknowledgements

Revising the existing national newborn care guidelines is a timely need in keeping with the new scientific evidence available globally, thus to improve quality survival of newborns via evidence based practices. Sri Lanka aims at reaching the sustainable developmental goals (SDGs) by the year 2030. Preventing all preventable deaths among newborns cannot be achieved without achieving quality of care. Sri Lanka is already on track to achieve the targeted neonatal mortality rate of 2 per 1000 live births in concordance with the SDG targets.

Quality coverage of newborn care provided at all levels is essential to ensure further reduction of neonatal mortality and morbidity. With 99.9% of births occurring in institutions, care given during birth and immediately after, lead to triple investment including reduction of neonatal deaths.

Publishing the updated National Guidelines for Newborn Care 2020 would not have been possible without the commitment and support from many individuals and organizations. We greatly appreciate the administrative support extended by Dr. Susie Perera, Deputy Director General, Public Health Services II, Ministry of Health.

The Family Health Bureau gratefully acknowledges contributions of all the technical experts of the guideline development committee and the Sri Lanka College of Paediatricians for updating the guidelines despite their busy schedules.

We are thankful to the UNICEF country office Sri Lanka for supporting this activity technically and financially.

Electronic version of these guidelines will be available for ease of reference for all health care workers. The heads of health institutions and technical supervisors are expected to ensure availability of this document in all neonatal units, postnatal units and labour rooms for easy access. We hope the updated national newborn care guidelines will help to improve quality of care for our newborns by adhering to the highest standard of care while maintaining uniformity of health services in Sri Lanka so all newborns may survive, thrive and transform to reach their highest growth potential.

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Content

List of Abbreviations

AC	Assist control
ACD	Acid citrate dextrose
ANC	Absolute neutrophil count
AOP	Anaemia of prematurity
ART	Anti retroviral therapy
BNF	British National Formulary
CFL	Compact fluorescent lamp
CNS	Central nervous system
CONS	Coagulase negative staphylococcus
CPAP	Continuous positive airway pressure
CPD	Citrate phosphate dextrose
CRP	C-reactive protein
CRT	Capillary refill time
CSF	Cerebro- spinal fluid
CTG	Cardiotocography
CVP	Central venous pressure
CXR	Chest X –Ray
DAT	Direct antibody test
DCT	Direct Coomb's test
DIC	Disseminated intravascular coagulation
ECMO	Extra Corporeal Membrane Oxygenation
EEG	Electroencephalogram
EOS	Early onset sepsis
EPO	Erythropoietin
ESR	Erythrocyte sedimentation rate
FBC	Full blood count
FFP	Fresh frozen plasma
FiO2	Fraction of inspired oxygen
G6PD	Glucose 6 phosphate dehydrogenase
GBS	Group B Streptococci
HFOV	High frequency oscillatory ventilation
HIE	Hypoxic ischaemic encephalopathy
IC	Intercostal
IEM	Inborn-errors of metabolism
IL	Interleukin
INR	International normalised ratio
ITR	Immature neutrophils / Total neutrophils ratio

IV	Intra venous
IVIG	Intravenous Immunoglobulin
LED	Light emitting diode
LOS	Late onset sepsis
LP	Lumbar puncture
MAS	Meconium aspiration syndrome
MRSA	Methicillin resistant Staphylococcus aureus
MSAF	Meconium stained amniotic fluid
NG	Nasogastric
NICU	Neonatal Intensive Care Unit
NIPPV	Non – invasive positive pressure ventilation
PCO_2	Partial pressure of carbondioxide
PDA	Patent Ductus Arteriousus
PEEP	Positive end-expiratory pressure
PPHN	Persistent pulmonary hypertension of the newborn
PT	Prothombin time
RDS	Respiratory distress syndrome
ROM	Rupture of membranes
SIMV	Synchronised Intermittent positive pressure ventilation
SIPPV	Synchronised intermittent positive airway pressure ventilation
SIR	Systemic Inflammatory Response
SPO2	Percentage of haemoglobin saturated with oxygen
T4	Thyroxine
TCL	Total Leukocyte Count
TGF-β	transforming growth factor-beta
TNF	Tumour Necrosis Factor
TORCH	Toxoplasma, other Rubella, Cytomegalovirus, Herpes, Syphilis
TSB	Total serum bilirubin
TSH	Thyroid stimulating hormone
TTN	Transient Tachypnoea of newborn
US	Ultra sound
UTI	Urinary tract infection
VZIG	Varicella zoster immunoglobulin
WBC	White blood cells
WOB	Work of Breathing
ZIG	Zoster Immunoglobulins

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Introduction

Clinical guidelines are systematically developed statements which assist clinicians in making decisions about appropriate treatment for specific conditions based on the best scientific evidence at the time of development. Guidelines are not intended to limit the clinical freedom. However, clinicians are expected to follow these recommendations as the basis for their decision making. Availability of resources, the existing situations and the expectations of individual families under their care need to be considered by the clinicians.

These guidelines are developed by the group of consultants in the guidelines development committee. The sources of information that were used as references in preparing the guidelines included the UK NICE (National Institute for Clinical Excellence)guidelines, American Academy of Pediatrics guidelines, SDF Facility Based Care for the Sick Newborn manual, Roberton's Text book of Neonatology, WHO recommendations and relevant research papers from peer reviewed journals. The information from these sources were combined with our local expert opinion and knowledge of available technical facilities in the country when formulating the guidelines. The latest available scientific evidence based recommendations have been made as far as possible. The draft guidelines were presented to the wider forum of paediatricians and neonatologists, in order to obtain feedback after which a consensus was arrived at. The guidelines were then presented to the Technical Advisory Committee on Newborn and Child Health of the Ministry of Health and consensus was arrived at with the participation of a multidisciplinary team including medical administrators, provincial health authorities, representatives of the Sri Lanka College of Paediatricians and other relevant professional colleges and national programme managers and senior nursing officers.

Scope

The guidelines are intended to assist all health care professionals at all levels of institutions where newborn care is being provided, in the clinical management of normal and sick newborns

Disclaimer

These guidelines are based on current best available evidence and consensus opinion of the Consultants involved in the development of Guidelines. They are neither intended to replace the process of critical evaluation of every case and nor is it intended to dictate an exclusive course of management or treatment. It must be interpreted with reference to individual patient needs, available resources and limitations unique to the institution and variations in local populations. This guideline on Neonatal Care has been developed based on the best available evidence at the time of preparation. It is the responsibility of the users of the guideline to keep updated with the latest evidence relevant to the management of patients under their care.

ANAEMIA IN NEONATES

Chapter 12

ANAEMIA IN NEONATES

12.1 Introduction

Anaemia is a common finding in preterm babies and is seen less commonly in term babies. Timely diagnosis and appropriate management are essential for optimal growth and development of these young infants. Bleeding in the neonate is an emergency. A variety of disease processes and disorders can exacerbate the physiological haemostatic immaturity present in a newborn and can lead to significant haemorrhage at times.

12.2 Definition

Neonatal anaemia is defined as a haemoglobin (Hb) or haematocrit (Hct) concentration of >2 standard deviations below the mean for postnatal age.

Table 12.1 : Reference haematologic values in term newborns

Age	Hb (g/dl)		Hct (%)		RBC (10^{12}/L)		MCV (fL)		MCH (pg)	
	Mean	-2SD	Mean	-2SD	Mean	-2SD	Mean	-2SD	Mean	-2SD
Cord blood	16.5	13.5	51	42	4.7	3.9	108	98	34	31
1-3 days	18.5	14.5	56	45	5.3	4.0	108	95	34	31
7 days	17.5	13.5	54	42	5.1	3.9	107	88	34	28
14 days	16.5	12.5	51	39	4.9	3.6	105	86	34	28
4 weeks	14.0	10.0	43	31	4.2	3.0	104	85	34	28
8 weeks	11.5	9.0	35	28	3.8	2.7	96	77	30	26
12 weeks	11.5	9.0	35	29	3.8	3.1	91	74	30	25

Hb- haemoglobin; Hct- haematocrit; RBC- red blood cell; MCV-mean corpuscular volume; MCH-mean corpuscular haemoglobin

Courtesy: Roberton's Texbook of Neonatology – 5th Edition, 2013

12.3 Physiological anaemia of infancy

Hb oxygen saturation increases from ~50% to 95%, when infants take their first breath. The normal developmental switch from foetal to adult Hb synthesis replaces high-oxygen-affinity foetal Hb with low-oxygen-affinity adult Hb, which can deliver a greater fraction of Hb-bound oxygen to the tissues. Therefore, after birth, the increase in blood oxygen content and tissue oxygen delivery downregulate erythropoietin (EPO) production so that

erythropoiesis is suppressed. The Hb concentration continues to decrease until tissue oxygen needs are greater than oxygen delivery. The nadir Hct in term infants occurs between 10 and 12 weeks of age and rarely falls to <30% with Hb concentrations of 10-12 g/ dL . As hypoxia is detected by renal or hepatic oxygen sensors, EPO production increases and erythropoiesis resumes. In the term newborn the supply of iron is sufficient for Hb synthesis, even in the absence of dietary intake, until ~20 weeks of age. After 10-12 weeks, the Hct and Hb increase slowly to reach adult values by 2 years of age. Physiologic anaemia in healthy term infants is essentially benign, they remain asymptomatic, and no treatment is necessary.

12.4 Anaemia of prematurity

Anaemia of prematurity (AOP) is an exaggeration of the normal physiologic anaemia and is defined as: anaemia in a preterm infant <32 weeks of gestation; inappropriately low reticulocyte count for severity of anaemia; and inappropriately low circulating erythropoietin (EPO) concentration for the degree of anaemia. Premature babies (1200-2500 g) reach the nadir earlier (5-10 vs 6-12 weeks) and at lower Hb (8-10 vs 9.5-11 g/dL) or Hct (28 vs >30%) levels compared to term newborns; small premature babies (<1200 g) display even more rapid and more severe anaemia (nadir at 4-8 weeks, Hb 6.5-9 g/dL, Hct 21%).

Endogenous factors include low circulating EPO concentrations causing decreased production, increased clearance and high volume of distribution as well as high growth rates whereas exogenous factors include repeated blood sampling, iron or other nutritional deficiencies, inflammation, infections, and chronic illness.

Table 12.2: Reference haemoglobin (Hb) values in preterm newborns

Age (weeks)	Hb according to birth weight	
	1000-1500g	1501-2000g
2	16.3 (11.7-18.4)	16.8 (11.8-19.6)
4	10.9 (8.7-15.2)	11.5 (8.2-15)
8	8.8 (7.1-11.5)	9.4 (8.0-11.4)
12	9.8 (8.9-11.2)	10.2 (9.3-11.8)
16	11.3 (9.1-13.1)	11.3 (9.1-13.1)

12.5 Causes of anaemia

1. Blood loss
2. Haemolysis
3. Diminished RBC production (rare)

12.5.1 Blood loss

- **Iatrogenic – excessive blood sampling (commonest cause)**
- Obstetric causes – Antepartum haemorrhage, umbilical cord rupture
- Occult blood loss – Feto-placental bleeding, feto-maternal bleeding, twin to twin transfusion.
- Neonatal bleeding – cephalohaematoma, intracranial bleed, bleeding from umbilicus, gastrointestinal bleeding, mucosal bleeding, adrenal haemorrhage and ruptured liver or spleen.

Minimise phlebotomy to prevent anaemia

12.5.2 Haemolysis

Hereditary red blood cell disorders

- Disorders of the RBC membrane (spherocytosis, elliptocytosis, etc.)
- RBC enzyme defects (G6PD deficiency, pyruvate kinase deficiency, etc.)
- Hemoglobinopathies (α and β thalassaemia and chain structural abnormalities)

Immune

- ABO incompatibility
- Rh incompatibility
- Minor blood group incompatibility
- Maternal autoimmune diseases (lupus, haemolytic anaemia, etc.)
- Drug-induced haemolytic anaemia

Acquired

- Infections
- Disseminated intravascular coagulation
- Micro- or macroangiopathic anaemia (renal artery stenosis, cavernous haemangioma)
- Nutritional anaemias (vitamin E deficiency)

12.5.3 Decreased RBC production

- Physiologic anaemia of infancy
- Anaemia of prematurity
- Diamond Blackfan anaemia
- Congenital leukaemia or tumour
- Down syndrome
- Pearson syndrome
- Osteopetrosis
- Congenital infections (rubella, parvovirus B19, cytomegalovirus, adenovirus)
- Drugs

12.6 Diagnostic approach to a newborn with anaemia

Identify the underlying cause by taking a detailed history, including family and obstetric history and examining the baby.

Examine for signs of :

- chronic anaemia - pallor, poor weight gain,
- acute anaemia - tachycardia, cardiac failure, respiratory distress
- malformations, where anaemia is part of the disease
- haemolysis (jaundice, splenomegaly, cephalohaematoma, anasarca

Laboratory Tests

1. Complete blood count, reticulocyte count and peripheral smear
2. Coombs test

3. Bilirubin level
4. Ultrasound of the abdomen and head is usually diagnostic in suspected cases of retroperitoneal, adrenal or intracranial haemorrhage

Importance of reticulocyte count: Once anaemia is detected, the reticulocyte count provides a further clue to diagnosis. Normal reticulocyte count is about 3% - 7% of the total RBC count.

High reticulocyte count points towards a haemolytic cause like hereditary spherocytosis, ABO incompatibility or G6PD deficiency.

Low reticulocyte count indicates decreased RBC production or hypoplastic anaemia.

A normal reticulocyte count warrants a peripheral smear for type of anaemia. A normocytic picture on smear suggests an acute blood loss or infections, whereas a microcytic picture indicates a chronic loss or an iatrogenic cause.

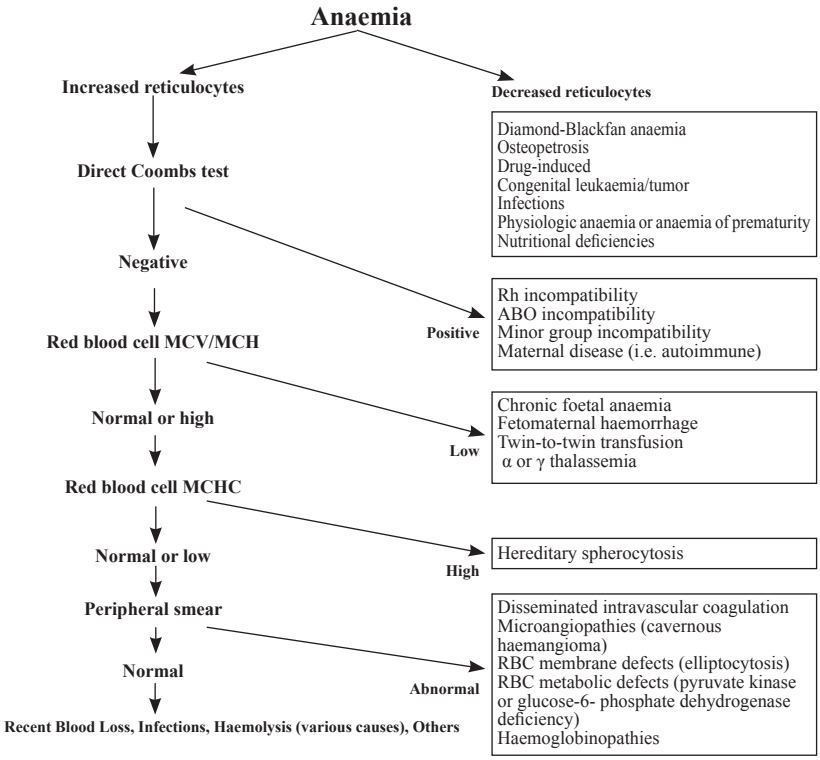

Figure 12.1 : Diagnostic approach to anaemia in neonates

12.7 Management of anaemia of prematurity

- Iron supplements are prophylactically started for preterm infants (<37 weeks gestation) and low birth weight babies at the age of 2 weeks (Annexure 1).
- Elemental iron is given at 6mg/kg/day as treatment in babies who are already anaemic or as prophylaxis at 3mg/kg/day for those who are not anaemic yet.
- Adequate amount of vitamin E, vitamin B12 and folic acid are also important and are administered as multivitamin and folic acid supplements soon after birth.

Table 12.3 Supplementation to prevent anaemia of prematurity

Supplements	Doses	Preparations
Iron	Elemental iron 2-4mg/kg/day for prophylaxis 6mg/kg/day - treatment	1ml=30drops=50mg (Orofer / Mumfer) 1ml=25mg (Iberol)
Folic acid	Requirement is 50mcg/day Given as ½ tablet (500mcg) weekly	1mg tablet
Multivitamin supplements preferably with zinc	0.3ml/kg/day - if 0.6ml has 40 mg of vitamin C 0.5ml/kg/day – if 1ml has 40mg of vitamin C (maximum 0.6ml/day)	MVT* drops preferably with zinc

*MVT- Multi-vitamins

- **Blood transfusions should be avoided as much as possible** as it inhibits the baby's erythropoiesis as well as increases the risk of late onset necrotising enterocolitis in stable growing preterms in addition to other infectious, haematologic, immunologic and metabolic complications including increased donor exposure. Discharge from the unit is not an indication to transfuse a baby if there are no clinical indications. Research support restrictive transfusion policies compared to liberal transfusion policies. Thresholds are shown in table 12.4.
- **Blood transfusions are indicated to improve tissue oxygenation with lower cardiac output in babies who need respiratory support, in those who have an oxygen requirement and those who have poor growth, lethargy or apnoea due to anaemia.**

- A high reticulocyte count in the face a low haemoglobin indicates that the baby is having active erythropoiesis to correct the anaemia whereas a low reticulocyte count indicates a marrow suppression even in the face of low haemoglobin.
- Expect decline in Hb levels in premature infants.
- Periodic measurement of Hb levels and reticulocyte count.

Avoid blood transfusion unless clinically indicated
Do not transfuse based on Hb level alone

Table 12.4 British Committee for Standards in Haematology (2016) for <32 week preterm transfusions

Postnatal age	Suggested transfusion threshold Hb (g/dL)		
	Ventilated	On oxygen/ CPAP	Off oxygen
First 24 hours	<12	<12	<10
≤Week 1 (days 1–7)	<12	<10	<10
Week 2 (days 8–14)	<10	<9.5	<7.5depending on clinical situation
≥Week 3 (day 15 onwards)		<8.5	

12.8 Blood transfusion

There is little evidence regarding appropriate thresholds for > 32 week preterm babies and term babies and the British Society of Haematology states that clinicians may consider similar thresholds to those used for preterm babies off oxygen.

12.8.1 Choosing the blood group for transfusion

- In case of Rh incompatibility, the first choice is Rh-ve blood of the baby's ABO group. If this is not available, O-ve blood may be used.
- In case of ABO incompatibility, the first choice is O cells suspended in AB plasma or type O blood that is same Rh type of infant or O-ve blood.
- In case of no incompatibility, blood should be newborn's ABO and Rh group.

In all cases (below three months), the blood to be transfused should be cross matched with maternal serum.

For anaemia, it is preferable to give packed RBC transfusion over whole blood transfusion except when there is acute blood loss.

12.8.2 Quantity to be transfused

- Commonly, 10ml/kg over 2 hours which raises the Hb level by about 2.0 g/dl.
- Maximum transfusion is 20ml/kg which can be given over 4 hours.

Ensure safe transfusion: While giving transfusion, one should follow and ensure certain principles of safe transfusion

Before transfusion check,

a) Blood Bag number
b) Date of donation – Blood should not be more than 7 days old
c) Name on Medical Record / registration number of patient,
d) Blood group of baby and mother

- Routine administration of diuretic e.g. furosemide is not recommended. Furosemide 1 mg/kg IV can be given during transfusion in patients with impending heart failure.
- Baby's vitals should be monitored during and after blood transfusion (at least for 2 hours).
- If an untoward transfusion reaction like haemodynamic instability with tachycardia, desaturation, rash or shock is observed, the transfusion should be immediately stopped and baby managed accordingly. Send bag with blood set, post transfusion sample & completed reaction form to blood bank.

12.9 Prevention of anaemia in neonates

1. Minimise phlebotomy
2. Delayed cord clamping for at least 1 minute where resuscitation is not required in both term and preterm babies

3. Ensure preterm and low birthweight babies receive iron supplements from 2 weeks of age

Erythropoietin is not recommended to reduce transfusion due to increase in adverse effects like retinopathy of prematurity.

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BLEEDING NEONATE

Chapter 13

BLEEDING NEONATE

13.1 Clinical presentation

Baby may present with bleeding at any site

- cephalohaematoma
- intracranial bleed
- bleeding from umbilicus
- gastrointestinal bleeding
- mucosal bleeding
- puncture site bleeding
- adrenal haemorrhage
- ruptured liver or spleen.
- pulmonary haemorrhage

Baby may also present with hypotension and shock.

13.2 Approach to a bleeding neonate

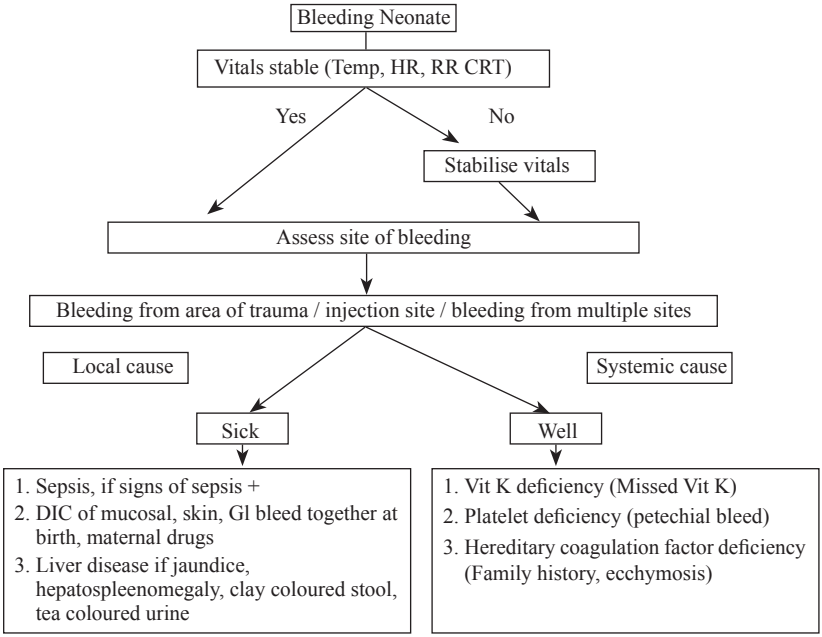

Figure13.1 Approach to a neonate with bleeding

13.3 Investigation of the bleeding baby

First line tests include:

- Platelet count
- APTT
- PT/INR
- TT / fibrinogen
- D dimer (if available)
- Blood picture
- ROTEM/TEG (if available)

The following are considered abnormal (McMillan et al, Paediatrics and Child Health 1998)

- PT > 17s
- INR > 1.5
- APTT > 60s (> 80s on day 1 in pre-terms)
- Platelets < 150 x 10^9/l
- Fibrinogen < 1.5g/l

- Neonates have a different balance of procoagulant and anticoagulant proteins.
- APTT has different postnatal and gestational age-related coagulation ranges in the first months of life.
- Polycythaemia causes apparent prolongation of coagulation times, in particular the prothrombin time (PT).
- Most neonatal coagulopathies are secondary to acquired bleeding disorders.

Table 13.1 Interpretation of laboratory investigations

Abnormality	Cause
Prolonged APTT	Factors XII, IX, XI, VIII Heparin Early DIC
Prolonged INR	Vitamin K deficiency Liver disease Factor VII deficiency Early DIC
Prolonged APTT and INR with low fibrinogen	Vitamin K deficiency Liver disease DIC Prothrombin deficiency (rare)
Normal APTT, INR, platelets, fibrinogen	Factor XIII deficiency Platelet function defect AV malformation Severe neutropenia (umbilical bleeding)

13.4 Coagulation screening

There is no evidence for routine coagulation screening.

Indications for coagulation screening are:

1. Neonates with evidence of bleeding
2. Neonates at high risk of bleeding eg. sepsis or NEC
3. Maternal anticoagulants eg. warfarin

13.5 Treating the bleeding neonate

- Immediate transfusion 20ml/kg RBC O-negative or ABO D-specific 20ml/kg RBC at 5ml/kg/hr
- A ratio of 1 FFP: 2 RBC is recommended in early resuscitation of major haemorrhage (In trauma use 1:1 ratio).
- Use platelets and cryoprecipitate if active bleeding persists after initial resuscitation.
- Maintain ratio of 1:1:1 of plasma: platelet: RBC thereafter.

- Use FFP and platelets early prior to results of coagulation test being available, when there is ongoing bleeding.
- RBC 20ml/kg aliquots (maximum 4 adult units, 1 unit=270ml)), O Rh negative or ABO and Rh –specific (ideally cross matched)
    - 4ml/kg increase Hb by 1g/dl
    - Transfused RBC should be less than 5 days old
- FFP in 20ml/kg aliquots (maximum 4 adult units).
- Platelets in 15-20ml/kg aliquots (maximum 1 adult therapeutic dose = 200ml) to be considered after every 40ml/kg RBC.
- Cryoprecipitate 10ml/kg or 1 unit per 5 kg (maximum 2 pools).
- Repeat these aliquots until bleeding is controlled.
- Modify ratios accordingly once laboratory results are available.
- Therapeutic aims should be Hb >8g/dl, fibrinogen> 1.5g/l, PT/INR <1.5, and platelets > 75 x 10^9/l.
- Monitor for adequacy of resuscitation and circulatory overload.
- Start Tranexamic acid 15mg/kg (maximum 1000mg) intravenously over 10 minutes, as soon as possible within 3 hours of onset of bleeding followed by an infusion of 2mg/kg/h for at least 8 hours or until the bleeding stops. (RCPCH 2012).

Management of massive blood loss

- Active resuscitation
- Early use of FFP, platelets and cryoprecipitate is recommended to reduce coagulopathy and thrombocytopenia
- Early use of tranexamic acid is recommended in trauma
- Avoid hypothermia, hypocalcaemia, acidocis and hypokalaemia
- Always prescribe in millilitres

13.6 Use of blood products

13.6.1 Platelet transfusions

The use of platelet transfusions for neonates with thrombocytopenia and active bleeding is considered appropriate, but there is uncertainty and

practice variation in the wider use of platelet transfusions for prophylaxis in the absence of bleeding. Levels should be rechecked after transfusion.

Table 13.2 Indications for platelet transfusions (BCSH)

Platelet Count (x 10^9/1)	Indication of Platelet transfusion
<25	Neonates with no bleeding (including neonates with NAIT if no bleeding and no family history of ICH
<50	Neonates with bleeding, current coagulopathy, before surgery, or infants with NAIT if previously affected sibling with ICH
<100	Neonates with major bleeding or requiring major surgery (e.g. neurosurgery)

NAIT, neonatal alloimmune thrombocytopenia; ICH, intracranial haemorrhage

13.6.2 Cryoprecipitate and fresh frozen plasma

- There is no evidence to support routine use of FFP to correct abnormalities of coagulation in non-bleeding babies.
- FFP should not be used routinely for prevention of intraventricular haemorrhage or for routine volume replacement

Indications for transfusion of Fresh frozen plasma (FFP)

- Clinically significant bleeding
- Prior to invasive procedures with a significant risk of bleeding
- Suspected purpura fulminans due to protein C and protein S deficiency

- Cryoprecipitate is used in the management of low fibrinogen.

Indications for transfusion of cryoprecipitate

- Major haemorrhage
- Cardiac surgery
- Secondary causes are commoner
  - DIC
  - Liver dysfunction
- Congenital hypofibrinogenaemia/ dysfibrinogenaemia

13.7 Gastrointestinal bleeding

13.7.1 Aetiology

Common:

- Swallowed maternal blood - commonest
- Anal fissure
- Allergic colitis

} baby is well

Uncommon:

- Necrotising enterocolitis
- Infectious colitis eg: Shigella, Salmonella, E. coli, Yersinia, Clostridium, Campylobacter
- Congenital gut anomalies eg: volvulus, Hirschsprung's, Meckel's diverticulum, intussusception
- Bleeding disorders eg: Vitamin K deficiency bleeding in the newborn, disseminated intravascular coagulation

} baby is unwell

13.7.2 Investigation

- APT test
- FBC
- Abdominal X ray
- Coagulation profile
- CRP
- Blood culture
- Stool culture
- Liver function test

13.7.3 Management

In addition to the above mentioned management of the bleeding neonate

- Surgical referral
- Keep nil oral

- Parenteral nutrition
- Intravenous antibiotics
- Intravenous ranitidine
- Intravenous omeprazole
- Intravenous tranexamic acid
- Octreotide
- Vasopressin

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NEONATAL SHOCK

Chapter 14

NEONATAL SHOCK

14.1 Introduction

A sick neonate may present with shock or it may appear during the course of the disease. The success of management depends on its early diagnosis and prompt and appropriate management.

14.2 Definition

The term shock denotes a clinical state of poor perfusion of the body tissues in which the body demands of oxygen and nutrients are not met. This can result in tissue hypoxia and metabolic acidosis causing irreversible tissue damage.

Shock and hypotension are not synonyms as hypotension is a late sign of shock.

The initial compensated phase

- It is characterised by neuroendocrine compensatory mechanisms with increased tissue oxygen extraction, leading to maintenance of blood pressure (BP) in the normal range.
- The blood flow and oxygen supply to vital organs are maintained at the expense of non-vital organs.
- Tachycardia, prolonged capillary refill time (CRT) and decreased urine output may be seen.

Ischaemic threshold

- Where the blood pressure starts to drop.

The late uncompensated phase

- Characterised by a decrease in vital and non-vital organ perfusion with increase AST/ALT/Creatinine.
- Development of lactic acidosis.
- Cellular disruption with irreversible damage, clinically characterised by multiorgan failure and death.

14.3 Classification of shock (based on pathophysiology)

- **Abnormal vasoregulation is the major contributor to neonatal shock**
- Myocardial dysfunction and persistent pulmonary hypertension are also primary sources of neonatal shock.
- Shock is often complicated by the relative adrenal insufficiency often seen in the premature infant.
- **Hypovolemia is not common in the first few days of life unless there is an acute blood loss.**

Table 14.1: Classification of neonatal shock based on the pathophysiology (Adapted from Advances in the management of neonatal shock, Frontiers In Paediatrics, 2018)

Mechanism for poor tissue perfusion	Types of neonatal shock	Causes of shock
Abnormalities within the vascular beds	Distributive shock	Sepsis, endothelial injury and vasodilators
Defects of the pump	Cardiogenic shock	Congenital heart disease heart failure, arrhythmia, cardiomyopathy and post-cardiac surgery/post-patency of the ductus arteriosus ligation
Inadequate blood volume	Hypovolemic shock	Blood loss from infants or placenta around birth of infants
Flow restriction	Obstructive shock	Cardiac tamponade, pneumothorax, high pulmonary vascular resistance restricting blood flow such as in presistent pulmonary hypertension of the newborn, pulmonary hypertension
Inadequate oxygen-releasing capacity	Dissociative shock	Methemoglobinaemia and severe Anaemia

14.4 Assessment of tissue perfusion

14.4.1 Direct measures

14.4.1.1 Perfusion pressure

- Perfusion pressure is the difference between mean arterial pressure (MAP) and central venous pressure (CVP)

  Perfusion pressure = MAP – CVP

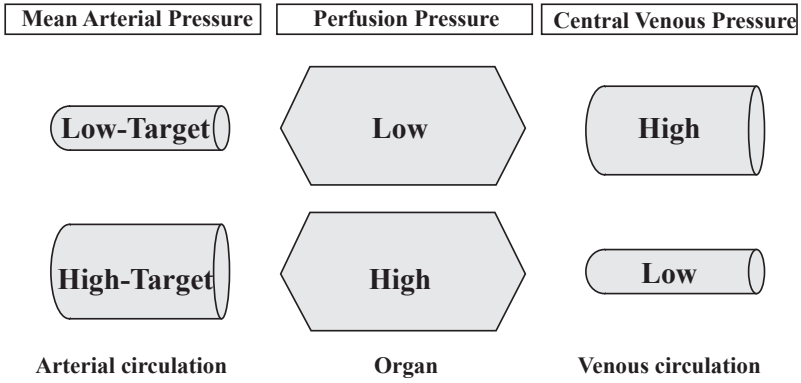


Figure 14.1: Interactions between MAP, CVP, and perfusion pressure
Adapted from Leone et al. Optimising mean arterial pressure in septic shock, 2015

- **Central venous pressure - not feasible to measure due to the invasive nature of the procedure**
  - Requires surgical placement of the catheter tip in the vena cava via umbilical/internal jugular
  - Measures the right ventricular preload.
  - The 'normal' level lies somewhere between zero and + 6mm Hg.
  - CVP is determined by :
    - Volume of intravascular blood within the venous system
      - hypovolaemia – low CVP
      - fluid over load – high CVP

- Function of the cardiac pump
  - congestive heart failure – high CVP
- Pulmonary pressure
  - pulmonary hypertension – high CVP
- Intra-thoracic pressure
  - pneumothorax - high CVP
  - over ventilation of compliant lungs – high CVP

- Mean Arterial Pressure
  - Measured directly by an arterial line or derived from the systolic and diastolic blood pressures
  - Calculation of MAP =
    $$\frac{(2 \times \text{diastolic blood pressure}) + \text{systolic blood pressure}}{3}$$
  - **MAP is considered equal to the gestational age in the first few days of life.**

Perfusion pressure = MAP or slightly lower (CVP is 0 or higher)
MAP < 30 mm Hg - compromises cerebral perfusion in < 1500g babies

14.4.1.2 Blood flow

- Blood flow is a better indicator than BP.
- However, flow measures such as left ventricle (LV) and right ventricle (RV) output may not be accurately depictive of organ blood flow in VLBW infants due to the presence of shunts in the transitional period.
- Superior Vena Cava (SVC) flow may be used as a valid indicator of cerebral blood flow (CBF).
- SVC flow is measured via echocardiography.
- Adequate SVC flow - therapeutic endpoint ACCM guidelines.

Early bedside focused echocardiography
helps to deliver goal oriented time specific interventions

14.4.2 Indirect measures of cardiovascular function

Early findings

- Pallor
- Poor feeding
- Temperature instability
- Tachycardia
- Tachypnoea
- Increased capillary refill time > 3s – exclude hypothermia

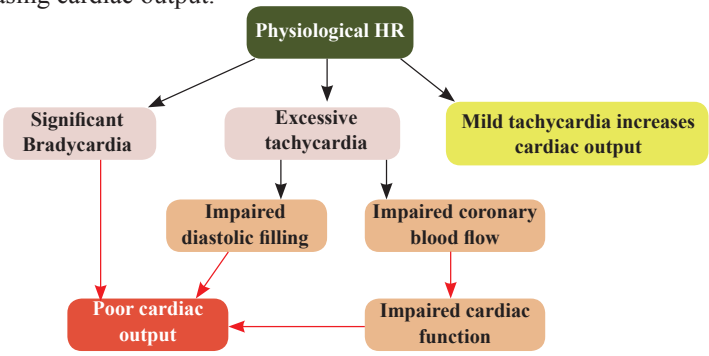
Late findings

- Hypotension
- Weak peripheral pulses
- Acidosis
- Elevated lactate
- Acidotic breathing
- Reduced urine output

A combination of these measures would help in the early identification of shock rather than an individual assessment.

14.4.2.1 Heart rate

Unexplained tachycardia (HR>160/min) may be an early sign of shock. However extreme tachycardia and bradycardia are late signs indicating decreasing cardiac output.



Heart rate (HR), cardiac output (CO)

Figure 14.2: Relationship between HR, cardiac filling and CO (Adapted from Advances in the management of neonatal shock, Frontiers In Paediatrics, 2018)

14.4.2.2 Capillary refilling time (CRT)

- This is the rate at which the capillaries refill following emptying of capillaries by pressure and indicates adequacy of tissue perfusion.
- **Technique:** CRT is checked on the central part of the body such as the chest in a neonate. Gentle pressure is applied by the tip of finger for 5 seconds (e.g. by slowly counting from 1 to 5). This results in blanching of the underlying surface. Observe how fast the blanched area refills and becomes pink after the tip of the finger is lifted from the skin surface.
- **Normal capillary refill time** is 2 seconds or less. A prolonged CRT of more than 2 seconds indicates poor circulation and tissue perfusion. However, this may be falsely prolonged in hypothermic babies.

14.4.3 Septic shock

Inadequate tissue perfusion is due to proven or suspected infection – should be suspected in infants born to mothers with chorioamnionitis or prolonged rupture of membranes.

Newborn septic shock is typically accompanied by acidosis and hypoxia that can lead to an increase in pulmonary resistance and persistence of the patent ductus arteriosus, resulting in persistent foetal circulation which will result in right ventricle failure with right to left shunting at the atrial and ductus arteriosus levels causing cyanosis, hepatomegaly and tricuspid regurgitation.

The clinical diagnosis of septic shock is made in children with both

(1) Suspected infection manifested by hypothermia or hyperthermia

(2) Clinical signs of inadequate tissue perfusion including any of the following:

- Decreased urine output of less than 1 ml/kg per hour
- Decreased or altered mental status
- **Cold shock**
  - Prolonged capillary refill of more than 2 seconds
  - Diminished pulses
  - Mottled cold skin

- **Warm shock**
  - Flash capillary refill
  - Bounding peripheral pulses
  - Wide pulse pressure

14.5 Management

- Key to the management is early recognition and identifying the underlying pathophysiology of shock.
- Use the early clinical features for early recognition and bedside focused echocardiography for early identification of underlying pathophysiology.

Restoring perfusion before reaching the "ischaemic threshold" for hypotension is the cornerstone in the management of shock

- **First step - (0-5 min)**
  - Recognise shock.
  - Establish an airway for adequate ventilation and oxygenation.
  - Use high flow humidified and heated nasal cannula oxygen or continuous positive airway pressure apparatus.
  - Obtaining rapid peripheral or central venous or intraosseus access.
- **Start prostaglandin within 10 min if**
  - Baby has hepatomegaly, cyanosis or pressure gap between upper and lower limbs.
- **Within the next 60 min of recognition**
  - **Take blood for blood culture, FBC, CRP, calcium, serum electrolytes and glucose while obtaining venous access.**
  - Avoid hypo or hyperglycaemia, maintain normoglycemia 45mg/dl - 180mg/dl.
  - Avoid hypocalcaemia as it causes myocardial depression.
- **Start antibiotics – penicillin and gentamicin as soon as blood culture is taken if suspecting septic shock.**

- **Start fluid resuscitation – if no features of hepatomegaly or basal crepitations**
- **If not reached therapeutic end point - start inotropes/ vasopressors via a peripheral line**
    - Start dopamine (<10µ/kg/min) – if not responding adrenaline (< 0.3µg / kg/min)
    - If not reached therapeutic end point - start hydrocortisone
- Avoid fluid resuscitation and start adrenaline – if there are features of hepatomegaly or basal crepitations
- Therapeutic end points in the first hour of resuscitation are as follows (ACCM Guidelines):
    - CRT ≤ 2 s
    - normal and equal central and peripheral pulses
    - warm extremities
    - urine output >1 ml/kg/h
    - normal mental status
    - normal MAP for age (55mmHg)
    - normal heart rate for age (120 – 180/min)
    - normal glucose
    - normal calcium
- If the baby does not respond to the above resuscitation
    - Intubate and ventilate
    - Check for pneumothorax
    - Use minimum ventilatory pressures required – as high ventilator pressures reduce CVP, CO
    - Get central access
        - Adrenaline – cold shock
        - Noradrenaline – warm shock
    - Give a blood transfusion if haemoglobin is < 10g/dl
    - Use nitric oxide for PPHN if available

14.5.1 Fluid resuscitation

- There is no clear correlation between blood volume and BP in neonate.
- Hypovolemia is rarely the primary cause of hypotension in the VLBW infant in the first few days of life, unless there is clear history of perinatal blood loss.
- Excessive fluid administration is associated with adverse outcomes (PDA, chronic lung disease, mortality).
- Avoid in babies with hepatomegaly or additional breath sounds.
- Volume support can increase preload and hence cardiac output.
- In the absence of hypovolemia, hepatomegaly and additional breath sounds - support volume with 10 ml/kg of 0.9% NaCl over 30–60 min.
    - If there is no clinical improvement - no further boluses should be given.
    - If there is an improvement - a second bolus of 10ml/kg should be administered.
- There is no advantage of colloids over crystalloids.
- Functional echocardiography can be of assistance in determining volume status and following changes with intervention.
- **Assessment of improvement**
    - Improvement in CRT
    - Decrease in heart rate by at least 10 beats per minute
    - An increase in urine output over the next 4-6 hrs

If the signs of poor perfusion persist despite 2 fluid boluses (or there was no improvement after the first bolus) , in the absence of hepatomegaly and/or additional breath sounds - inotropic support should be commenced and underlying causes should be identified and treated.

14.5.2 Drugs affecting vasoregulation

- Abnormal vasoregulation is the major contributor to neonatal shock.

- Inotropes - enhance myocardial contractility and increase cardiac output
- Vasopressors – increase blood pressure via vasoconstriction
- Patients with shock may warrant use of vasopressor therapy while patients with impaired cardiac function may need more inotropic therapy
- Most inotropes have a vasopressor effect in addition to its inotropic effect. This vasopressor effect can result in some inotropes decreasing the systemic blood flow.
- Therefore it is important to choose the one most appropriate for the specific clinical situation as shown in table 14.2.
- Bedside echocardiography would be helpful in finding the pathophysiology and determining the best drug as shown in figure 14.3.
- When using inotropes for increasing blood pressure they should be titrated to achieve the minimal acceptable blood pressure while being prepared to wean if the blood pressure rises above this, as dramatic increases in blood pressure have been shown to increase the risk of intraventricular haemorrhage.
- Once hypotension improves (normal BP for 4-6 hours) and tissue perfusion improves, inotropes should be tapered every 1-2 hours in the allotted decrements mention under each inotrope, provided the neonate continues to maintain the above listed therapeutic end points.

Inotropes should be delivered through peripheral intravenous or intraosseous access when central access is unavailable because delay in inotrope delivery can increase mortality by 20 fold

Table 14.2: Drugs used for vaso-regulation in neonatal shock

Name of drug	Dose	Site of action	Haemodynamic effects
Dopamine	1-4 µg/kg/min	Dopaminergic receptors (1 and 2)	Renal and mesenteric dilation
	4-10 µg/kg/min	α receptors	Inotropic effects
	11-20 µg/kg/min	β receptors	Vasopressor, increase SVR and Increase PVR
Dobutamine	5-20 µg/kg/min	β 1 and β 2 receptors, some effect on α receptors	Inotropic effects; decrease SVR; increase cardiac output
Epinephrine (adrenaline)	0.02-0.3 µg/kg/min	α 1 receptors	Inotropic effects; decrease SVR
	0.3-1 µg/kg/min	β 1 and ß 2 receptors	Vasopressor effects; increase SVR
Norepinephrine (Noradrenaline)	0.1-1 µg/kg/min	α 1 and α 2 receptors	Vasopressor effects; increase SVR
Hydrocortisone	1-2.5 µg/kg/min; 4-6 hourly	Enhance sensitivity to catecholamines	Uncertain-enhance sensitivity to catecholamines
Vasopressin	0.018-0.12 U/kg/h	Vasopressin 1 receptors	Increase SVR; no inotropic effect
Milrinone	50-75 µg/kg/min bolus followed by 0.25-0.75 µg/kg/min	Phosphodiesterase III inhibitor and produces effect at β 1 and β 2 receptors	Inodilator effects; lusitropic effects; increase contractility; and decrease SVR
Levosimendan	6-24 µg/kg/min bolus followed by 0.1-0.4 µg/kg/min	Multiple action including Phosphodiesterase inhibitor effect on higher doses	Inodilator effects; increase contractility without increasing myocardial oxygen demand

SVR, systemic vascular resistance, PVR, pulmonary vascular resistance

14.5.2.1 Dopamine

- Useful with poor cardiac contractility and decreased vascular resistance.
- At higher doses (> 10 µg/kg/min) - the effect on increasing afterload is greater and systemic blood flow can decrease even though blood pressure rises.
- Peripheral line can be used to administer doses up to 10 µg/kg/min.
- **Dose**
  - Starting dose - 5 µg/kg/min.
  - Increment/decrement - 5 µg/kg/min every 10-15 minutes.
  - Maximum dose - 20 µg/kg/min.

- **Preparation:**
  - **Always use a 1 ml syringe for drawing dopamine out of the vial.**
  - One ml of dopamine injection contains 50mg of dopamine.
  - Add 30mg/kg of dopamine (200mg=5ml) in 50ml of fluid (5% or 10% dextrose, 0.45% or 0.9% NaCl) will provide 10µg/kg/min of dopamine when infused at 1ml/hour.

14.5.2.2 Dobutamine

- Useful with poor cardiac contractility and increased vascular resistance.
- At higher doses (>10µg/kg/min) improvement in systemic blood flow is greater with dobutamine rather than dopamine.
- Peripheral line can be used to administer doses up to 10 µg/kg/min.
- Dose and preparation are similar to the method for dobutamine.

14.5.2.3 Noradrenaline

- Useful with normal cardiac contractility with decreased vascular resistance.
- First line treatment of hyperdynamic septic shock secondary to sepsis .
- Second line inotrope for treatment of fluid-refractory hypotensive shock in the setting of low systemic vascular resistance (SVR) and circulatory failure in the setting of pulmonary hypertension refractory to nitric oxide.
- Administer via central line.
- Dose
  - Starting dose - 100 nanograms noradrenaline base/kg/minute.
  - Increment / decrement – 100 – 200 nanograms every 10-15 minutes.
  - Maximum dose - 1microgram noradrenaline base/kg/minute.

- **Preparation:**
    - **Always use a 1 ml syringe for drawing noradrenaline out of the vial.**
    - One ml of noradrenaline injection contains 2mg of noradrenaline.
    - Add 30mg/kg of noradrenaline (2mg=1ml) in 50ml of fluid (5% or 10% dextrose) will provide 100ng/kg/min of noradrenaline when infused at 0.1ml/hour.
    - Dilution in NaCl causes loss of potency.
    - Protect infusion from light.

14.5.2.4 Adrenaline

Useful in poor cardiac contractility and decreased vascular resistance.

Peripheral line can be used upto 0.3 µ/kg/min.

- **Dose**
    - Starting dose – 100 - 300 nanograms adrenaline base/kg/minute.
    - Increment / decrement –200 nanograms every 10-15 minutes.
    - Maximum dose – 1.5 microgram adrenaline base/kg/minute.
- **Preparation**
    - Always use a 1 ml syringe for drawing noradrenaline out of the vial.
    - Prepare 1 in 10,000 solution by diluting 0.1ml of 1 in 1000 adrenaline injection.
    - Add 1 in 10,000 adrenaline 30mg/kg in 50ml of fluid (0.9%NaCl, 5% or 10% dextrose) will provide 100 nanograms/kg/min of adrenaline when infused at 0.1ml/hour.
- Administer via central line.
- Protect infusion from light.

14.5.2.5 Hydrocortisone

- Useful in catecholamine resistant shock.

14.5.2.6 Milrinone

- Useful in pulmonary hypertension.

14.5.2.7 Phenylephrine

- Useful in catecholamine resistant vasodilatory shock.

14.5.2.8 Vasopressin

- Catecholamine resistant vasodilatory shock.
- Persistent pulmonary hypertension.

14.6 Unresponsive shock

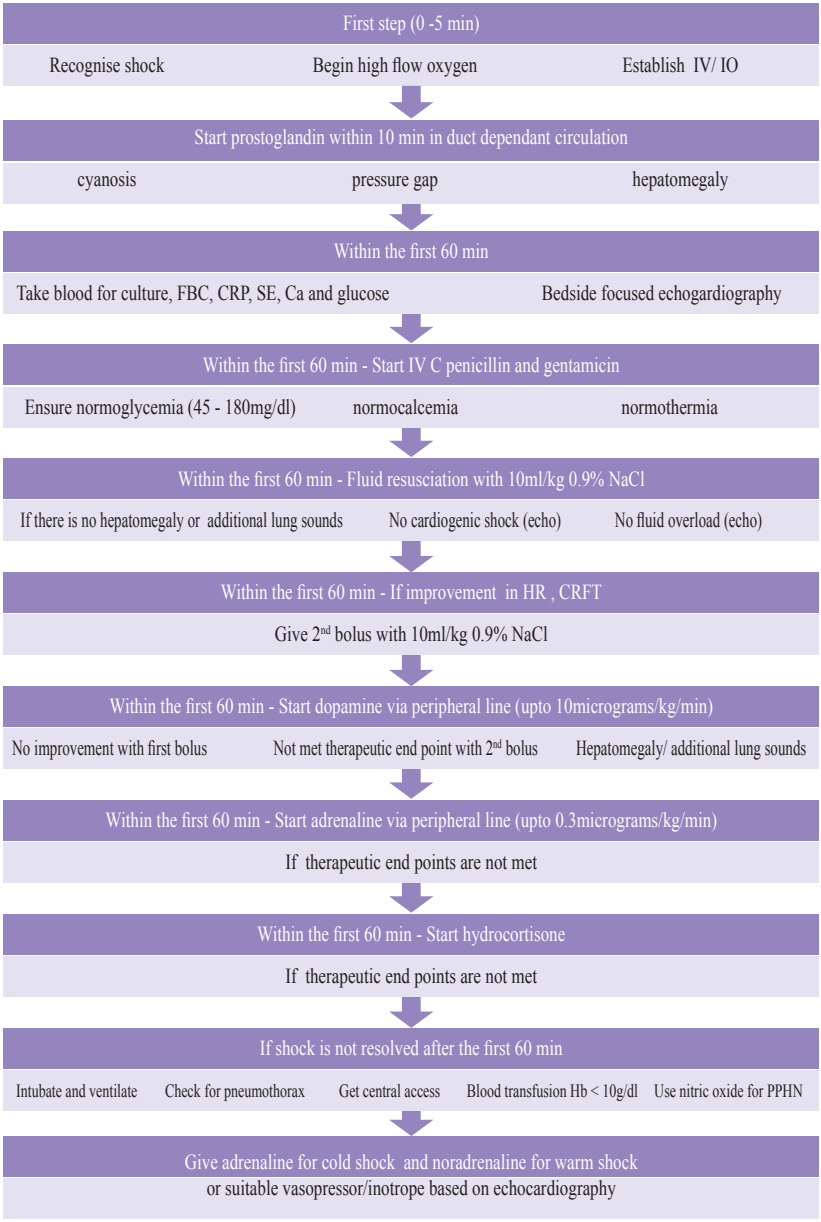
- Neonates with shock may not respond to above treatment in the presence of hypoglycaemia, hypoxia, hypothermia, hyperkalemia, anaemia, severe sepsis, pneumothorax and cardiac tamponade etc.
- Consider referral after stabilisation.

14.7 What to do if referral is not possible

- Continue inotropes.
- Continue supportive care.

Summary

- Monitor all sick babies for early signs of shock.
- Start treatment immediately if shock appears.



14.3 Flow chart : The management of neonatal shock

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COMMUNICATION IN NEWBORN CARE

Chapter 15

COMMUNICATION IN NEWBORN CARE

15.1 Introduction

Good communication is an integral part of comprehensive patient care. It assumes special importance in neonatal care because of technical and physical complexities involved, rapid changes in the clinical course and associated stress of the parents.

Effective communication is crucial for

- Making informed decisions on behalf of the neonate, by the parents.
- Medico legal issues.
- Maintaining a cordial relationship between the health care provider and the parents.

15.2 Forms of communication

Information can be provided through two forms of communication:

(i) **Verbal:** involves the exchange of information using words including spoken and written.

(ii) **Nonverbal Communication:** or body language involves transmission of information without words. It may be in the form of eye contact, touch, facial expressions, posture, gestures etc.

15.3 Types of information to be provided in a neonatal unit

- Communication by the neonatal team begins in the antenatal period if the baby is expected to be at risk of being born prematurely or have a congenital anomaly requiring admission to the neonatal unit.
- In the case of an unexpected problem at birth or in the early neonatal period which prompts admission to the unit, communication with parents would begin right at the time of admission of the neonate until the time of discharge or referral to a higher centre. The communication would progress through follow up visits too.

- Parents need to be informed at each step of the neonatal care which includes,
    - The reason for admission to neonatal unit
    - Initial diagnosis of the neonate at the time of admission
    - Ongoing medical management
    - Initial/current prognosis
    - Changing clinical course/adverse events
    - Information and consent regarding any intervention/ procedure
    - Reason for referral and care during transport in case of referral to a higher centre
    - Follow up information in case of discharge

15.4 Principles of communication

- Practical and in simple language easily understood by the parents/ relatives.
- Should be of immediate relevance.
- Do not flood the parents with too much information at a single contact.
- Avoid use of technical jargon.
- Information provided may require repetition and reiteration for the parents to understand it.
- Timing of providing the information is crucial: e.g. fix up a specific time daily for the parent doctor interaction.
- Discussion should be unhurried and relaxed.
- Bad news/adverse events should be disclosed in a quiet and private setting.
- Communication should be done after the morning ward round as and when required preferably by the bedside so that the parents are oriented to the current situation.
- Documentation of the information provided to the parents is important. (explanation regarding poor prognosis/ adverse events etc.)

- Meet the parents and communicate directly as far as possible in person.
- In cases where this in not possible eg; father overseas, speak over the phone. Presence of extended family members have to be at the discretion of the parents.
- Procurements (medicines, reports), if any, to be provided by the parents should preferably be at single visit on a day to avoid inconvenience and repeated calls to the parents, unless urgent.

15.5 Communication in different situations

1. Communication antenatally
2. Communication on admission to the neonatal unit
3. Communication during the course of stay
4. Communication in case of death of baby admitted in the unit
5. Communication at discharge of neonate from neonatal unit
6. Communication at the time of referral

15.5.1 Communication antenatally

- All attempts should be made to counsel prospective parents of preterm babies / infants with antenatally diagnosed problems that would require admission to a neonatal unit prior to the delivery. The counselling should be to both parents preferably. However, if time does not permit (mother in labour and father not living in close proximity) at least very briefly with mother.
- Parents should be informed of what to expect at time of delivery (they will/will not get to see the baby, baby will be very small, may not cry, may need intubation etc.), will need admission to the neonatal unit and monitoring / IV fluids etc. (lots of wires, tubes and machines), may need to stay in the neonatal unit for an extended period.
- Mother should also be informed that she may not be able to breastfeed initially, but it is essential that she commences expression of breast milk (store colostrum in freezer / fridge if it is impossible to give even very small quantities of feeds to the baby) preferably within 6 hours of birth with the assistance of

postnatal ward staff. Visitation rules of the unit should also be mentioned.

- In the case of extremely preterm babies provide some idea of possible short and long term outcomes based on your own unit statistics (preferably) and national / international statistics within realistic expectations.

15.5.2 Communication at the time of admission to the Neonatal Unit

- It is crucial to talk to the parents and relatives at the time of admission of a neonate to the SCBU/NICU. This discussion should be done once the baby has been stabilised and a reasonable clinical diagnosis has been made. The discussion should be relaxed and unhurried.
- The first contact should preferably be made by the senior most person of the unit available at the time, He / she should also introduce the staff (junior doctors and staff nurses) who would be available round the clock during this contact.
- Honest opinions should be given and all aspects of the illness should be explained in detail. Cost of care where relevant (eg; private sector) should be explained.
- In case of babies with congenital malformations, provide information about the consequences of the disorder/ malformation, and ways to prevent or treat the disorder. This involves assisting the family in comprehending medical facts, including the diagnosis and the available management.
- Words should be carefully chosen as tactlessly uttered opinions may result in tremendous conflicts resulting in provision of poor or no care for the baby. If the baby's father is not available, a responsible member of the immediate family should be identified and all the relevant information should be given to that person in the presence of the mother if possible.

15.5.3. Communication during the course of stay

- If the baby is admitted in the unit, it is the duty of the health personnel to communicate with the parents about the condition every day and more frequently if required. The treatment plan

should be appropriately communicated to the family and the changes informed in a timely manner.

- Health care provider must be available when the mother visits her baby for the first time in neonatal unit. Both parents should be encouraged to get involved totally in the care of their baby when the baby is stable. Even if the baby is very sick, the parents should be encouraged to visit often, talk/read/sing/pray, touch the baby, provide expressed breast milk, give skin to skin care etc.
- Mother is welcome to visit the baby at any time as she is an in-patient too. Father is allowed to visit at visiting times if baby is stable or at any time if the baby's condition deteriorates.
- Nursing staff should be very considerate and compassionate as mothers at this point are often sick themselves and worried about their babies.
- The doctor and the nursing staff should be able to explain the equipment surrounding the baby & give the right amount of information so that the family members can make informed choices about any procedure that is to be performed.
- In case of critically ill babies, family should be informed and prepared in advance of possible poor outcomes.

15.5.4 Communication in case of death

- The death of an infant is a major loss for the entire family. The mother's separation from her new, sick infant leaves her emotionally and physically helpless. Events may occur too fast for the parents to comprehend. Dealing with the death of a newborn is traumatic for both families and caregivers. The most important goal is to be compassionate and humane.
- If the babies are critically ill, as explained earlier the family members should have been prepared for any eventuality. The exact cause of death should be informed to the parents in a simple language.
- As soon as possible, sit down with the parents (or another support person) to tell them about the condition of the baby. The role of the health personnel should be to support the parents by giving clear and honest information in a supportive and caring manner.

Avoid using phrases and sentences that may make the family members feel uncomfortable like, "it was for the best" or "it was meant to be".

- Avoid negative comments regarding the parents, referring doctor or the obstetrician (such as, you came too late, baby was sent when very sick, delivery was not conducted well).
- Offer to bring the baby to the mother and father to hold. Baby should be cleaned and wrapped well soon after being declared dead and should not be lying dead with intravenous lines and other monitoring equipment. All queries should be answered with utmost sincerity and genuine concern for the bereaved parents.
- If an autopsy is required, the parents' consent and the formalities should be completed as soon as possible, so that the parents are free to take care of other things. All the formalities with the other departments should be completed quickly and the body handed over to relatives as early as possible. Parents can be called a month later to explain the findings of the postmortem & if required discuss the possibility of the problem occurring in the next baby and also be offered support.

15.5.5 Communication on discharge

- The families should be informed well in advance regarding discharge.
- Arrange a family meeting to find out their social situation and give individualised advice on the home care of the neonate e.g. about breastfeeding, keeping babies warm, how to prevent infection, danger signs for which the parents need to come to the health facility immediately. Help them to plan on how to get to the hospital, which hospital they should go in case of emergency. Family members should also be given hands on training on basic resuscitation and first aid for choking in case of possible aspiration.
- Standardised information should be provided to ensure that every family member receives uniform information.
- The family should be counselled regarding care, nutrition, immunization and follow up.
- Parents should be encouraged to contact the unit for any queries.

Write the contact number of the SCBU/NICU on the discharge sheet.

- Information should address well baby clinics, high risk clinics, developmental issues, information regarding ROP and hearing, other screening tests etc. and infection prevention.

15.5.6 Communication at the time of referral to a higher centre

- Some of the critically ill neonates may require referral to a higher centre for tertiary care. One of the most important and often very difficult aspects of transport is the need for emotional support of the parents and family. The need for transport of a newborn can precipitate a crisis for the entire family. Address the concerns of the family. Accepting emotional outbursts calmly and reassuring the parent that their newborn is being cared for can reduce parental anxiety.
- Allow parents to see and touch their child prior to transport and encourage them to accompany the baby.
- Explain thoroughly the clinical problems and anticipated care during transport.
- Explain where to go and indicate whom to contact.
- Ensure communication with the referral facility and request for feedback
- Consider maternal transfer with her medical records whenever possible.

Summary

- Each neonate in SCBU/NICU requires individualised assessment and nursing care.
- A family centred approach in the SCBU/NICU can make a tremendous difference to parents, providing the basis of systematic support. Ensuring that parents have good information on which to base their decisions, requires intense effort from staff using innovative communication strategies.
- Equipping staff to undertake this communication should be a mandatory component of their training and assessment; its practice should be a compulsory component of care.

- Good communication with family brings confidence and faith in health care providers and avoids emotional harassment and unnecessary litigations.
- It is good to arrange a special private place for communication in the neonatal unit.

EMERGENCY TRIAGE ASSESSMENT AND TREATMENT (ETAT)

Chapter 16

EMERGENCY TRIAGE ASSESSMENT AND TREATMENT (ETAT)

16.1 Introduction

- Many neonatal deaths in hospitals occur within 24 hours of admission due to treatable conditions when waiting in the queue for their turn. This can be prevented by 'triaging' or rapid screening of neonates who require immediate attention for life threatening conditions.
- The word 'triage' means sorting.
- Triage is sequential process for sorting sick neonates as soon as they arrive in the health facility (NICU/SCBU) according to their need and available facilities.
- ETAT guidelines are adapted from the Advanced Paediatric Life Support (APLS) guidelines.

16.2 Process & steps of management of sick neonates

- Triage should be the first step in assessing neonates referred to a health facility.
- This helps to ascertain the group a referred neonate belongs to.
- **Sick newborns are triaged into the following categories:**

E	**Emergency**
P	**Priority**
N	**Non-urgent**

Tri Categories	**Action required**
Emergency	Need immediate management
Priority	Need assessment and rapid action
Non-urgent	Need assessment and counselling

- Once emergency signs are identified; prompt emergency treatment needs to be given to stabilise the condition of the neonate.
- After the neonate with emergency signs is stabilised, a detailed history should be taken and relevant examination performed.

- Relevant laboratory investigations should be performed.
- A list of possible diagnoses should be made. A sick neonate often has more than one diagnosis or clinical problem requiring treatment.
- After deciding the main diagnosis and any secondary diagnoses or problems, treatment should be commenced (specific and supportive).
- Once the diagnosis is made and treatment given, the neonates should be closely monitored for response to treatment.
- Decision should be made to admit to the ward/SCBU/ NICU.
- At discharge, educate the mother on treatment that need to be carried out at home and advise her on when she should return to the health facility.

16.3 Assessing Triage Signs (refer figure 16.1)

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

16.3.1 Emergency signs

- Hypothermia. (Temp <35.5^{0}C)
- Apnea or gasping respiration
- Respiratory rate> 60 with retractions
- Grunting
- Central cyanosis
- Cold peripheries
- CRT >3secs
- Rapid thready pulse
- Convulsions

- Difficulty in arousal
- Coma

Management

- Neonates with emergency signs are at high risk
- They require immediate intervention / resuscitation.
- These neonates should always be admitted (SCBU/NICU) after stabilisation

16.3.2 Priority signs

- Neonate <1800g
- Temp 36.4°C - 35.5°C
- Temp > 38°C
- Tachypnea (rate>60, no retractions)
- Irritable/restless
- Jittery
- Refusal to feed
- Bilious or projectile vomiting
- Abdominal distension
- Severe jaundice (appears<24 hours /stains palms and soles/ lasts>2 weeks)
- Severe pallor
- Bleeding from any site
- Major congenital malformations
    - Tracheo-oesophageal fistula,
    - Meningomyelocele
    - Anorectal malformation
- Large baby >3.8 kg

Management

- Neonates with priority signs are sick and would need urgent assessment.

- They should be attended to on a priority basis.
- These babies need to be admitted to SCBU/ NICU

16.3.3 Non urgent signs

- Jaundice
- Transitions stools
- Developmental peculiarities
- Minor birth trauma
- Possetting (vomiting milk)
- Superficial infections
- Minor malformations

Management

- All cases not categorised as Emergency/ Priority
- In neonates with no emergency or priority signs, proceed with assessment and further treatment according to neonate's requirement

16.4 How to Triage

- All neonates should receive priority in the A & E / Preliminary Care Unit.
- To carry out the process of triage, the reception and resuscitation (RR) area or the casualty of the hospital managing sick neonates should be earmarked as the triaging area.
- The site at the facility where a neonate is first brought should be the triaging area.
- All the staff involved in the initial management of a child should be trained in the triaging process.
- The most experienced doctor present who is trained in neonatal care should undertake the responsibility of emergency treatment and management of the neonate keeping in mind the TABCD steps: Temperature, Airway, Breathing, Circulation, Coma, Convulsion, and Dehydration.
- Make sure that the neonate is warm at all times.
- Also ensure that blood sugar is normal.

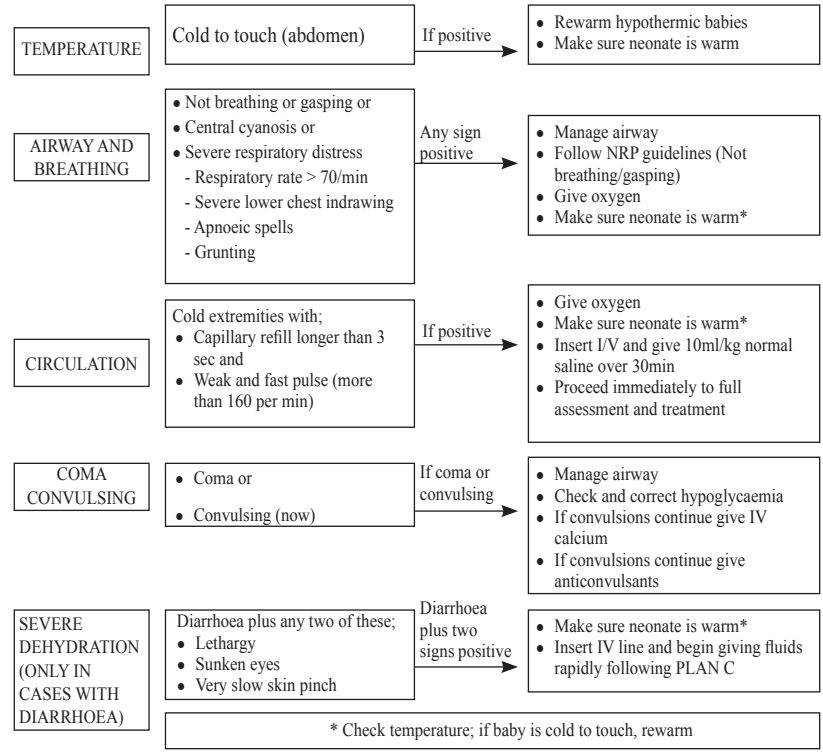

Figure 16.1: Triage

16.5 Assessment of state of consciousness

A baby's conscious state can be classified according to the following categories:

- Alert
- Responding to stimulation

- Responding to pain
- Unresponsive
- A neonate who is not alert, but responds to stimulation is lethargic.
- An unconscious neonate may or may not respond to pain.
- A neonate who is unresponsive or responding only to pain will receive treatment for coma.
- Ensure TABCD.

16.6 Post triage and stabilisation

- Once the baby is triaged and stabilized, the next step is to decide whether the baby requires admission to SCBU or NICU or referral.
- The team which will be taking over the care of the baby, needs a detailed handover in order to ensure appropriate continuation of care.

Summary

- Triaging is the process of identification of sick neonates requiring urgent attention.
- Carry out Emergency Triage, Assessment and Treatment (ETAT) of all sick neonates when they arrive at a health facility.
- Remember the TABCD steps: Temperature, Airway, Breathing, Circulation, Coma, Convulsion, and Dehydration.
- Never forget sugar

NEONATAL TRANSPORT

Chapter 17

NEONATAL TRANSPORT

17.1 Introduction

- During the course of treatment a neonate may need to be transferred for further management to a higher centre equipped with better facilities. It is important to ensure a safe and timely transfer. It is also important to prepare the baby for transfer, communicate with the receiving or sending facility, and provide care during transfer.
- If delivery of a high risk baby is expected and adequate facilities are not available at the primary centre, it is always best to transfer in utero.

The elements of safe transport include anticipation, preparation, stabilization, transport and handover.

17.2 Types of transfer

The need for transport of a neonate can be from home or smaller hospital to a SCBU or higher referral centre.

- From home or smaller hospital to a hospital with SCBU
- Intra hospital transport (LR/OT/Radiology)
- Inter facility transport (SCBU to a NICU or tertiary care facility)
- Reverse transport after treatment.

17.3 Identify babies who need referral

17.3.1 Transferring from the field setting to a hospital with SCBU *(preferably using the 1990 ambulance service)*

Any neonate who has,

- Lethargy
- Refusal of feeds
- Hypothermia
- Tachypnoea, grunting, gasping, apnoea

- Seizures
- Abdominal distension
- Bleeding
- Jaundice over palms & soles
- Birth weight 1.5kg or less(VLBW)
- All preterms

17.3.2 Transferring from SCBU to a Tertiary Care Neonatal Centre

- Need for mechanical ventilation
- Unresponsive shock
- Refractory seizures
- Refractory hypoglycaemia
- Need for surgical intervention

17.4 Preparation & organisation of transport

17.4.1 Communication with family/accepting hospital

- Explain the condition, prognosis and the reasons for transfer of the baby
- Explain where to go and whom to contact.
- Inform the referral facility beforehand.

17.4.2 Personnel

A doctor and nurse (midwife- if there is no nurse) should accompany the baby in the vehicle to provide care en route and to facilitate transfer. Mother or any other relative should accompany the baby and transport team.

17.4.3 Vehicle

The ambulance used for neonatal transport should have the following requirements:

1. Secure fixation for the transport incubator.
2. Secure fastening of other equipment (e.g. Oxygen and air tanks, monitoring equipment)

3. Independent power source to supplement equipment batteries. This will ensure uninterrupted operation of the equipment. Necessary adapters to access the ambulance power source should be readily available.

17.4.4 Equipment & drugs

Equipment needed for thermal control, maintaining the airway, resuscitation, oxygen therapy, CPAP/ mechanical ventilation, administration of IV fluids and monitoring should be available and be in working order. Availability of all essential medicines should be ensured.

17.5 Counselling and support to the family

One of the most important and often difficult aspects of transport is the need for providing emotional support to the parents and family. Hospitalization and the need for transport of a newborn can precipitate a crisis for the entire family. Accepting emotional outbursts calmly and reassuring the parents that their child is being cared for, can reduce parental anxiety. Interventions to reduce the stress and to support the grief response must be incorporated into the transport process.

- Allow parents to see and touch their child prior to transport.
- Thoroughly explain the clinical problem/s in simple language and the anticipated care during transport and at referral centre.
- Inform about the receiving hospital including location, visiting policies and transport.
- General NICU facts should be provided.
- Consider maternal transfer whenever possible.
- Obtain consent for transfer and specifically for anaethesia and surgeries/procedures etc if anticipated.

17.6 Stages of neonatal transport

17.6.1 At the referral centre

17.6.1.1 Stabilisation prior to transfer

- Baby should be stabilised prior to transfer.
- A safe transfer should be uneventful without en route intervention.

- Assess the baby with regard to problem identification and deciding on subsequent actions.
    - What is the problem?
    - What is being done?
    - What effect does it have ?
    - What is needed now ?
- Stabilize temperature, airway, breathing, circulation and blood sugar. (TOPS: Temperature, Oxygenation, Perfusion, Sugar)

17.6.1.1.1 Temperature

- **Ensure maintenance of the 'warm chain' during transport**

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

- Skin to skin care

  This is probably the most effective, safe and convenient method provided for a baby who is respiratory and haemodynamically stable. The skin to skin contact can be provided by the mother. If she is not accompanying, KMC can be provided by another willing person.

- **Cover the baby**

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

- **Transport incubator**

  This is the ideal mode of transport and should be made available.

- **Hot water bottle**

  This is not a recommended method unless there is absolutely no other option. If hot water bottles have to be used, utmost care has to be taken to prevent burns. The hot water bottle has to be wrapped with a piece of cloth and it should not be placed in direct contact with baby's skin.

17.6.1.1.2 Oxygenation : Airway and breathing

- Maintain airway in all babies. Keep head in neutral position. Clear the mouth and nose of any secretions
- If mild respiratory distress give CPAP and oxygen as necessary. If baby has severe respiratory distress or gasping respiration or apnoea, intubate and provide positive pressure ventilation.
- If healthcare provider does not have intubation skills effective positive pressure ventilation can be provided by bag and mask even for extended periods if proper positioning of the baby and the mask are used along with an oral airway if necessary.
- Use pulse oximeter to monitor oxygenation.

17.6.1.1.3 Perfusion

- Check heart rate, capillary refill time, peripheral warmth and blood pressure (if feasible).
- If perfusion is compromised secure venous access (preferably two) in a very sick baby.
- Give fluid bolus and / or inotropes as per guidelines for shock management.
- Fix the UVC / UAC to the baby's pamper and the other lines to the nest

17.6.1.1.4 Sugar

- Check sugar with glucometer. Ensure adequate blood glucose levels. If glucose levels are low appropriate measures have to be taken (Refer Chapter 6).

17.6.1.2 Pre transport medication

- Give first dose of antibiotics as intravenous penicillin and gentamicin
- Give Vitamin K if not administered earlier.

17.6.1.3 Prepare the equipment

- All re-chargeable equipment should be connected to mains until en-route.

- Get copies/originals of the investigation results including X rays.
- Emergency equipment
- Airway
    - Reintubation drugs, tubes, equipment
    - Suction charged, connected and tested
- Breathing
    - Hand ventilation circuit
    - Self Inflating bag and mask
- Circulation
    - Adrenaline
    - Volume
    - Inotropes

17.6.1.4 Speak to the parents

- Inform the reason for transfer and honest expectations
- Get a 5ml maternal blood sample to send to receiving centre
- Get consent for anaesthesia and surgery
- Give details on where baby is being sent

17.6.1.5 Packaging the baby

- Fix the airway
- Ensure fixation of the ETT / CPAP
- Secure all vascular lines and blood pressure cables
- Secure the temperature probe
- Secure all access - chest drain, ETT and NG tube
- Keep baby inside a nest and fix baby to the nest.
- Secure the nest to the incubator.
- Secure the incubator to the trolley
- Secure the trolley to the ambulance

17.6.1.6 Pre departure check list

- Review patient status
  - History □
  - Assessment □
  - Interventions □
- Problems □
  - Check monitoring □
  - Check documentation / X rays □
  - Check gas cylinders □
  - Check syringe levels □
  - Ensure child seen by parents □
- Contact numbers …….
- Refreshment, water, money, antiemetic to the transport team

17.6.2 En-route care - The journey

- Always check and utilise the ambulance power and gas supplies
- Ensure trolley, incubator, equipment and patient are secure before departure.
- Nothing should be carried loose.
- Staff must wear seat belts.
- Excessive speed is not recommended
- Stop the ambulance if an intervention is needed to be carried out
- Consider diversion to the nearest hospital if life threatening deterioration occurs
- Best to avoid feeding babies during transfer unless at risk for hypoglycaemia.
- Monitoring "TOPS" needs to be continued during the journey
- Document baby's condition with monitoring during transfer

17.6.3 Documentation and handover

- Write a precise note for the providers at the referral facility providing details of baby's condition on assessment, reasons for referral and treatment given to the baby.
- Patient remains the responsibility of the transferring team until
  - Handover is complete
  - Baby is moved to the NICU incubator /ventilator / monitors and infusion pumps

Send 5ml of mother 's blood in a plain bottle if she is not accompanying the baby

Summary

- Neonatal transport is an important component of newborn care at a National level.
- Transport by trained, dedicated staff of a retrieval system is the ideal situation to ensure best outcome for the baby.
- Identify which babies need referral to which unit.
- Prepare and organise transport
- Counsel and support family
- Provide pre-referral stabilization en-route care – TOPS
- Document the details and handover

DEVELOPMENTAL CARE IN THE NEONATAL UNIT

Chapter 18

DEVELOPMENTAL CARE IN THE NEONATAL UNIT

18.1 Introduction

Developmental care is a broad category of interventions that is designed to minimise the stress of the NICU environment by controlling light, noise, minimising disturbance to the baby by minimal handling and clustering of nursery care activities, along with positioning of the preterm baby to provide a sense of containment similar to the intrauterine experience. It does not need sophisticated equipment but only a change of behaviour and attitude with commitment and dedication. Therefore it can be easily be undertaken in any resource poor setting to improve the neonatal outcomes of our preterm babies.

18.2 Light reduction

18.2.1 Why is light reduction important?

To facilitate sleep and reduce unlimited light exposure as pupillary constriction is absent until 32 weeks POA where light goes in through the thin eyelids even when eyes are closed.

18.2.2 How can we reduce light in the neonatal unit?

- Have individual lights with dimmers wherever possible.
- Blinds / curtains can be used to shade brightly lit windows or doors.
- Incubator covers with multiple flaps to access all portholes, for babies <32 weeks POA
- From 32 weeks the baby should be gradually exposed to ambient light during awake periods during skin to skin, feeding or nursing care.
- Cot covers should be used till 34 weeks or till a week prior to discharge.
- Darkness at night should be provided for infant approaching term by dimming lights near stable babies.

- **Avoid fluctuating bright light on the baby's eyes during care giving procedures. Cover eyes with rolled towels**
- **Babies who undergo ROP screening should be protected from light for a minimum of 12 hours after the procedure.**

Figure 18.1: Incubator cover with flaps © Copyright Dr Nishani Lucas

18.2.3 Which babies would benefit from light reduction?

- Babies <34 weeks POA and post - Retinopathy of Prematurity (ROP) screening.

18.2.4 Visual stimulation of the preterm baby

- Minimise visual stimuli for babies < 32 weeks - toys and pictures should not be placed within direct visual space.
- Support emerging need for eye contact - generally infant shows preference for human faces after 32 weeks.
- Offer opportunities for visual stimulation when the infant is displaying longer attention spans.

18.3 Noise reduction

18.3.1 Why is noise reduction important?

- High frequency noises have been shown to cause impaired language development and 3rd trimester hyperstimulation has been associated with disorganisation of the auditory cortex.

18.3.2 How can we reduce noise in the neonatal unit?

- Use thick incubator covers.
- Talk softly near open cots.
- Do not talk with the portholes of the incubator open.
- Attend to alarms promptly and set alarm volume as low as is clinically safe.
- Decrease volume of telephone ring and no radios or audio tapes for babies <37 weeks
- Close incubator doors quietly.
- Do not tap or bang on incubator.
- Discourage the use of the top of the incubator as a writing surface and or storage area.
- Ensure CPAP and ventilator tubing is regularly cleared of H_2O.

18.3.3 Auditory stimulation of the preterm baby

- Encourage parents to talk softly to their baby from 28 weeks.

18.4 Protect babies from noxious odours

18.4.1 Why it is important?

Preterm babies are deprived of smell and taste sensations due to breast milk given via tube / cup instead of direct breastfeeding. Unpleasant odours arising from the hospital disinfectants etc. have a negative impact on already deprived smell and taste sensations.

18.4.2 How can we protect babies from noxious odours?

- Open alcohol wipes and antiseptic preparations away from the incubator and infant.
- Avoid use of strongly scented perfume.

Stimulate baby with pleasant odours

- Use a milk soaked gauze prior to and during a feed.

18.5 Minimising oral aversion and promoting suckling on the empty breast

18.5.1 Why it is important?

- **Oral aversion**

  Preterm neonates have many negative oral experiences like insertion of endotracheal tubes, suctioning and insertion of orogastric tubes. These negative experiences lead to oral aversion where the neonate rejects any object that comes into contact with the mouth. This may lead to delayed establishment breast feeding

- **Suckling on the empty breast**

  Facilitates the sucking behaviour of infants and improves digestion of enteral feeds through secretion of specific digestive enzymes mediated by vagal innervations of oral mucosa.

18.5.2 How can we minimise the oral aversion and create a positive oral experience?

- Suction orally only when clinically necessary.
- Encourage hand to mouth contact.
- Encourage stable babies to nuzzle at the empty breast during skin to skin contact under close supervision

18.6 Tactile stimulation, minimal handling and clustering nursery activities

18.6.1 Why it is important?

- Handling causes hypoxia, bradycardia, sleep disruptions, increased intracranial pressure and behavioural agitation.
- Ensure minimal handling along with appropriate level of tactile stimulation.

18.6.2 What we can do?

- Swaddling a baby during the non-contact period provides tactile stimulation.

- Cluster cares, but avoid multiple distressing interventions at the same time.
- Gently prepare infant for handling with a soft voice or gentle touch
- Interventions should take place when an infant is in a gently aroused state and with consideration of infants' cues with slow gentle handling, avoiding abrupt/fast changes in position for babies under 33 weeks
- Hold infants during feeding if awake - this includes tube feeding
- Vary infant head and body position-mindful of infant physiological status and response to handling
- Avoid stimulating the infant with stroking or patting for babies under 32 weeks.

18.7 Positioning

18.7.1 Why it is important?

- Before the baby is born he is contained securely by the form boundaries in the uterus by the mother's abdominal musculature, pelvis, spine and diaphragm.
- The baby's arms and legs are curled up, knees and elbows tucked towards the middle of the body, spine is curved and head is tucked slightly forwards.
- Maintaining the correct posture is important as muscle tone is still developing until 36 weeks,
    - Helps in ex-utero movement development
    - Prevents postural deformities
    - Helps self-consoling
- In order to ensure the correct posture it is vital to position the baby in such a way with simulated intrauterine boundaries.

Figure 18.2 In utero positioning

18.7.2 The nest

Supportive positioning technique used should enhance flexion, promote comfort and provide opportunities for movement as well as have simulated intrauterine boundaries.

18.7.2.1 How to make the nest ?

It can be made with rolled up towels / blankets or cot sheets as shown below.

Figure 18.3: How to make a nest © Copyright Dr Nishani Lucas

18.7.2.2 Which babies need nests?

- Preterms below 34 weeks,
- Growth restricted but mature babies
- Acutely ill immobile newborn

18.7.2.3 Cleaning of the nest

- Every 48 hours unless visibly soiled
- Soft cloth that is used to line the nest should be cleaned daily

18.7.3 Timing of different positions

- Prone position is best until the baby is stable.
- Side lying position can be introduced as the baby is becoming more stable and supine position is introduced when preparing to discharge
- Nesting boundaries should be gradually decreased and removed as the baby approaches term / discharge

18.7.3.1 Prone position

- In this position (figure 18.4) the baby must be well supported, as gravity will push the knees out to the sides. It helps breathing movements by supporting the rib cage, reduces reflux, increases time spent in quiet sleep and saves energy and helps faster weight gain.
- Kangaroo care is another method of keeping babies in the prone position

Figure 18.4: Prone position © Copyright Dr Nishani Lucas

18.7.3.2 Side lying

- Helps to get their hands to their mouths for comfort, when upset as part of self-regulation.
- Babies naturally roll out of this position as shown in Figure 18.5 (b) due to inadequate support.
- Therefore need to use a rolled-up towel to support a tucked up, curled in position 18.5 (a).

Figure 18.5 (a). Side lying (b) rolling out
© Copyright Dr Nishani Lucas

18.7.3.3 Supine position

- When the medical condition has stabilised
- Introduce during wake periods e.g. nappy changes
- Face should look up towards the ceiling
- Face should not be turned to either side.
- Keep head in the midline using rolled towels / roll pillows
- For pressure to go down the back of head symmetrically
- Help the baby to learn to keep the head straight
- Prevent premature head shape by NOT keeping the cheek on the cot.

Figure 18.6 Supine Position © Copyright Dr Nishani Lucas

18.8 Involve parents in the care of preterm babies

It is important promote early and continued parental involvement

- Encourage parents to observe their infants behaviour /cues
- Teach parents to identify infant's readiness for touch and handling
- Help parents to understand the infant's potential low tolerance for stimulation
- Encourage parents to assist with cares where appropriate.
    - gentle touch
    - containment during and after handling
    - top and tail wash
    - kangaroo care
- Promote independence and enjoyment of maturing infant by empowering the parents to
    - feed the baby
    - do the cares
    - provide containment during and after handling
    - kangaroo care

18.9 Understand stress signals of the preterm baby and using consoling strategies

18.9.1 Features of a comfortable baby

A comfortable baby will have his feet supported (touching the cot / incubator) with a relaxed expression and allow brief eye contact.

Figure 18.7 (a) Feet supported by cot (b) Brief eye contact (c) Relaxed expression

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18.9.2 The following indicate a stressed baby

- arched back
- breathing rate
- thrusting arms and legs in the air
- scowling face
- toes and fingers spread out
- looking away
- frowning
- sudden changes in heart rate
- suddenly going floppy or stiff
- waving arm movements
- yawning / hiccups

Figure 18.8 (a)
Thrusting arms and legs in the air, fingers spread out, scowling face

Figure 18.8 (b)
Looking away

© Dr Sanjeewanie Karunaratne

18.9.3 Consoling strategies

Consoling strategies that would help the preterm during stressful situations are given below:

- Containment holding - holding the preterm by with hand over the head and the other over the lower back
- Grasping a finger
- Suckling on a gauze soaked with breast milk

- Gentle touch
- Quiet talking.

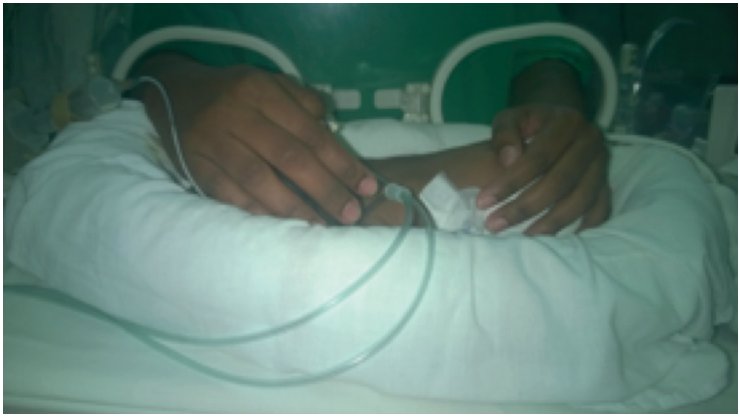

Figure 18.9 Containment holding © Copyright Dr Nishani Lucas

Figure 18.10 Gentle touch

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Summary

- Implementation of developmental care in the neonatal unit calls for change of attitudes and behaviour
- NO sophisticated equipment are needed
- Reduce light, noise, noxious odours, oral aversion
- Use non-nutritive sucking on the empty breast
- Position babies appropriately by use of nests
- Involve parents in care
- Identifying the stresses of the preterm baby
- Use appropriate consoling strategies

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PROCEDURES IN NEWBORN CARE

Chapter 19

PROCEDURES IN NEWBORN CARE

19.1 Heel prick

19.1.1 Indication

The preferred method for blood sampling except for blood culture and coagulation test which need to be obtained via venepuncture.

19.1.2 Equipment required

- Heparinised, one ml syringe for capillary blood sampling
- A kidney tray
- 70% alcohol and sterile gauze / 70% alcohol wipes
- Sterile lancet
- Hb and U&E blood tubes / capillary tube Cotton wool
- Tape
- Paraffin (a small dab of paraffin)
- Expressed breast milk-soaked swab / sucrose for analgesia.

19.1.3 Procedure

- Wash hands and put on gloves and apron.
- Change gloves and apron and wash hands between babies.
- Nurse to administer expressed breast milk if available / if not available dextrose soaked swab for analgesia if appropriate.
- First warm the foot as it will produce hyperemia which increases vascularity, making blood collection easier.
- Choose the area of puncture.
- Do not use the centre of the heel, as there is an increased incidence of osteomyelitis if this area is used.
- Clean the area with 70% alcohol wipes, and let it dry.

- If the area is wet with alcohol, hemolysis may occur, altering the results of blood testing.
- Apply a thin film of paraffin to the area of the heel where the heel is stabbed.
- Encircle the heel with the palm of the hand and index finger.
- Make a quick deep puncture with a lancet.
- Wipe off the first drop of blood.
- Gently squeeze the heel, and place the collection tube at the site of the puncture.
- Collect to capillary tube or heparinised one ml syringe drop by drop (a minimum of 0.3 – 0.4 ml)
- It may be necessary to gently 'pump' the heel to continue the blood flow.
- Allow enough time for capillary refill of the heel.
- Avoid excessive squeezing, which may cause hemolysis and give inaccurate results.
- On completion of blood sampling, apply pressure on the puncture site with a small, dry cotton wool ball until the bleeding stops. Don't plaster the site.
- Remove all equipment from the incubator.
- Make the baby comfortable and close the portholes if it is a closed incubator.
- Dispose of all dirty equipment safely and appropriately and bag bloods with correct labels and forms.

19.2 Endotracheal Intubation of a neonate

- **Elective intubations**

  Should be done following the use of premedication for sedation and muscle relaxation.

- **Emergency intubations**

  Non responsive babies and those immediately after birth do not require premedication.

19.2.1 Objective

- Provide optimal respiratory support with minimal lung injury.
    - Avoid complications during insertion

19.2.2 Indications

- Facilitate mechanical ventilation for the treatment of respiratory failure as evidenced by increased work of breathing increased oxygen requirements and respiratory acidosis.
- Surfactant administration.
- Pre – operative intubation

19.2.3 Equipment required

- All the equipment necessary should first be gathered to the resuscitation trolley, on a clean drape.
- Once opened from the packets, the endotracheal tube, introducer and laryngoscope blades should be kept inside a sterile kidney tray or on a sterile towel.
- Correct (non cuffed) ETT size :
    - 2.5mm - <1.0 kg
    - 3.0mm - 1 – 2 kg
    - 3.5mm - 2 – 4 kg
- Introducer – for oral intubations
- Lubricant (sterile)
- Scissors
- FG 10 - 12 suction catheter
- Magill's forceps appropriate size for the neonate – for nasal intubations
- Laryngoscope
    - Size 00/0 - preterm newborns
    - Size 0/1 - term newborns
- Stethoscope

- E shaped plaster (elastoplaster) to fix ETT
- Non allergic tape to put on the baby's face
- FG 8 feeding tube and 10 ml syringe to aspirate stomach contents

19.2.4 Check set-up and functioning of

- Neopuff with appropriate sized mask
- Suction unit
- Oxygen/air blender and oxygen tubing
- Laryngoscope and blade
- Ventilator with circuit correctly set up, modes and pressures preset and calibrated.

19.2.5 Drugs

Prepare using appropriate technique according to intravenous access, and administer in the following sequence:

a) **Morphine (Ampoule : 5mg/ml)**

Indication	:	Sedation and analgesia
Dose	:	0.1mg/kg given as an IV bolus with a flush of normal saline before and after.
Complications	:	Depression of CNS, decreased respiratory rate, hypotension.

b) Atropine (Ampoule: 400 micrograms/ml)

Indication	:	Helps prevent a vaso-vagal response.
Dose	:	20mcg/kg given as a rapid IV bolus with a flush of normal saline after.
Complications	:	Tachycardia, arrhythmia, dry mucous membranes, reduces gastric motility.

c) Suxamethonium (Ampoule: 100mg/2ml)

Indication	:	Muscle relaxation.
Dose	:	3mg/kg given as a rapid IV bolus followed by a normal saline bolus until it is clinically evident that drug has become therapeutic. It is quick acting and has a very short half-life, so it should only be given when intubation is imminent.

Complications : Respiratory depression, excessive salivation, arrhythmias, hypotension, hypertension, bradycardia, tachycardia

Avoid : In severe hyperkalaemia

- Ensure adrenaline (1:10,000) is available

19.2.6 Procedure

- Set up equipment required for intubation using an aseptic technique.
- Aspirate stomach contents using size FG 8 feeding tube and 10 ml syringe.
- Suction of naso and oropharynx if necessary.
- Wrap neonate in warmed cloth nappy or plastic wrap (to visualise baby's chest) and apply hat.
- Position neonate supine and flat with head midline and slightly extended in the sniffing position.
- Remove water pillow and nesting.
- Neonate may need to be rotated 90^0 horizontally to allow for easier access to head and airways when in incubator.
- Ensure unobstructed view of the chest – remove any clothing or covers which cover neonate's chest.
- Hand ventilate neonate with Neopuff to get the highest possible saturation.
- Visualise the vocal cords with appropriate laryngoscope.
- Use suction under direct vision" to see if there are secretions, blood, meconium covering the airway.
- Keep your finger between laryngoscope and baby's lip to prevent injury to the lip with the sharp laryngoscope blade.
- Insert ETT through the visualised vocal cords until the black line on the end of the ET tube is in level with the vocal cords.
- Closely observe the neonate's vital signs, colour, SpO_2 and heart rate.
- Be alert to any desaturations or bradycardias.

- If there are severe desaturations and bradycardias during the procedure– stop – pre-oxygenate and try again when the vitals recover
- If required apply cricoid pressure (gently apply pressure to the larynx -'Adam's apple) – this allows the operator to visualise the glottis and vocal cords.
- When ETT inserted, observe for a rise and fall of chest wall with each breath via Neopuff.
- Using a small stethoscope, auscultate chest to confirm correct ETT placement. Place stethoscope laterally and high on the chest wall (both axillae). Breath sounds should be equal over both lung fields, but decreased or absent over the stomach.
- When satisfied with ETT placement, reconfirm correct length at which ETT to be taped at and assist securing ETT with precut tapes.
    a. Cease manual ventilation via ambu / neopuff and promptly connect to ventilator.
    b. Post intubation, reposition neonate using developmental care principles.
    c. Recheck bilateral air entry.
    d. Check temperature and warm neonate appropriately.
    e. Monitor vital signs and chart on observation chart.
    f. Document intubation procedure and neonate's tolerance to the procedure (eg. complications that may have occurred or an uneventful intubation) on baby's bed head ticket.
    g. Prepare infant for CXR.
- Once correct placement of ETT is verified by x-ray, document on care plan and observation chart, the ETT size, and where ETT is taped at.
- On chest X-ray the tip of the ETT should be 0.5-1.0 cm above the carina (which is between T2-T3 vertebral bodies).
- Mark on tape measure where the ETT is tied at, where it is cut at and where the bullet ends (3cm from where tube cut) and place in easily accessible and appropriate position for measuring for ETT suctioning.

19.3 Intravenous cannulation

19.3.1 Objective

- Parenteral nutrition
- IV medications

19.3.2 Number of attempts

Seek help from the most experienced health care personnel in cannulation after

- 1 attempt in babies < 26 weeks
- 2 attempts in any baby

19.3.3 Equipment required

- IV trolley
- Sterile drape
- Sterile gauze
- Normal saline and 3ml syringe
- Ampoule normal saline (warmed for neonates < 1000g)
- Ideally a IV 3 Way Tap - T Piece - with Extension (primed with normal saline)
- IV cannula – 24 gauge preferred; or 26 gauge
- Splint
- Sterile gloves

19.3.4 Procedure

Requires minimum of 2 people

Cannulator

1. Wash hands
2. Set up trolley with the above items
3. Wash hands: Regular hand wash – 2% chlorhexidine
4. Sterile gloves

Assistant

1. Manage neonate's pain with expressed breast milk soaked swab when available / or dextrose soaked swab when not available .
2. Keep neonate warm with hat and blanket or sterile plastic drape for neonates < 1000g.
3. Assistant holds limb of neonate where IV is to be inserted.
4. Assists with procedure as necessary.

Skin Antisepsis

- Alcohol and / or betadine

Dressing

- Ideally a Tegaderm ®TM to cover skin insertion point.

Fixation

- Sterile micropore tape, swabbed with sterile cotton wool to reduce adherence, and splint of appropriate size if required.

Care of IV

- Observe IV site for phlebitis, swelling, redness one hourly, ¼ - ½ hourly for blood transfusion.
- Ensure order for 6 hourly 0.5ml sodium chloride flush on medication chart.
- Record time and amount flush given on medication chart.

19.3.5 Removal

- Recommended removal and replacement at 48-72 hours or beforehand if any complications occur. Insert new IV prior to removal of former IV, as it may be difficult to re-cannulate in some instances
- Removal when enteral nutrition ≥ 100-120 mls/kg/day

19.3.6 Documentation

- Document insertion site, date, time and operator
- Document removal of cannulae in same manner

19.4 Arterial lines

19.4.1 Objective

- Continuous monitoring of arterial blood pressure
- Obtaining blood samples

19.4.2 Peripheral arterial line

19.4.2.1 Selection of the peripheral arteries for cannulation

- The right radial artery is the site of choice as it is always pre-ductal.
- Right and left radial, right and left posterior tibial.
- Brachial, temporal or ulnar arteries should only be used with senior medical consultation.

19.4.2.2 Equipment for insertion of peripheral arterial cannula and line

- procedure trolley
- 1 basic dressing set
- swabs, gauze, sterile towel, forceps, small tegaderm
- 1 cannula extension
- 1 x 3-way tap
- 2 x cannula size 24G
- 1 x 3 or 5ml syringe
- 1 x ampoule of heparinised saline
- 1 pair surgical gloves
- fibre-optic light [transilluminator]
- flexible splint (appropriate length)
- alcohol and Betadine
- 1 syringe infusion pump with “rate lock” facility, labelled “arterial line pump”.

19.4.2.3 Procedure for insertion of peripheral arterial cannula

- Blood cultures can be taken via an umbilical arterial catheter or peripheral arterial line at the time of insertion only.
- **Prepare equipment as mentioned above**
- **Prepare infant**
  - Monitor patient continuously via cardiorespiratory monitor and oximeter.
  - Maintain infant warmth and ventilation.
  - Position infant and stabilise limb
  - Once cannula is in situ, cover with an occlusive dressing and secure with sterile tape.
  - Immobilise the joint above and below the site of catheter insertion with splint and adhesive tape.
- **Prepare infusion solution**
  - (Add 0.5 ml heparin (1000 units per ml) to 500 ml of either 0.9% or 0.45% saline as prescribed.
  - Label bottle including 2 signatures with IV additive label and date and time of preparation.

Splint shape for peripheral arterial line on the forearm

19.4.2.4 Care of peripheral arterial line and management of fluids

- Ensure insertion site and all tubing are exposed so that circulation and patency of tubing can be monitored.
- Check insertion site and hand or foot distal to cannula at least hourly for inflammation, signs of infection, signs of extravasation, signs of fluid leakage and security of tapes.
- Report and record signs of arterial spasm or occlusion.

  Signs include:

  a) cyanosis of all or part of fingers/toes

  b) patchy/mottled skin discolouration

c) blanched or oedematous hand/fingers or foot/toes

d) lack of warmth in fingers or toes

- Have limb supported in a natural position to avoid damage to joint, muscles and nerves.
- Control bleeding by direct pressure at site or turn off 3-way tap to patient and check for loose or cracked connections.
- Change 30 ml solution syringe every 24 hours, label appropriately and document on progress notes.
- Change the solution in the 5 ml syringe every 24 hours (or more often as required) label appropriately, and document on progress notes.
- Change lines and filter every 96 hours/4 days. Label appropriately.
- Check solution for correct amount of heparin and saline every shift.
- Check tubing for air bubbles and that all connections are secure.
- Ensure pressure transducer is on same horizontal plane as infant. Zero transducer at beginning of each shift.

19.4.2.5 Contraindications

- Skin infection
- Impaired distal circulation
- Proximal problems, eg. Bone fracture

19.4.2.6 Complications

- Haemorrhage
- Dislodgment of cannula
- Open connections
- Vasospasm of cannulated artery causing blanching of hand/ fingers or foot/toes
- Embolism
- Thrombosis
- Infection
- Skin burns from transilluminator

19.4.2.7 Procedure for taking the blood pressure reading.

- Turn the distal 3-way tap 180^0.
- Record blood pressure reading on the observation chart in black.
- Return the distal 3-way tap to the correct position.

19.4.2.8 Removal of cannula

- Observe standard precautions
- Loosen strapping
- Inactivate blood pressure monitor alarm
- Withdraw cannula, and place a sterile gauze swab firmly over insertion site
- Apply direct pressure to cannula site for at least 5 minutes. Pressure applied need only be sufficient to stop bleeding; it should not cause hand or foot discolouration.

19.4.3 Umbilical arterial catheter

19.4.3.1 Equipment required

- Procedure trolley
- Mask
- Ampoule heparinised saline
- Alcohol and betadine for cleaning; Ideally 2% chlorhexidine
- 1x Procedure tray
- Sterile gauze
- Sterile drapes
- 1x plastic drape
- 1x sterile gown
- 1x sterile gloves
- 1x disposable scalpel blade and handle
- Sterile umbilical tie

- 1 x 3- way tap
- 1x atraumatic suture (2/0 silk, curved needle)
- tape measure
- 1x drawing up needle
- umbilical catheter
  - 3.5 French gauge (<1500)
  - 5.0 French gauge (>1500)
- 2x 5ml syringes

19.4.3.2 Procedure

- Blood cultures can be taken via an umbilical arterial catheter or peripheral arterial line at the time of insertion only. (due to skin flora potentially contaminating future blood culture results)
- Note the baby's vital signs, including perfusion and capillary refill time of all 4 limbs and buttocks, prior to insertion
- Maintain thermoregulation and ventilation
- Calculate the length to be inserted for UAC
  - UAC length in cm = (weight x 3) + 9 + length of the umbilical stump
- Apply face mask, goggles, sterile gown and gloves.
- Set up trolley maintaining strict aseptic technique
  - Attach a 3-way tap to the umbilical line
  - Attach a 5ml syringe with heparinised saline to above and flush both and keep
- Get the assistant to pour antiseptic solution into tray
- Cleanse umbilical stump and drape baby with sterile gown
- Cotton tape from sterile tray is placed around stump to prevent bleeding
- Umbilical cord is cut and arteries identified. It may take some time to dilate the artery gently.
- Once the arterial catheter is inserted draw back and watch for pulsation of blood column.

- Line is flushed with heparinised saline and the infusion (0.5 ml/hr) commenced immediately in the setting of X-rays being available only after some time. If not keep the sterile field intact and keep flushing very small amounts of heparinised saline every 5-10 minutes.
- Most of the time a UVC will also be needed and inserted at the same time.
- An x-ray is required to check the correct positioning
- Catheter position
    - High- between T6-T10 (tip should be placed in descending aorta just above diaphragm)
    - Low- at L4 in the abdominal aorta
- Attach the in-line sampling and blood pressure monitoring device if available.
- If UAC in the incorrect position
    - It can only be advanced if the sterile field has not been breached.
    - If field has been breached a new UAC may be required or a low position used.
- Suture the UAC in position and apply tegaderm around catheter
- If a UVC has also been inserted they are not to be taped together to allow for the easy removal of either catheter
- Clearly tag both catheters (UAC,UVC) for easy identification of catheters separately
- Document the position of the UAC and date.
- Umbilical tie to be removed when bleeding stops to avoid the potential for skin necrosis

19.4.3.3 Collecting a blood sample via UAC

- Position proximal (closest to baby) 3-way tap “off” to all.
- Turn tap at cannula extension off, remove bung.
- Insert 3 ml syringe into port,

a. Withdraw 3.0mls blood/heparinised saline for coagulation screening

b. Withdraw 1.6 mls blood/heparinised for all others

- Turn tap off to all, remove syringe, and place back into packet to maintain sterility.
- Insert syringe for sampling (heparinised 1ml syringe for blood gas, 3ml syringe for any other test.)
- Aspirate desired sample volume into syringe.
- Turn tap off to all, remove syringe, place back into packet to maintain sterility or place lid on.
- Give blood gas sample to assistant to process in the gas analysis machine.
- With the syringe in an upright position, aspirate a small amount of blood to remove any air in the port/tip of syringe. Return diluted blood to patient by slowly and gently depressing the plunger of the syringe at a rate of 1ml per minute. NOTE: Observe involved limb distal to insertion site.
- It is advised that a second nurse process the ABG. Returning the blood from step 3 will be at a rate of 1ml per minute. (If diluted blood is returned too quickly it can increase the risk of IVH).
- Position 3 way tap nearest infant "on" to the heparinised saline infusion.
- Manually and slowly flush the line with 0.5 - 1.0 ml heparinised saline from the 5 ml syringe to clear the system of any residual blood.
- Turn sampling 3-way tap off to baby, open to syringe, and flush the line with enough volume to clear the line and 3 way tap of residual blood (NB This is not being infused into the baby or counted in cumulative total, so therefore volume can vary as needed)
- Ensure the syringe pump is at the ordered rate (usually 0.5 ml/hr), start, and lock rate.
- When the 5ml syringe is empty, discard, replace with new 5 ml syringe, and fill from 50 ml syringe (this ensures that the flush is filtered).

19.4.3.4 Precautions

- Use only luer-lock connections to reduce risk of disconnection and haemorrhage.
- Ensure connections and tapings are secure.
- Do not infuse blood, drugs, or hypertonic solutions via peripheral or umbilical arterial line unless there is no other option

19.4.3.5 On-going management of UAC

- Observe skin colour
  - Note any skin blanching or bruising of limbs, toes and buttocks prior to , during and following the procedure and while the catheter is insitu
  - Note for any discolouration of the umbilical stump and for any redness and tracking down the abdomen.
  - If there is blanching or decolourisation to one limb, warm the opposite limb to promote vasodilation of the affected limb
    - Maintain infant supine or in the lateral position while the UAC is insitu to observe for haemorrhage from the umbilical stump
    - Ensure that at least 0.5ml/hr of heparinised saline to maintain patency of catheter and to reduce the risk of clot formation
    - Change 30 ml solution syringe every 24 hours, label appropriately and document on progress notes.
- Change the solution in the 5 ml syringe every 24 hours (or more often as required) label appropriately, and document on progress notes.
- Change lines and filter every 96 hours/4 days. Label appropriately.
- Check solution for correct amount of heparin and saline every shift.
- Check tubing for air bubbles and that all connections are secure.
- Ensure pressure transducer is on same horizontal plane as infant. Zero transducer at beginning of each shift.

19.4.3.6 Complications

- Vasospasm
- Thrombosis
- Malposition
- Haemorrhage
- Trauma
- IVH
- Sepsis
- Hypertension
- Perforation
- Emboli

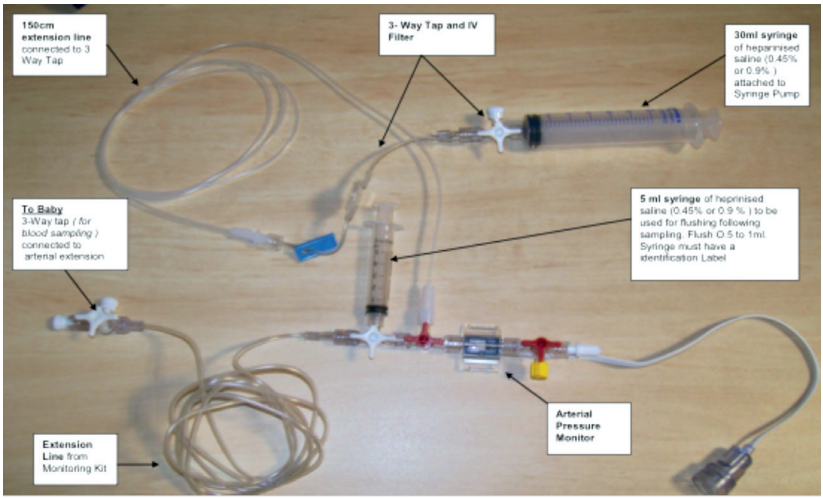
19.4.3.7 Removal equipment

- Suture cutter
- Sterile gauze
- Sterile dressing pack

19.4.3.8 Removal of UAC

- Wash hands.
- Adhere to standard precautions by wearing gloves and goggles.
- Turn 3-way tap off to baby – switch fluids off.
- First attempt to loosen stitch by unravelling stitch up catheter ensuring that catheter is not removed at this point. If required, stitch may need to be cut.
- Gently withdraw UAC using sterile gauze; gentle counter-traction to umbilical area will need to be applied. Catheter is withdrawn until the 3-4cm mark. Take great care in counting the markers as the umbilical lines are marked but not numbered, therefore, count from the last marking distal to the baby which is at 25 cm. Markings are in 1 cm increments and the bold squares are at 5 cm increments.
- Secure line at 3-4 cm mark with tape.

- Leave for 5-10 minutes or until the artery has stopped pulsing (remain at bedside and observe end of catheter near the umbilicus).
- If catheter will not move do not apply greater force. Soak umbilical cord in normal saline for 5 minutes and attempt again.
- Remove last 3-4cm gently, have sterile gauze on hand in the event of oozing..
- Ensure catheter tip is complete.
- If bleeding occurs, apply pressure for approximately 5 minutes just below stump to occlude artery.
- Document procedure.
- DO NOT lie baby prone for 4 hours post removal of catheter to observe for bleeding. DO NOT cover umbilicus with nappy or dressing, leave open for observation.



19.5 Umbilical Venous Catheter:

19.5.1 Indications for use

- Urgent administration of resuscitation drugs, such as adrenaline
- Administration of medications
- Delivery of parenteral nutrition, hypertonic solutions
- Exchange transfusion (Removing blood)

19.5.2 Equipment for Insertion of Umbilical Venous Catheter (UVC)

- 2x green sterile drapes
- Sterile plastic drape
- Sterile gown
- Sterile gloves
- Procedure tray
- 3-way taps (for each lumen)
- 2x 3ml syringes
- Drawing up needles
- 1x atraumatic suture (4/0 silk curved needle)
- Size 22 scalpel
- Small Tegaderm
- Double lumen UVC catheter
- Vial of heparinised saline (50 units per ml)
- 2% aqueous chlorhexidine (dilute 1:1 with sterile water for neonates < 1000g, swab 2 cm diameter only)

19.5.3 Procedure for insertion of umbilical venous catheter

- Calculate the length to be inserted according to following formula
  - UVC length in cm = (weight x 1.5) + 4.5 + length of the umbilical stump
- Prepare neonate: Monitor patient continuously with cardio respiratory monitor and pulse oximeter, maintain neonate warmth and ventilation
- Ensure that the fluids to commence post insertion are drawn up in a sterile technique and ready to be attached. There needs to be at least 0.5ml/hr of fluid running through each lumen to prevent blockages or clot formation
- Set up trolley maintaining strict aseptic technique
- Prime all lumens of the UVC through the three way taps with heparinised saline

- Pour 2% chlorhexidine antiseptic solution into tray (dilute 1:1 with sterile water for neonates < 1000g)
- Sterile protective equipment
- Cleanses umbilical stump and covers abdomen with sterile drape
- Cotton tape from sterile tray is placed around stump to prevent bleeding
- Umbilical cord is cut and venous catheter is inserted.
- The line is then sutured to the umbilical stump which is nerve free
- An x-ray is required to check the correct positioning
- Catheter position
    - **High position**

      To be between T8 and T9.

      The tip of catheter must lie above the liver, in the inferior vena cava or just below the right atrium.
    - **Low position**
        - 3cm plus umbilical stump length, irrespective of gestation.
        - Can be used for any medications, fluids or blood products without position confirmation by x-ray
- Commence fluids for high UVC, once position confirmed by xray
- If UVC is in the incorrect position,
    - It can only be advanced if the sterile field has not been breached.
    - If field has been breached, a low position may be used or a new UVC may be required
- Doctor completes the fixation of UVC in position and applies tegaderm around catheter
- If the neonate has a UAC insitu they are not to be taped together. This will allow independent removal of either catheter
- Document the position of the UVC and date on the care plan
- Umbilical tie is to be removed when bleeding stops to avoid the potential for skin necrosis

19.5.4 Precautions

- Use only luer-lock connections to reduce the risk of disconnection and infection
- Ensure connections and taping is secure
- Avoid infusing Platelets through the UVC. Consult with the neonatologist on duty.

19.5.5 Contraindications of UVC Insertion

- Omphalitis
- Abdominal Defects
- Peritonitis

19.5.6 On-going Management of UVC

- Observe skin colour
  - Note any skin blanching or bruising of lower limbs, toes and buttocks prior to, during and following the procedure and while the catheter is in situ
  - Note for any discolouration of the umbilical stump and for any redness and tracking on the abdomen.
  - If there is blanching or discoloration of a limb, warm the opposite limb to promote vasodilaton of the affected limb
- Maintain neonate supine or in the lateral position while the UVC is in situ to observe for haemorrhage, leaking or dislodgement from the umbilical stump
- Ensure umbilical stump and all tubing are exposed so that patency of the tubing can be monitored.
- Ensure that at least 0.5ml/hr of fluid through each lumen to maintain patency of catheter and to reduce the risk of clot formation and blockage
- Change Intravenous solution every 24 hours, label appropriately and document on progress notes.
- Change lines and filter every 96 hours/4 days. Label appropriately.
- Check solution and rate infusing through each lumen of the UVC each shift.

19.5.7 Complications

- Thrombosis
- Catheter Malposition
- Sepsis
- Hemorrhage
- Perforation
- Trauma
- Emboli

19.5.8 Equipment for removal

- Suture cutter/sterile scissors
- Sterile gauze

19.5.9 Removal of UVC

- Remove UVC as soon as it is no longer clinically indicated
- UVC's can remain in situ for 7-14 days without complication, but are usually removed within the first week of life.
- Cease infusions immediately prior to removal. (risk of clot formation and dislodging of the clot)
- Maintain standard precautions.
- Wash hands and ware sterile gloves
- Cleanse the umbilicus with normal saline.
- Carefully remove suture.
- Remove catheter slowly.
- Ensure catheter tip is complete.
- If bleeding occurs apply gentle pressure just above the stump for approximately 5 minutes using sterile gauze.
- DO NOT lie baby prone for at least 4 hours, to enable observation for bleeding.
- DO NOT cover umbilicus with nappy or dressing, leave open for observation.
- Document procedure

19.6 Naso-gastric & Oro-gastric Tubes

19.6.1 Objective

- Naso-gastric or oro-gastric feeding tubes are inserted safely and positioned correctly in the fundus of the stomach.

19.6.2 Equipment required

- Appropriate size feeding tube:
  - ➢ PVC tube size FG 5 for short term feeding use.
  - ➢ Polyurethane tube size FG 6 for long term feeding use.
  - ➢ PVC tube size FG 8 for feeding, drainage of gastric contents and/or venting of air in CPAP neonates (Medical order only)
- Syringe for aspiration (≥ 2.5 ml)
- Stethoscope
- Tape for securing tube: Leukoplaster preferable
- Scissors
- Small ID sticker
- Gloves or alcoholic hand rub.

19.6.3 Procedure

- Ideally insert naso-gastric or oro-gastric tube prior to a feed to prevent vomiting and potential aspiration.
- Wash hands
- Collect equipment and tapes to appropriate size
- Connect the syringe to the end of feeding tube.
- Nasogastric tubes are preferred as it does not cause oral aversion
- However babies on CPAP or HiFlow nasal prongs will need orogastric tubes
- For neonates requiring CPAP or HiFlow Nasal prongs, consider changing from an Orogastric to a Nasogastric tube at about 33-35 weeks corrected age to allow for breast contact/breast feeding, encouragement of sucking feeds and prevention of oral aversion.

- For naso-gastric tubes
    - Place small pieces of micropore next to nostrils, over cheeks.
- For oro-gastric tubes
    - Place a small piece of micropore at the side of the mouth or on chin.
    - Ideally, the oro-gastric tube should sit at the side of the mouth as a central position can cause oral aversion.
- Apply gloves or alcoholic hand rub.
- Place infant in supine position with head in midline, sniffing position
- For nasal insertion
    - Measure tube from the outer nare to the ear lobe to the point that is halfway between xiphoid process and umbilicus
    - Note this measurement in centimetres.
- For oral insertion
    - Measure tube from the edge of mouth to the ear lobe to the point that is halfway between xiphoid process and umbilicus.
    - Note this measurement in centimetres.

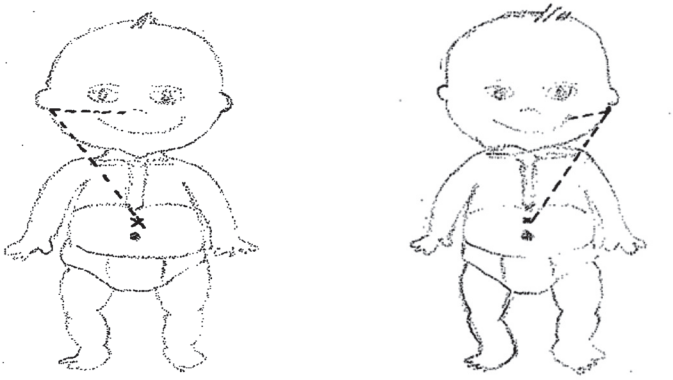


Figure 19.1 Measuring the length of NG/OG tube before insertion

- Insert feeding tube slowly into nostril/mouth (over 10 – 15 seconds) and stop at the pre-measured distance.

- Check the tube position by auscultating the abdomen, to hear air injected from a 5-10 cc syringe or aspirating yellowing gastric content. If in doubt, the tube is kept under water in a kidney tray to observe for bubbling. The absence of bubbling indicate that the tube is not in the trachea and within the oesophagus.
- Secure feeding tube to the skin on top of the micropore with pre-cut and measured tapes, ensuring that the amount of tape in contact with skin is kept to an absolute minimum.
- Document the change and the due date for next change on the observation chart and the care-plan.

19.6.4 Tube changing

- Replace feeding tube every 5 days or unless required earlier.
- Replace the polyurethane size 6 FG feeding tube every 28 days or unless required earlier.

19.6.5 Checking procedure

- At insertion and at the commencement of the shift, check feeding tube position by aspiration and auscultation. Note the appearance of the gastric aspirate.
- Check that the tube is not coiled in the mouth.
- Suggested centimetre measurements:
  - Orogastric tube = 12 + (3 X weight in kg)
  - Nasogastric tube = 13 + (3 X weight in kg)
    - ➢ If an X-ray is performed, check for placement of the feeding tube. It should be in the fundus of stomach. Adjust position as necessary.

19.6.6 Drip feeds

- Check position of the feeding tube as described above.
- Draw up feeds only required for a single feed into the syringe.
- If required, attach and prime extension line. The extension line is changed daily. This should be labelled and dated.

- Place syringe into driver, set at prescribed rate and press “start’.
- Routine aspiration to check residual gastric volume is not recommended.
- If neonate is on CPAP aspiration may be required to remove excess air in stomach.
- All neonates on drip feeds should be on a continuous ECG or saturation monitor.

19.6.7 Bolus feeds

- Check position of the feeding tube as above.
- Take expressed breast milk into the syringe
- Attach syringe to end of feeding tube, allow milk to run in slowly by gravity.
- Ensure you observe the neonate until the feed is complete.
- Close the spigot on the end of the tube.

19.6.8 Removal of tube

- Administer a swab soaked with expressed breast milk
- Use wet cotton ball or adhesive remover to remove any tape.
- Wash off adhesive remover
- Kink tube during removal

19.7 Intercostal tube insertion and needle thoracostomy

19.7.1 Needle Thoracentesis

19.7.1.1 Indications

Suspected pneumothorax in a deteriorating patient

19.7.1.2 Method 1

Equipment

- Transilluminator
- 20 ml syringe

- 22 gauge cannula
- Skin prep

Procedure

- Identify site of insertion (this is the second intercostal space in the midclavicular line)
- Apply skin prep
- Insert a 22 gauge cannula / butterfly into the second intercostal space (i.e. below the second rib and aiming just above the third rib) perpendicular to the chest
- As you insert the 22 gauge cannula/needle aspirate with a syringe until you get air entering the syringe.
- Do not drain the pneumothorax using this as the needle can damage the underlying lung

19.7.1.2 Method 2

Equipment

- Transilluminator
- Butterfly 22 gauge
- 20ml syringe
- 20ml water for injection
- Container for sterile water e.g. universal pot filled with water
- Skin prep

Procedure

- Identify site of insertion as above Method 1
- Apply skin prep
- Insert 22 gauge butterfly needle as above Method 1
- Hold end of butterfly under water to bubble (will need manual support) this will confirm placement as entrapped air will bubble through.

19.7.2 Insertion of chest drain

19.7.2.1 Indications

Suspected / confirmed pneumothorax

19.7.2.2 Intercostal tube and drain

- Trocar drain tube- A trocar is a metal rod inside the chest tube for easier insertion through the intercostal muscles.
- The tube is made of clear, rigid yet flexible plastic which may have a radio opaque strip incorporated into it, which enables X-ray detection. It has a proximal and distal end.
    - The proximal end is inserted into the pleura and has a number of holes at the insertion end which facilitate drainage.
    - The distal end is connected to the underwater seal.

19.7.2.3 Procedure

- Prepare Equipment
    - Equipment for the administration of local anaesthetic
    - Lidocaine (on medical decision)
    - 2ml syringe
    - 24 – 26FG (purple / orange / brown) needle
    - I.V. cut-down set
    - Dressing towel
    - Skin prep chlorhexidine gluconate 0.05%
    - Sterile gloves
    - Masks
    - Trocar catheter
    - Vygon green connector
    - 5ml syringe
    - Surgical blade
    - For securing trocar:sleek tape
    - Tegaderm dressing

- Give information and obtain consent for the procedure from the parents/cares wherever possible. Document this.
- Monitor the patient's cardiorespiratory status and oxygen saturations throughout the procedure.
- Premedicate infant for pain control and assess need for further medication throughout the procedure.
    - Morphine (bolus dose) if infant is on an existing infusion otherwise no time constraint
    - Lignocaine – Neonate and child 1month - 12 years – Local infiltration of 0.3ml/kg of 1% solution.
- Clean the skin with chlorhexidine 0.05% and dry with sterile towels
- Position the patient supine with the affected side slightly elevated and the arm on the affected side restrained superiorly (over the head) or anteriorly.
- Ensure the baby is kept warm and still throughout the procedure.
- The doctor should choose the spot between the 4th/5th intercostal space, in the midaxillary line for insertion of the drain. The nipple usually lies in the fourth intercostal space and can be used as a handy reference point.
- Make a 0.5cm incision along the line of the intercostal space just above the rib below.
- Bluntly dissect the subcutaneous tissue just over the top of the rib below, and puncture the parietal pleura with the tip of the clamp/ forcep.
- Advance the chest drain tube into the pleural space during expiration. Ensure tube is in the pleural space by listening to air movement, and by looking for fogging in the tube during expiration.
- Once the chest drain is inserted it may be secured by suture, occlusive dressing e.g. Tegaderm or by tape
- Connect it to the under water seal and observe for swinging and / or bubbling.

- Settle the baby comfortably
- Dispose of all sharps/waste of as per policy
- Document the procedure, date and time of insertion, the batch number of the chest tube, the position of the insertion, size & length of the tube, baby's condition and tolerance of procedure
- Inform the parents of completion of procedure and baby's condition.
- Obtain chest X-ray to verify position
- Perform and document 1-4 hourly observations including:
    - Signs of signs of swinging and bubbling
    - Position/length of the tube.
    - Blockage and kinks in the tubing.
    - Insertion site for any oozing, leakage, empyema or signs of infections
    - Complications e.g. incorrect placement, injury to intercostal
    - vessels, perforation of other organs.
    - Pain assessment
- Document any changes to the chest drain following initial insertion
- Emergency chest drain equipment and artery forceps are set up in readiness
- Ensure medication is prescribed and administered as required for pain management
- Attach Heimlich valve to suction or an underwater seal as indicated.

19.7.2.4 Complications of chest drains

- Accidental injury or perforation of intrathoracic and/or abdominal organs.
- Introduction of pleural infection, e.g., thoracic empyema.
- Damage to the intercostal nerve, artery or vein.

- Converting a pneumothorax to a haemopneumothorax.
- Resulting intercostal neuritis/neuralgia.
- Chest tube kinking, clogging, or dislodging from the chest wall.
- Persistent pneumothorax.
- Persistent or unexplained air leak in the tube.
- Subcutaneous emphysema, usually at tube site.
- Recurrence of pneumothorax upon removal of chest tube;
- Lung fails to expand due to plugged bronchus; bronchoscopy required

19.7.2.5 Precautions / contraindications

- Small sized spontaneous pneumothorax that, in the absence of lung disease, is likely to resolve with conservative management
- There is a 10-20% chance of causing a pneumothorax if thoracocentesis is attempted and the baby does not have a pneumothorax

NEWBORN CARE IN THE FIELD SETTING

Chapter 20

NEWBORN CARE IN THE FIELD SETTING

20.1 Introduction

The mother and baby discharged from the hospital receive professional postnatal care through home visits by the Public Health Midwife (PHM) and care in the postnatal clinics from the Medical Officers of Health (MOH). Care provided by the family and the circle of support to the postpartum mother and newborn are also extremely important for the well-being of both of them. Hence, it is the duty of the health staff to ensure that home care practices for the mother and newborn are in keeping with the evidence based best practices and impart knowledge and skills to the family and the close community to support women and newborns in this most vulnerable time in life.

Following are the WHO recommended evidence based interventions for improving newborn health care at the home and community level;

Table 20.1 Evidence based interventions for newborn health at home and community

Home/Family	Community and Work Place
Exclusive breastfeeding	Promotion, protection and support for breastfeeding
Hygiene (cord care, washing, bathing and cloths)	Keeping mother with the baby
Avoiding contact with sick family members	Supporting the family during maternal absence
Clean, warm and quiet place, tobacco and fire smoke free	Support for referral care for sick newborn
Extra care for small babies (pre term, low birth weight) including Kangaroo Mother Care	
Support for routine and follow up visits	
Motivation for home treatment of minor commonly seen problems	
Recognition of danger signs	
Safe disposal of baby's stool	
Care seeking at health facility or hospital	

These evidence based interventions are incorporated in to the postnatal care model in Sri Lanka.

20.2 Postnatal Care model in Sri Lanka

In the postnatal care model in Sri Lanka the domiciliary care and the field clinic care are provided by the MOH and the staff. The area PHM is responsible for the postnatal home visits while hospital or field clinic manned by a qualified Medical Officer is responsible for clinic care.

Following is the schedule for postnatal care in the field setting;

Following a child birth in a hospital (normal vaginal delivery or caesarian delivery);

02 home visits during the first 10 days after delivery (first visit within first 5 days)

01 home visit during 14 – 21 days (around 15th day) after delivery

Postnatal clinic visit at 4 -5 weeks

01 home visit around 42 days (6-7 weeks) after delivery

In the rare event following a home delivery;

03 visits during first 10 days after delivery

01 visit 14 – 21 days (around 15th day) after delivery

Postnatal clinic visit at 4-5 weeks

01 visit around 42 days of delivery

In the following instances more home visits and clinic visits are mandatory;

For women with postnatal complications

When there are complications in the newborn

For women who had still births and infant deaths, home visits and if needed clinic visits have to be made

Discharging a newborn at risk from the hospital

Prior to discharge, inform the area MOH or PHM via a phone call

Following discharge, the first home visit for preterm babies to be made within the first two days of discharge from hospital (instead of five days)

A locally adopted system is implemented to inform the PHM regarding the child birth as soon as the mother and baby are discharged from the hospital eg; telephone call, sending a sms, sending a messenger, or using a specially designed card etc are used.

The PHM should identify all the postpartum mothers in her area and acting areas allocated to her including those coming from other areas temporarily. She has to identify and take necessary action to the problems in the mother and baby. In this document only the activities conducted in relation to the newborns are mentioned.

20.3 Responsibilities of the Public Health Midwife (towards newborn)

20.3.1 At the first and second home visits within first 10 days postpartum

20.3.1.1 Observe the general condition of the mother and baby;

- Assessing the postnatal environment of the mother and the baby – Cleanliness, place where newborn and mother sleeps (including ventilation, light, safety – no pillows should be used for the baby, warmth, humidity, smoke exposure etc)
- Mother and baby are within easy reach. Co-sleeping should be encouraged (rooming-in or bedding-in).
- Personal hygiene of the mother
- Behaviour and mood of the mother (whether sad or happy)
- Support and general attitude of other family members towards mother and baby. It is extremely important to assess and communicate with the family members with regard to supporting the mother and the newborn (on breastfeeding, daily care etc.)
- Check the entries in the CHDR (Newborn screening etc.) and in the Neonatal Diagnosis card if any.
- Ensure that BCG immunization and Vitamin K have been given
- Identify the presence of any high risk conditions that need special attention

20.3.1.2 Essential newborn care at home

PHM should ensure the practice of essential newborn care for the newborn;

- Ensure that the baby is kept warm (refer chapter 1 in Volume I)
- Ensure that the mother and baby are together in the same room or in same bed or within easy reach of one another
- Reiterate and facilitate exclusive breastfeeding for 6 months (refer chapter 3)
- Ensure adherence to hygienic practices
    - Bathing of the baby
        - Daily baths that lasts no longer than 10 minutes (5-10 minutes) should be given to the newborn during first few weeks.
        - All the necessary equipment (basin, soap, clean towel, fresh clothes etc) should be prepared beforehand.
        - No fans or air conditioning should be switched on during the time a bath is given.
        - Cleaning the following areas should be paid special attention to
            - Eyes should be cleaned in one stroke using two cotton swabs for each eye.
            - Ears - Do NOT use cotton buds or any external item (wicks etc) to clean the inside of the ears
            - Skin folds – neck, legs should be cleaned well.
            - Umbilicus – Clean well with soap and water. After drying do not cover with the nappy.
            - Genitalia
                - Do not retract the penis to clean. It is not necessary to clean the penis everytime after the baby passes urine
                - Do not try to deep clean the labia minora and majora.
                    * It is advised to minimally handle the genitalia when cleaning

                Applying any baby creams or colognes is discouraged unless medically prescribed.
- Look for and advice regarding danger signs in the baby

20.3.1.3 Assessment of the well-being of the newborn

Ask from the mother;

- Mother's feelings and observations about the baby
- Feeding; on demand feeding, length of the feed, frequency of feeds (how many times the baby has fed in the last 24hirs), whether the baby is satisfied after the feed, whether the baby is exclusively breastfed, any concerns of the mother
- Excretions; Urine – frequency, Stools – colour and consistency (refer the CHDR)
- Sleep
- Crying
- Any abnormalities observed – eye discharge, vaginal discharge, umbilicus, yellow discoloration etc
- Vomiting

Observe and examine;

Before examining the newborn always wash hands with soap and water. Choose a place with good light and a safe surface for the examination of the newborn.

- General appearance: weight, colour, any other external abnormalities
- Look at the presenting part: swelling or bruises
- Movements: normal/abnormal
- Observe the cry
- Hygiene of the baby
- Breathing: normal/grunting/ and count breaths (30 – 60/minute)
- Feel for warmth. If cold or very warm measure the temperature
- Tone: normal/abnormal
- Colour; tip of the nose, eyes, skin (cyanosis, jaundice)
- Condition of the umbilicus (colour, discharges etc.)
- Observe a breast feed and ensure that - the mother is confident about breastfeeding

- Position of the mother
- Positioning and Attachment of the baby to the breast
- How the baby ends a breastfeed

- Inquire about mother's knowledge on hunger cues, on demand feeding, breastfeeding the baby at night, how to ensure that the baby is getting adequate breast milk etc.
- Presence of any danger signs given in the box below;

Danger signs in the new born

- Fast breathing (> 60 breaths / minute)
- Slow breathing (<30 breaths/minute)
- Indrawing of the chest
- Grunting
- Convulsions
- Floppy or stiffness of the limbs
- Weak/ impaired cry or excessive crying
- Lethargy/ not active as usual
- Bluish discolouration of the body
- Yellow discolouration of the body
- Pallor
- Fever (temperature >38^0C)
- Cold body (temperature <36^0C) or not rising after rewarming
- Bleeding from umbilical stump
- Umbilicus draining pus or umbilical redness extending to skin (periumbilical redness)
- Diarrhoea
- Vomiting after ever feed
- If a baby who was breast feeding well refuses two consecutive feeds
- Swelling in one or more limbs
- Weakness in any one of the limbs
- More than 10 skin pustules or a large pustule or bullae or swelling, redness, hardness of skin
- Stool colour – refer chart in CHDR

If any danger sign is detected refer the baby immediately to the MOH clinic or to the closest hospital for care. If any of the other problems detected refer accordingly.

20.3.1.4 Give information to the mother and family members

* The information mentioned below must be discussed with father and family members

- Educate and support the mother on routine care of the newborn – how to clean the baby when soiled, proper disposal of stools, bathing the baby, cleaning the ears, genitalia, keeping the baby warm etc.
  - using diapers and wet wipes, application of creams to the body
- Activities that should be done for psychosocial development of the baby – kissing the baby, touching, singing to the baby etc.
- How to keep the home environment safe and clean (without exposure to bright light or loud noises, dust, cold, smoke)
- Advice on methods of infection control – importance of limiting the visitors, limiting the number of visitors and hand washing
- Inquire about myths and support the mother – giving ratha kalkaya, gammiris pimbuma
- Inquire and solve the problems regarding BCG immunization
- Register the baby and maintain records.
- Decide on the date of next visit according to the problem identified
- If the baby is low birth weight or pre-term encourage the mother/ father to practise Kangaroo Mother Care (KMC)

20.3.1.5 Role of father in caring the newborn

- Emotional support for mother
- Sharing household chores
- Encourage and appreciate breastfeeding
- Fostering positive father-newborn relationships: smiling,

touching, cuddling, singing, talking to the baby, skin to skin care, playing

- Daily care of the baby: dressing, settling, nappy changing
- Caring for and playing with older children

20.3.2 At third home visit within day 11-21 postpartum

20.3.2.1 Observe the general condition of the mother and the home (as described earlier)

Assess all the items as discussed in 20.3.1

20.3.2.2 Assessment of the well-being of the newborn

Ask;

- Mother's feelings or observations about the baby
- Feeding; on demand feeding, frequency of feeds, any concerns of the mother
- Excretion; urine- frequency/stools – colour and consistency
- Sleep
- Crying
- Any abnormalities observed – eye discharge, vaginal discharge, umbilicus, yellow discoloration, etc
- Vomiting
- Any other concerns

Examine;

- Colour; cyanosis, icterus
- Umbilicus; fallen or not, discharge, peri-umbilical redness
- BCG scar - presence of papule or scar following BCG vaccination
- Excretion (stool/urine; frequency, colour)
- Infections; pustules, discharges

- Feeding – correct positioning of the baby to breast, adequacy of breast milk, solve problems during breast feeding

Intervene;

- Educate the family on duties of mother/father for psycho social development of baby
- Early childhood care practices
- Safety of the baby – from animals, physical environment, older children
- Refer to postnatal clinic by 4 weeks
- Maintain records
- Revisit if needed

20.3.3 At the home visit around 42 days postpartum

- Support the mother to maintain nutrition, cleanliness and psychosocial development of the baby
- Check whether mother is maintaining the records of psycho social developmental activities of the baby according to the age
- Refer baby for immunization
- Explain importance of weighing baby monthly to assess growth until one year of age
- Discuss about breast feeding and address any issues identified, build the mother's confidence to breastfeed exclusively for the first six months
- Ensure continued family support to the mother
- Inform the working mothers on maternity benefits and how to continue breastfeeding while going for work, supporting mother to express breast milk and cup feeding

20.4 Field postnatal clinic

Area PHM should refer all postnatal mothers and the newborns to the postnatal clinics in 4-6 weeks postpartum. Postnatal clinic should be a component of a poly clinic. There should be two postnatal clinics per month. Two postnatal clinics should be held in the MOH area per month. A date for

the postnatal clinic should be given to all mothers during the home visits and it should be mentioned in H 512 and the CHDR A and B. portions. The attendance of mothers for postnatal clinics should be entered in the clinic attendance register as well as the clinic summary. The number of mothers attended, mothers found with postpartum complications and mothers referred for specialized care should be entered in the quarterly clinic record (H – 527)

20.4.1 Objectives of the postnatal clinic

- Complete examination of the newborn by medical officer of health (MOH/AMOH) and attend to any deviations detected.
- Assess breast feeding, identify and solve problems regarding breastfeeding
- Assess the growth and development of the child
- Examination of postpartum mothers with complications and introducing a family planning method

20.4.2 Proceedings at field postnatal clinic

20.4.2.1 On arrival to the clinic

- Register the mother and baby
- Measure head circumference and the weight of the baby

20.4.2.2 Tasks

- Check the CHDR/diagnosis cards if any

Ask

- About breastfeeding
- Urine output/bowel opening
- Sleeping habits
- Eye to eye contact (milestones)
- Any worries for the mother

Examine

- General appearance
- Fill the neonatal examination format/check list in the CHDR
- BCG scar

Intervene

- Check the neonatal diagnosis card if available
- Check the CHDR
- Supervise breastfeeding technique (if weight gain is not adequate)
- Check for exclusive breastfeeding
- Do investigations if needed
- Take necessary actions

A separate time should be given for mothers who had still births and infant deaths.

20.5 Newborn Screening

Screening for congenital heart disease, congenital hypothyroidism and congenital deafness is carried out before discharge of the newborn from the hospital. The field staff must ensure that the babies have undergone these tests and the mother is aware of the results and follow up is carried out accordingly. Especially with regard to congenital hypothyroidism the positive results will be communicated to both the mother and the MOH Office that the mother resides in. It is paramount that follow up and referral of the baby is done without any delay to the nearest hospital with a paediatrician.

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Annexures

Annexure 1

General Circular No. 01-68 /2016

My No. FHB/ CNU/01/Gen/2016
Office of the Director General of Health Services,
Ministry of Health, Nutrition & Indigenous Medicine
Suwasiripaya,
Rev. Baddegama Wimalawansa Thero Mawatha,
Colombo 10.
21 .11.2016

All Provincial Directors of Health Services
All Regional Directors of Health Services
All Heads of Institutions
All Medical Officers of Health

Iron Supplementation for Infants and Young Children

Prevalence of anaemia among Sri Lankan children of 6 to 12 month and 1-2 year age groups, in whom there is rapid physical and mental development, is found to be high; 34% and 24% respectively (MRI 2012). Iron deficiency has been a major cause for the high prevalence of anaemia. Iron is a micronutrient required for growth and development of infants and young children, and scientific evidence shows that iron deficiency and iron deficiency anemia can lead to reduction in IQ, retardation in growth and increased risk of infections. Therefore iron supplementation has been strongly recommended by the WHO as an evidence based intervention aimed at improving iron status and reducing anemia among these groups of children (WHO 2013. Essential Nutrition Actions). The Technical Advisory Committee on New Born and Child Health and the Subcommittee on Maternal and Child Nutrition of the Ministry of Health chaired by the DDG PHS II have recommended the adoption of this evidence based intervention in Sri Lanka as a short term measure to prevent anemia among this important target group.

For the past few years multiple micronutrient (MMN) supplementation for infants and young children has been implemented in all the districts of Northern Province, Eastern Province, Uva Province, Hambantota and Nuwaraeliya districts. From year 2017 onwards this programme will be expanded to all 26 health districts.

Hence the following iron supplementation regime for all infants and young children will be implemented in Sri Lanka from 01st of January 2017 onwards;

Birth outcome	Age of commencement	Dose	Frequency	Duration
Term ≥ 2.5 kg	Infants on completion of 6 months of age	One MMN sachet per day	Once daily	2 months (60 days)
	Children on completion of 12 months of age	One MMN sachet per day	Once daily	2 months (60 days)
	Children on completion of 18 months of age	One MMN sachet per day	Once daily	2 months (60 days)
	(See annex 1 for feeding instructions)			
	If MMN is not available			
	Infants on completion of 6 months of age	**Elemental Iron** – 10-12.5mg/day	Once daily (1 hour before or 2 hours after a meal)	3 months

Pre terms and low birth weight children are excluded from the above regime. They should be managed during the first 2 years of life according to the following schedule.

Birth outcome	Age of commencement	Dose	Frequency	Duration
Pre-term* (< 37 weeks POA) **Or** **Low birth weight* (< 2.5kg)**	Infants from the age of 2 weeks	**Elemental Iron** 3mg/kg/day	Once daily	Till completion of 2 years of age
	Soon after birth	Multivitamin drops ** 0.3ml/kg/day	Once daily	Till completion of 2 years of age
	Soon after birth	Folic acid** 500 micrograms	Once weekly	Till completion of 1 year of age
	From completion of 1 year	Folic acid** 1 mg	Once weekly	till completion of 2 years of age

**If the baby is discharged prior to 2 weeks, supplementation can be started at the follow up clinic at 2 weeks. If the infant is not followed up at the hospital clinic, the area MOH should continue the same schedule till 2 years of age.*

*** For the prevention of anemia of prematurity*

Preparations of supplements and mode of administration:

Iron supplements are available either as a component of a multiple micronutrient powder or a liquid (drops/syrup). Please note that the concentration of elemental iron differs between dosage forms i.e. between drops and syrups as well as among different brands.

Multiple micronutrients (MMN); 1g sachet of lipid encapsulated powder contains 15 micronutrients including iron (ferrous fumarate) 10mg, Vitamin C (ascorbic acid) 30mg, folic acid 150ug, Zinc (zinc gluconate) 4.1mg. For detailed guidelines on MMN supplementation including composition please refer to the guideline (annex I).

Iron drops:
Strength of the commonly used iron drops have a concentration of 50 mg **elemental iron** in 1 ml (which should be dosed at 0.06ml/kg/day) or 25mg **elemental iron** in 1 ml (which should be dosed at 0.12ml/kg/day).

Iron syrup:
Commonly used iron syrup has a concentration of 50mg **elemental iron** in 5ml (0.3ml/kg/day) and 25mg elemental iron in 5ml (0.6ml/kg/day).

Multivitamin drops;
Multivitamin drops available in the country have 40mg of vitamin C in 0.6ml Therefore 0.3ml/kg/day will provide 20mg of Vitamin C /kg/day.

Folic Acid tablets;
The available tablet strength is 1mg. Therefore, half a tablet dissolved in expressed breast milk should be given once a week till the baby is one year of age and from one year onwards 1mg once a week till completion of 2 years of age.

Logistics

MMN will be issued by the Family Health Bureau and iron drops/syrup and multi vitamin drops by the Medical Supplies Division of the Ministry of Health for the government sector health institutions.

The MOOH should arrange to obtain their MMN stocks through Regional Medical Supplies Division (RMSD). OIC RMSD is required to prepare in triplicate and send the Monthly Stock Return/Request form (Nutrition Supplies) (see annex II) on a quarterly basis to MOMCH and the FHB. (*Please note that this return should be replaced when the new Monthly Stock Return H 1158 Form becomes available).*

Iron drops/syrup and multi vitamin drops are to be requested by MOH annually and obtained through the respective RMSDs. These should be issued to preterm/ low birth weight babies on prescription by Medical Officer in charge of the clinic centre (MOH/AMOH/MO/RMO).

You are requested to adhere to the above iron supplementation regime for all infants and young children in Sri Lanka from 01st of January 2017 onwards. Please bring the contents of this circular to the notice of all relevant health staff to ensure the success of this programme.

Dr. P. G. Mahipala
Director General of Health Services

Dr. P. G. Mahipala
Director General of Health Services
Ministry of Health, Nutrition & Indigenous Medicine
"Suwasiripaya",
385, Rev. Baddegama Wimalawansa Thero Mawatha,
Colombo 10.

Cc;

Secretary - Health, Nutrition & Indigenous Medicine
Additional Secretary Medical Services
Additional Secretary Public Health Services
Deputy Director General Medical Services I & II
Deputy Director General Public Health Services I & II
Director Maternal and Child Health
Director Private Health Sector Development
Director Medical Services
Director Nutrition
Director Nutrition Coordination Division
Director Health Education Bureau
Director MRI
Director MSD
All Deans of Faculties of Medicine
President - SLMA
President – Sri Lanka College of Pediatricians
President – College of Community Physicians of Sri Lanka
President - Perinatal Society of Sri Lanka
President – Sri Lanka Medical Nutrition Association
President – Nutrition Society
President – College of Medical Administrators of Sri Lanka
President - College of General Practitioners of Sri Lanka
President –Independent Medical Practitioners' Association of Sri Lanka

Annexure 2

Circular No; 01 - 29 /2017

My No; FHB/INBU/2017 -01
Ministry of Health, Nutrition and
Indigenous Medicine,
No 385, Baddegama
Wimalawansa
Thero Mawatha, Colombo 10
03.05 ,2017

All Deputy Director Generals of Health Services,
Director Tertiary Care Services,
Director Medical Services,
Director Maternal and Child Health,
All Provincial Directors of Health Services,
All Regional Directors of Health Services,
All Directors/Medical Superintendents/ Medical Officers in-charge of Hospitals,
All Medical Officers of Health

Recommendations for Resuscitation of extremely premature / low birth weight newborns

Sri Lanka has been working on its legally adopted viability guidelines of more than 28 weeks gestation and /or over 1000 grams birth weight when the resuscitation of extremely premature newborns are done. Over the years our neonatal and obstetric care have improved. Hence our neonatal units regularly save ELBW infants more than 900 grams in birth weight and 27 weeks in gestation. In the recent past there had been several cases where ELBW infants born at limits of viability below 28 weeks of gestation have posed clinical, ethical and legal dilemmas for the care providers from both paediatric and obstetric fields. In order to avoid these dilemmas the following circular is being issued as a recommendation of the Ministry of Health with concurrence of the Sri Lanka College of Paediatricians and Sri Lanka College of Obstetricians.

Recommended guidelines are for the management of extremely preterm infants with regard to provision of resuscitation and intensive care. It is based on several international guidelines, while taking into consideration the technological and other health care facilities available in Sri Lanka and the limitations faced by not being able to accurately estimate gestational age prenatally (mainly availability of accurate dating scans).

Especially in view of the latter fact and the high incidence of intra-uterine growth restriction in Sri Lanka, we recommend that the *antenatally estimated gestational age and birth weight are both used as independent variables* in taking decisions on the intensity of support that is to be offered at birth to extremely preterm babies.

The weight should not be considered if the baby is hydropic.

For extremely preterm babies whose gestation is thought to be around 24 weeks or more,

- The most senior clinician responsible for the baby should be informed prior to the delivery whenever feasible, so that the clinician will have the opportunity to inform parents of the expected outcomes and plan of management for the baby. Antenatal counselling which prepares the parents for the possibility of, for example a 22 week infant taking a few gasps after delivery although ultimate prognosis is very poor, can help to prevent or mitigate many unpleasant situations and legal issues.
- The most senior clinician responsible for the baby should be present at the delivery if feasible or should examine the baby as soon as possible after delivery as there is always the possibility that a baby expected to be 24 weeks by dates actually has a physical maturity of 28 weeks.
- In the event of the delivery of a baby whose gestation is estimated to be between 24+0 to 27+6 weeks the senior most neonatal /paediatric medical officer (or 2 if feasible) available in the hospital should be present at the delivery, accompanied by an experienced nursing officer from the neonatal unit if possible. The labour room / operating theatre / obstetric and gynaecology staff should assist and provide all necessary support and equipment as required and even commence resuscitation in the event of a delay in the paediatric / neonatal staff being present.
- If these babies are admitted to the neonatal unit, the baby should be accompanied by the nurse and medical officer.
- Baby should be weighed soon after birth if they appear to be less than 500g or the gestation is uncertain and believed to be around 24 weeks, in order to decide on resuscitation. A digital weighing scale should therefore be available in Gynaecology wards, operating theatres, labour rooms and antenatal wards.
- A baby more than 22 weeks gestation who shows any sign of life (e.g. beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles) should be registered as a live birth and if the baby dies subsequently during the first 28 days of life it will be a neonatal death.
- A baby less than 22 weeks gestation who shows any sign of life would be a live abortus (not a live birth – therefore not a neonatal death when baby dies)

1. **Babies 22 to 25+6 weeks:**
   - **Babies 22 to 25+6 weeks and with a weight less than 500 g**
     - If baby has signs of life keep warm and reassess; if signs of life are present for more than 15 minutes and heart rate is more than >100/min take the baby to the neonatal unit, to provide comfort care, after showing to the mother, and
     - If baby shows signs of life but is rapidly deteriorating (in heart rate / breathing) comfort care in the form of keeping warm and being cuddled by the mother (if

she wishes) can be provided in the labour room / operation theatre itself after explaining about non-viability of baby to mother.

- If baby is showing signs of life with no immediate deterioration and weight appears to be ≥500g, provide mask ventilatory support until weight is checked.

- Babies **22 to 25+6 weeks**, but with a weight **more than 500g**
  - **22 to 25+6 weeks**, with weight **500-599g**
    Baby should be kept warm, mask ventilation provided and if heart rate responds, stabilise the baby and take the baby to the neonatal unit for further management including clinical assessment of gestational age. If the heart rate does not respond to mask ventilation provide comfort care as described above.
  - **22 to 25+6 weeks, and weight ≥600g**
    Baby should be kept warm, inflation and ventilation breaths given, and cardiac compressions and adrenaline also provided if necessary. Clinical assessment of gestational age should be done as soon as possible.

2. Babies ≥26+0 weeks gestation

- Resuscitate with inflation breaths, ventilation breaths and adrenaline and cardiac compressions unless the attending paediatrician and other health professionals agree, in consultation with the parents, that the prognosis or outcome is poor on the basis of other scientific and technical reasons. Full intensive care treatment should be offered if the baby stabilises with initial resuscitation.
- Document all decisions / consultations with reasons for same, especially if intensive resuscitation is not offered.
- Those babies for whom resuscitation is not offered should still be provided comfort care (wrapping / holding by mother if she wishes to) and treated with dignity.
  It is essential to explain all details to parents and *document the conversation*.
- If the baby showed signs of life (any heart rate and / or breathing) initially and then died immediately afterwards, the baby should be recorded as a live birth and a neonatal death, with birth and death certificates being issued.
- It is recommended to perform a pathological post-mortem for all neonatal deaths.

Summary of recommendations

- **Babies 22+0 to 25+6 weeks gestation and <500g : comfort care**
- **Babies 22+0 to 25+6 weeks gestation and 500-599g: airway and ventilatory support without cardiac massage and adrenaline at birth**
- **Babies ≥26 weeks gestation and /or ≥ 600g: full resuscitation**

Optimising the care of extremely preterm infants

- A mother whose gestation is unsure but appears to be close to the limits of viability or the known gestation is close to the limits of viability, and she is in labour, it is suggested that

she be admitted to the antenatal ward (rather than gynaecology ward) and be taken to the labour room for the birth in order to provide the baby with the optimal set-up of personnel and equipment to achieve early stabilisation / comfort care as appropriate.

Antenatal steroids should be administered to the mother as per National Guidelines with minimal delay when an eligible pregnant mother presents in labour or is likely to need delivery within the next week. This will give the longest possible time for the baby to reap the benefits of the steroids prior to delivery, of a reduced risk of death, respiratory distress syndrome and intraventricular haemorrhage.

Magnesium sulphate should be given to mothers in the eligible gestations, when delivery is imminent, as per National Guidelines, in order to reduce the incidence of cerebral palsy in a category of preterm babies.

Transfer of preterm neonates

Extremely preterm infants have a high rate of mortality and morbidity both of which increase with the baby being smaller and of a lesser gestation. Transport of these infants even in the most ideal conditions with the availability of transport incubators, transport ventilators and trained personnel from a tertiary unit (who even attend the delivery of the baby) it is proven that these babies fair much worse outcomes than inborn babies of the same hospital. Even a moderate drop in body temperature during transport is a significant independent risk factor for poor outcomes in preterm infants.

Therefore if time permits, the best method of transferring a neonate is to do so before delivery, while the baby is still *in-utero,* if facilities in equipment or personnel are not available in the particular hospital that the mother has currently presented to. This should be done by the obstetric team following consultation with the neonatal / paediatric team of the hospital where the mother is currently in and most importantly in consultation with the receiving hospital obstetric and neonatal teams.

In the event that the mother's presentation does not allow adequate time for an in-utero transfer, and once the baby is born it is evident that available facilities (technological and personnel) in that particular hospital are not adequate to care for the baby, the prevailing situation should be discussed with the parents. It should be explained very clearly that transport is one of the most risky and destabilising activities for a preterm baby, with the risk of associated poor outcomes increasing exponentially, the smaller and more preterm a baby is.

Therefore parents need to understand that transporting the baby per se can result in death or poor long term outcomes and that being transferred to a unit that has the technological equipment and personnel trained in caring for such a baby does not herald the resolution and cure of all problems; it might actually result in the beginning of events that ultimately lead to death or severe neuro-disability.

It is vital that the decision to transport is therefore made in collaboration with the parents and a signature obtained to a written statement regarding same. The decision to offer transfer to an extremely preterm / low birth weight baby should be made on an individual

basis taking into consideration the baby's weight and estimated gestation, any congenital anomalies, along with current haemodynamic / respiratory stability. The transfer option should be offered to the parents by the attending clinician if he / she is of the opinion that the baby has a reasonable chance of survival with minimal disability taking into consideration possible instability enroute as well. The already high risk of mortality and morbidity with the additional risk of transport should be explained to parents.

Until the baby is ultimately transferred advice regarding management can be obtained from the receiving hospital.

Dr. J. M. W. Jayasundara Bandara
Dire cral of Health Services (Acting)
Min h, Nutrition & Indigenous Medicine,
385, "Suwasiripaya",
gama Wimalawansa Thero Mw,
Colombo 10.

.....

Dr J.M.W.Jayasundara Bandara,
Director General Health Services

Cc:
The President, SLCP
The President, SLCOG
The President, PSSL

Annexures 3

General Circular No : 01-19/2011

1st July 2011,
Ministry of Health,
"Suwasiripaya",
385, Rev. Baddegama Wimalawansa Thero Mawatha,
Colombo 10.

To:

All Provincial Directors of Health Services,
Deputy Provincial Directors of Health Services,
Directors of Teaching Hospitals,
MO i/c MoH Institutions,
MO i/c MoH Institutions of Line ministry,
President, College of Paediatricians,
President, Perinatal Society of Sri Lanka,
President, College of Obstrtricians,
Head of the Department, Pharmacology Department, University of Colombo.

GULDELINES FOR SURFACTANT USE

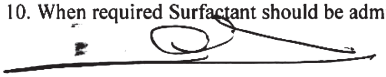
This replace the previous circular No P – 14 / 30 / 2008.
Surfactant is a life saving drug in a condition called Surfactant Deficiency Distress Syndrome (SDDS) occurring in newborn babies. The ministry has realized the importance of the surfactant availability at government hospitals and has taken steps to make available this drug in the hospitals through Medical Supplies Division.

Since the unit cost of the Surfactant is very high and the Ministry of Health has a limited budget for medical supplies, only a limited number of Surfactant will be made available at the initial stage. Therefore guidelines were formulated to ensure its optimum usage and avoid misuse.

Guidelines

1. Surfactant should be used in the **Neonatal Intensive Care Units** for the treatment of radiologically proven Hyaline Membrane Disease(HMD).
2. Surfactant should be requested and received only by the hospitals with ventilator support minimum CPAP facilities in the neonatal units.
3. It should be used for neonates,
    a) With a birth weight above 900grams
    b) With a maturity above 27 weeks gestation
    c) In the absence of major congenital abnormalities
    d) In the absence of asphyxia
    e) Any special circumstances Paediatricians / Neonatologists will decide to use

4. In meconium aspiration syndrome cases Paediatrician should take the decision.
5. Surfactant should not be used for prophylaxis.
6. It should be handled by trained personals. Consultant Paediatrician or a Medical Officer adequately trained to administer surfactant should use it.
7. It should be only single dose treatment.
8. The outcomes should be reported to the Family Health Bureau in the attached format and copy should be sent to Medical Supplies Division
9. Any adverse drug reaction reported due to the surfactant should be reported to ADR monitoring centre, Department of Pharmacology, University of Colombo (in the attached ADR form).
10. When required Surfactant should be administered as early as possible.



.....
Director General Health Services

Cc: DDG (MS)
DDG (PHS) II
Director / MCH
Director / MSD

o/c

AUDIT ON THE USE OF SURFACTANT

Name of the Patient : ..... BHT No : .....

Postal Address : ..... DOB : .....

..... Contact No : .....

Hospital : ..... UNIT : .....

District : ..... Province : .....

Institution transferred : .....

Age of the Neonate : ..... Gestation : .....

Number of doses and frequency : .....

Name of the Consultant : .....

Surfactant administered by : HO ☐ SHO ☐ REG. ☐ VP ☐

Hyaline Membrane Disease confirmed : yes ☐ o ☐ ROP Screening : Yes N ☐ ☐

CXR : Taken ☐ Not taken ☐ AGB : Done ☐ : done ☐

Source of Surfactant : Government : ☐ Private : ☐

Outcome : Live discharge ☐ Death ☐

Date of Extubation : .....

Duration of ventilation in hours : .....

Complications : Intra Ventricular Haemorrhage (IVH) ☐ Pulmonary Haemorrhage ☐

Necrotizing Enterocolitis (NEC) ☐ Pneumothorax ☐

Other comments : .....

.....

Signature of the Consultant : ..... Head of Institution: .....

Date : .....

Annexures 4

General Circular letter no: 02 - 117 / 2013

24/07/2013

Ministry of Health,
''Suwasiripaya'', 385,
Rev BaddegamaWimalawansaThero Mawatha,
Colombo 10.

All Deputy Director Generals,
Provincial Directors of Health Services,
Regional Directors of Health Services,
All Heads of Institutions,
All Medical Officers of Health.

Lactation Management Centres (LMC)

Breastfeeding is the most effective evidence based intervention that has the highest impact in reducing neonatal morbidity and mortality. In addition, the importance of exclusive breastfeeding for six months, in promoting the nutritional status and physical and mental development of infants and protecting them from infections has clearly been demonstrated. It is scientifically proven that skilled assistance mothers get in establishing lactation during early postpartum period is crucial for successful establishment and continuation of breastfeeding. Early establishment of breastfeeding in neonates ensures proper weight gain and contributes to reduction of child malnutrition. Mothers need practical support in initiation and establishing breastfeeding. Especially when a mother encounters breastfeeding problems, she has to be supported early and appropriately. Breastfeeding according to the national recommendations (Nutrition Policy, 2010) has short and long term, health as well as economic benefits to the individual, family and the society.

Lactation Management Centres (LMC) where feeding problems of infants are attended to, play a vital role in achieving these objectives.

According to the manual on '*Building and Other Guidelines for Neonatal Intensive Care Units, Special Care Baby Units and Mother Baby Centres'* published by the Ministry of Health in 2007, Mother Baby Centres (Mother Baby Units + Lactation Management Centres) have to be set up in all the specialist institutions providing maternal and neonatal care services (Teaching Hospitals, Provincial General Hospitals, District General Hospitals, Base Hospitals and the Lady Ridgeway Hospital and the Sirimavo Bandaranayake Children's Hospital). This circular guideline is issued further to the above mentioned manual.

The Ministry of Health instructs Heads of All the Specialist Institutions (Teaching Hospitals, Provincial General Hospitals, District General Hospitals, Base Hospitals and Lady Ridgeway Hospital and the Sirimavo Bandaranayake Children's Hospital) to set up Lactation Management Centres at their respective institutions, before the 31st December 2013 if they are not already established. It should be noted that Heads of Institutions should make every effort to establish Mother Baby Centres (MBC) alongside the LMCs in their respective institutions in due course. It is calculated that admitting mothers and babies to the MBC when possible is extremely cost effective than admitting such babies to the Special Care Baby Unit.

The Heads of Institutions should take steps to establish the LMCs according to the guideline given in the annexed document (Annex I). Progress of the activities conducted at the LMC has to be reviewed at the monthly Perinatal Surveillance meeting as an agenda item. LMC Monthly Return has to be sent before the 15th of the following month to the Family Health Bureau in the annexed format (Annex II). Resource mobilization for establishment of LMCs if required has to be done in keeping with the Sri Lanka code for promotion, protection and support of breastfeeding and marketing of designated products (2002).

.....

Dr P G Maheepala,
Director General Health Services

Cc:
Director/MCH
Director/HEB
Director/NIHS
Director Nutrition
Director Nutrition Coordination Division
Chief Medical Officer of Health – CMC

Annex I

Standard Guidelines to set up a Lactation Management Centre

Functions;

1. To anticipate, identify and attend to mothers and babies who develop or are likely to develop lactation problems eg: primies, multiple pregnancies, diabetes, preterm deliveries, babies born by LSCS etc.
2. To attend to feeding problems of babies referred from maternity units and other referrals including those of public health staff, GPs, self-referrals
3. To provide day facilities for mothers and babies who are referred from within and outside the hospital with feeding problems
4. To organise and coordinate breastfeeding promotion activities along with the Health Education Unit of the hospital within the institution and the support the catchment area MOOHs in such activities
5. To ensure in coordination with Health Education Unit of the institution that mothers who receive antenatal care from the hospital are knowledgeable and confident about newborn care with special emphasis on breastfeeding.
6. To assist the in-service training programmes on Breastfeeding Counselling, Baby Friendly Hospital Initiative and Infant and Young Child Feeding
7. If the LMC is functioning alongside a MBC, it can provide indoor facilities as well.
8. To maintain statistics in the unit

Criteria for Registration at the LMC;

- Mothers along with babies with feeding problems
- Mothers who need their skills developed on breastfeeding

Exclusion criteria;

- Acutely ill neonates should not be admitted to the LMC

Responsibility;

The unit need to function as a part of the Neonatal Intensive Care Unit (NICU)/Special Care Baby Unit (SCBU)/Mother Baby Centre (MBC). Technical responsibility for the unit is with the Consultant Neonatologist or Consultant Paediatrician as the case may be.

Location;

LMC should ideally be located in close proximity to the MBCand the NICU/SCBU. It should be in close proximity to the postnatal ward preferably in the ground floor. Clients coming from outside should also have easy access to the LMC. Efforts should be made to create a homely environment in the LMC. It should be away from common toilets and garbage collections.

The LMCs as Lady Ridgeway Hospital and Sirimavo Bandaranayake Children's Hospitals should be located as close as possible to the Out Patient Department.

Space;

Space should be $20m^2$ and should accommodate 3 cots, 1 bed, 5 low wooden arm chairs, the duty station and the utility area; There should be wall lockers for mothers to keep their utensils; There should be a foldable nappy changing area; Should have an attached toilet to the LMC for the mothers.

Water supply;

Maintaining 24hr water supply is mandatory.

Hand washing facilities

There should be a sink with an elbow operated tap with isolated valve; Soap racks to keep pieces of soap for hand washing and towel dispensers should be available; Pictorial hand washing instructions should be provided above all sinks.

Ventilation

There should be ceiling fans and cross ventilation. Ceiling fans should be cleaned regularly; There should be one or more rows of windows with an aluminium frame at above 5 feet level (easy cleaning and sustainability should be considered). It should be fixed in a way to promote cross ventilation; in places with low ambient temperature provision of warmers should be considered for LMC.

Ceiling;

Ceiling should be washable /wet moppable; Asbestos free cement sheet should be used.

Wall;

The wall should be tiled up to 5 feet upwards from the floor level. An anti-bacterial grout should be used to fill the groves between edges to prevent dust collection.

Floor;

The floor has to be tiled. Large tiles (2 ft by 2 ft) with a matt surface are preferred as there will be fewer borders. Correct fixation and proper apposition of edges is important to minimize grooves. An anti-bacterial grout should be used to fill the grooves between tiles.

Lighting;

Natural sunlight through windows is preferred; Light fixed to the ceiling directly or indirectly are better than lights fixed to a stand on the floor.

Staff;

Technical Responsibility – Consultant Neonatologist /Consultant Paediatrician; Medical Officers in the NICU/SCBU should oversee problems referred under the guidance of the Consultant Neonatologist /Consultant Paediatrician; Nursing Officers and Mid Wives should be assigned to the LMC and should be under the supervision of the Nursing Officer in-charge of the LMC;

Minimum number of staff for the LMC of a hospital with 300 deliveries should be 2 officers (2 nurses **or** 1 nurse and 1 midwife). For the LMC at Lady Ridgeway Hospital and Sirimavo Bandaranayake Children's Hospitals 3 nurses should be assigned.

All the Medical Officers, Nursing Officers and Mid Wives working in the LMC should have undergone training in the 40hr Breastfeeding Counselling Course.

Duty hours;

When only the LMC is functioning the duty hours are from 7am – 4pm.

Type of staff	Morning (7am – 4pm)
Officers (2 Nursing Officers or 1 Nursing Officer and 1 Mid wife)	02
Minor Staff	01

When the LMC is functioning alongside the MBC it can function in a 24 hr basis.

Equipment and Utensils;

- Steriliser for sterilising the feeding cups and utensils
- A television set /DVD or VCD for health education
- Computer
- Digital Infant weighing scale (0-10Kg)
- Neonatal stethoscope x 1
- Digital thermometer – low reading
- Small stainless steel feeding cups with lids x 20
- Rectangular trays with slots to keep feeding cups x 4
- Kidney trays x 2
- Wall clock x 1
- Water filter x 1
- Torch
- Tape
- Portable sucker
- Waste bins (colour code system should be practiced)
- Pedal bin for soiled nappies
- Adult low bed
- 3 Stainless steel baby cots with lower half to keep baby items
- Wooden feeding chairs to breastfeed – with low arm rest x 5
- Shoe rack
- Linen cupboard
- A book rack
- Pantry cupboard
- Chairs and table for the duty station
- Computer table and chair
- Doll
- Artificial breast
- Teaching Material
- Ambo Bag with neonatal mask

Final Diagnosis												
		Mother										
	1.	In correct positioning and attachment										
	2.	Flat or inverted nipples										
	3.	Engorged breast										
	4.	Large or small breast										
	5.	Cracked nipples										
	6.	Lack of demand feeding										
	7.	Postpartum mental conditions										
	8.	Teenage mothers										
	9.	Social issues										
	10.	Others										
		Neonate										
	1.	Cleft palate +/- cleft lip +/-										
	2.	Birth asphyxia										
	3.	Other neonatal conditions (congenital syndromes, tongue tie, etc)										
	Total											

Total number registered: .....

No. of multiple births registered: .....

No of LBW babies registered (1.5– 2.5 kg): .....

No. of VLBW babies registered (1 ≤1.5kg): .....

No. of ELBW babies registered; < 1kg: .....

Number of babies on formula feeding on arrival:-.....

Number of babies referred from the LMC for Consultant Neonatologist/ Consultant Paediatrician's opinion:-.....

No babies in whom lactation was successfully established: .....

Prepared by: Name and designation:-..... Signature:-.....

....

Consultant Paediatrician/Neonatologist Head of the Institution

2

Annex II

Monthly Lactation Management Centre Return

Name of the hospital: .....

Open time – From: .....To: .....

Number of staff permanently assigned to LMC:

Nursing Officers : ..... Midwives: .....

Year :..... Month :.....

			Source of Patient									
			Referrals from the wards, clinic and OPD		Referrals from field staff(MOH, PHM and other)		Referrals from Private Sector		Self-referrals		Referred from other wards	
			1st Visit	Sub Visit	1st Visit	Sub Visit	1st Visit	Sub Visit	1st Visit	Sub Visit	1st Visit	Sub Visit
Reasons for referrals	1.	Difficult attachment										
	2.	Feeling of not enough milk flow										
	3.	Infrequent suckling										
	4.	Poor weight gain										
	5.	Incorrect burping technique										
	6.	Vomiting										
	7.	Fever										
	8.	Reduce urine output										
	9.	Excessive weight loss										
	10.	Refusal of feeds										
	11.	Jaundice										
	12.	Excessive crying										
	13.	Breast conditions (engorgement, breast abscess, mastitis, crack nipple,)										
	14.	Small baby										
	15.	Babies with congenital defects (Specify)										
	16.	Others										
	Total											


9 789551 503673